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Character Development

in Blender 2.5

Jonathan Williamson

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Character Development in Blender 2.5
Jonathan Williamson

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I would like to dedicate this book to the memory of my grandfather;
the man who showed me that love, patience, and a spark
of passion are enough to change the world.

Acknowledgments

My sincerest thanks go out to the editor, Kezia Endsley, the tech editor, Kernon Dillon, and my acquisitions editor, Heather Hurley. It goes without saying that this book would not be in your hands without their hard work and guidance.

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About the Author

Jonathan Williamson is the education manager and instructor for CG Cookie Inc. He is an active member of the Blender Community, has authored more than 150 video tutorials and five training DVDs. He is a Blender Foundation Certified Instructor. He is also a freelance 3D modeler and artist.

Contents

Introduction

I got started in Blender approximately eight and a half years ago. At the time, there were very few tutorials or other training resources available. Essentially, the only resource around was the people of the Blender Community, who was active through the online forum, http://blenderartists.org. With nothing but the generous time of other community members, *Blender heads,* to guide me I dove in headfirst and spent roughly eight hours a day in Blender. After a year or two I had become familiar enough with the toolset to begin producing tutorials to help fill the void that previously existed for training material. This book is a continuation of that effort, to help provide high-quality training materials to the Blender Community as a whole.

Through my years of learning and teaching, I have found many people to quickly get discouraged by Blender and 3D modeling as a whole. I myself got discouraged many times; I even quit 3D entirely for six months to a year. But I have also found that it can be one of the most rewarding forms of art out there. For myself, as a self-professed geeky artist, it requires just enough technical prowess and skills, while still proving endless opportunities for artistic exploration, to satisfy my love for all things technology and art.

This reason, among many others, is why I have written this book.

The Purpose of This Book

This book is set out to provide an introduction to both Blender and character modeling. It is not intended to cover every corner of Blender and character modeling, but it is intended to give you a running head start while getting started in the world of 3D.

My hope is that you will walk away from this book with an understanding of how Blender works, some of the tools it offers, and how to utilize those tools to create the characters you could only previously imagine.

How This Book Is Organized

Being no stranger to the classroom or beginning Blender artists, I know how easy it can be to get lost and confused when an instructor jumps right in and starts doing things at mach-5 speed. When someone does this, there are two things that tend to happen. First, you lose track of all the steps needed to finish the task, and secondly, you seldom understand why they are doing what they are doing. 3D is such a technical-heavy field, that the "why" of a task is oftentimes more important than the "how." For this reason I have attempted to break this book into five sections.

The first section introduces you to the raw basics of Blender, giving you an understanding of how Blender's interface works and how you can manipulate objects in 3D space. I go on to demonstrate a few methods by which you can customize your Blender experience.

Moving on to the second section, I begin to introduce you to some of the modeling features of Blender and show you how to manipulate meshes with Blender's various modeling tools, modifiers, and sculpting functionality.

Following up part two, in part three I move in to the real focus of the book—modeling the character. Starting out I keep things simple and give you step-by-step instructions through the process. As you go along, I continue to provide the reasoning behind each decision, but I begin to focus more on the workflow and various techniques rather than the step-by-step instruction.

After the character is complete, I give you a brief introduction, in part four, to the lighting, materials, and rendering systems available in Blender. I do not touch heavily on these, but give you just enough to get started.

Lastly, in part five, I take you through the process needed to prepare the character for complete texturing and show you how to bake and apply normal maps to a low-resolution version of the character that is created in part three.

This book is not intended to cover everything, and has a strong emphasis on modeling, but it should give you a thorough introduction to both Blender and character modeling.

The Target Audience

This book is not intended for everyone. You will not learn anything about animation or special effects through this book. What you will get is a thorough introduction to most of Blender's modeling tools and many different techniques and processes. This includes box modeling, poly-by-poly modeling, sculpting, retopologizing, and normal mapping, among others.

Once everything is said and done, you should be well on your way to becoming an accomplished character modeler and Blender artist.

System Requirements

At the time of writing, this book references the Blender version 2.57. This version is included on the DVD or can be downloaded from http://blender.org. Blender will run on most systems, but the specific requirements, as listed on http://blender.org, are also listed here.

Operating systems:

- Windows XP, Vista, or 7
- Mac OS X 10.4 or later
- Linux
- FreeBSD 6.2 i386

Minimal specs for hardware:

- 1 GHz Single Core CPU
- 512MB RAM
- 1024×768 px display with 16-bit color

- Three-button mouse
- Open GL graphics card with 64MB RAM

Good specs for hardware:

- 2 GHz Dual Core CPU
- 2GB RAM
- 1920×1200 px display with 24-bit color
- Three-button mouse
- Open GL graphics card with 256 or 512MB RAM

Production specs for hardware:

- 64 bits, Multi Core CPU
- 8GB RAM
- Two times 1920×1200 px display with 24-bit color
- Three-button mouse and/or graphics tablet
- Open GL graphics card with 768MB RAM, ATI FireGL, or NVIDIA Quadro

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Part I

Making Your Way Around Blender 2.5

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Chapter 1

The Interface and Navigation

Introduction to the Blender Interface

The first time you open Blender can be very intimidating. At first glance you are faced with a myriad of elements: menus, buttons, and sliders are everywhere. When you click one item, more items appear; things can change faster than you can follow. You are presented with a huge amount of information and it is a lot to take in. Before long you find yourself at a loss, attempting to fight your way through the maze, but don't feel bad. In many ways, Blender is like stepping into an alien world with a different culture, language, and technology. There is a lot to learn and more than one place to trip and fall; but with a quick overview and explanation of the many elements, Blender will begin to make sense.

As you make your transition into the 3D world of Blender, there are a few things to remember that will make your life much easier:

- Blender is free, you never have to worry about paying for upgrades or licensing issues.
- Blender is community driven, if you find yourself faced with a problem this book does not address, do not hesitate to ask for help on the forums at http://blenderartists.org.
- There are many free resources available online for tutorials, including http://blendercookie.com, http://blenderguru.com, and http://blendernewbies.com.

Starting out, you may find Blender frustrating. A common complaint with Blender is its lack of a standard interface. Most users from other 3D applications find it to be backwards and completely unusable. However, this is a misconception. Blender's interface may not be standard—it never has been—but it is also remarkably fast and efficient. Most power users find themselves able to work much faster in Blender than many other applications, regardless of experience. The downside to this, of course, as with any advanced tool, is the learning curve that comes with it. My goal in this first chapter is to help you to overcome that learning curve and to feel at ease with Blender and its interface.

The First Five Minutes with the Interface

In order to make you comfortable as quickly as possible, this section will take a few minutes before getting down to the nitty gritty in order to introduce Blender's interface and cover the way it works.

Blender's interface, by default, consists of several primary elements: the Viewport, the Outliner, the Properties panel, the Timeline panel, and the toolbar.

The Viewport

The Viewport, shown in Figure 1.1, is your view into the 3D space. It is where you will create your objects and set up your scene. You will spend most of your time in this view.

The Outliner

The Outliner, shown in Figure 1.2, provides a rundown of your scene, organized in hierarchical order. It also allows you to hide/unhide objects quickly, make them unrenderable, unselectable, and so on.

The Properties Panel

The Properties panel, shown in Figure 1.3, gives you access to all of the settings for your scene. By default this panel displays the Render properties; these settings affect your render output, file formats, and so on. This panel, and its many sub-panels, will be in constant use throughout your projects.

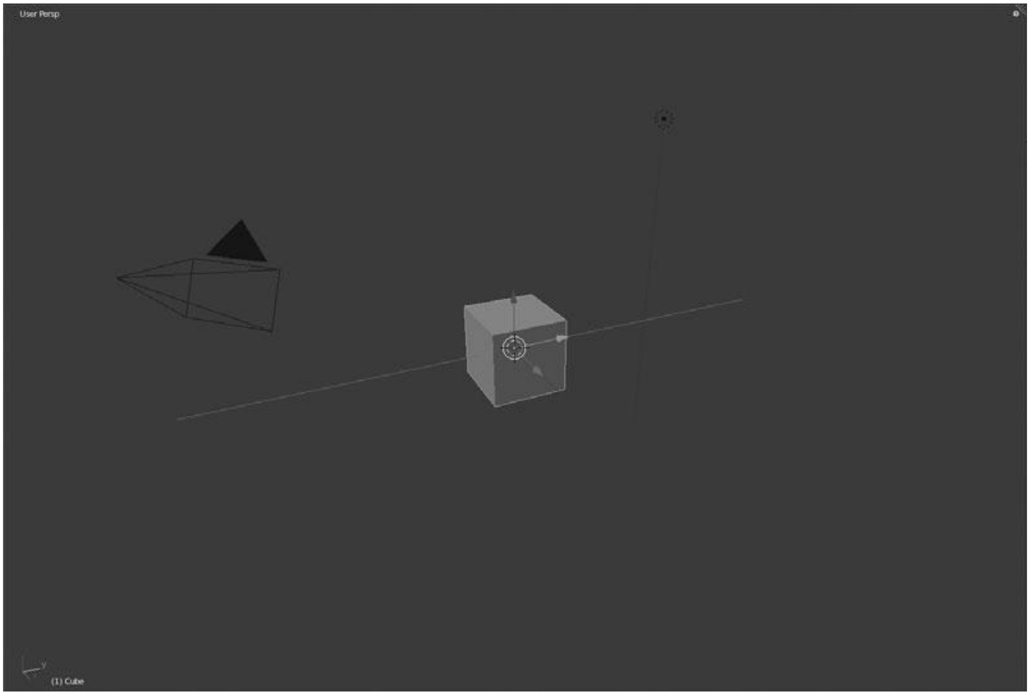

Figure 1.1
Blender's Viewport

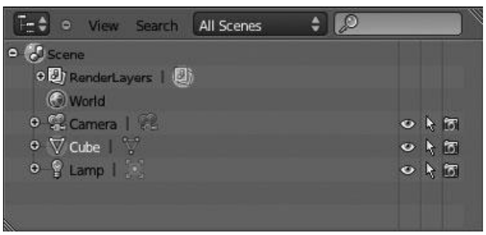

Figure 1.2
Blender's Outliner

The Timeline Panel

The Timeline panel, shown in Figure 1.4, allows you to quickly move (scrub) through time, change the animation duration, and easily record movements for animation. I will not be using this much in this book, but it helps to know what it is.

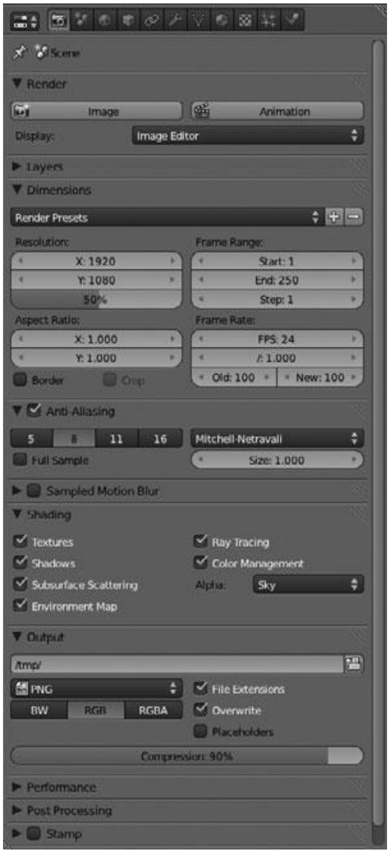

Figure 1.3
The Properties panel

Figure 1.4
Blender's Timeline panel

The Toolbar

The Blender toolbar, shown in Figure 1.5, places many of the common tools that are needed throughout this project, and others, close at hand.

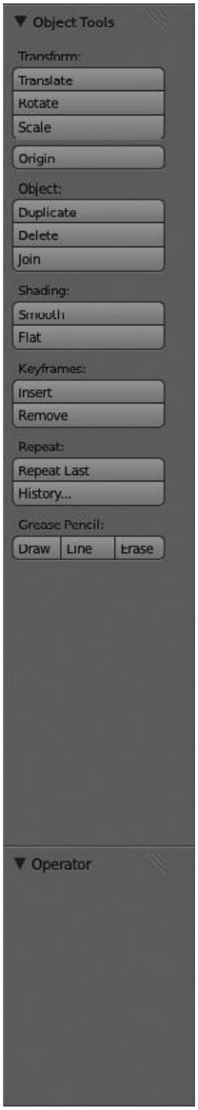

Figure 1.5
Blender's toolbar

Delving Deeper

That quick overview should provide enough information to start building an understanding of the interface. In this section, you'll take a closer look at each of the components that make up these elements in order to better understand Blender's interface and to help avoid confusion later down the road.

Note

I will be showing you only the primary aspects of each area. Elements like menus and individual settings will be addressed as the need arises.

The Viewport

Blender's Viewport is your 3D view and contains the following features:

- **Grid floor:** Think of the grid, shown in Figure 1.6, as your ground plane; everything above it is positive while everything below is negative. This helps divide your space visually. More importantly, though, the grid floor allows you to more precisely place objects, which is covered in Chapter 2.
- **Objects:** Objects are what you see occupying the Viewport. By default, there are three of them: a mesh, a lamp, and a camera, as shown in Figure 1.7. I will be talking about these more in Chapter 2.

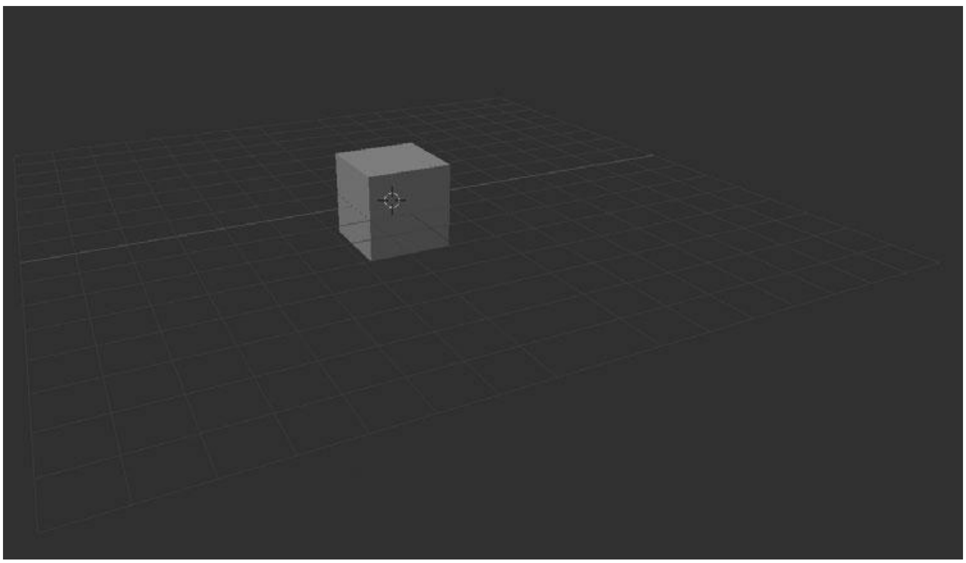

Figure 1.6
The grid floor

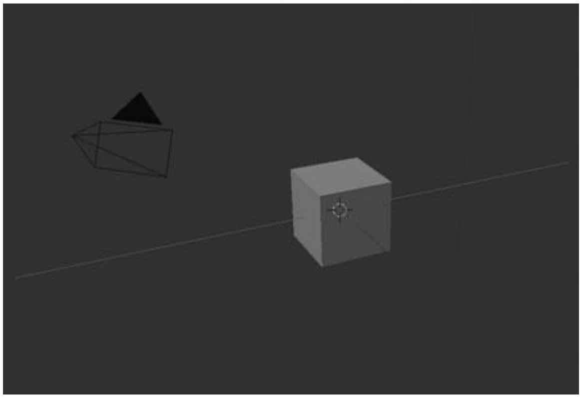

Figure 1.7
Objects in the Viewport

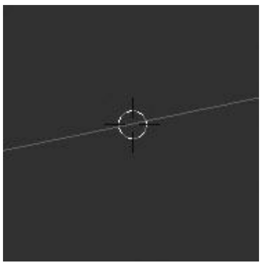

Figure 1.8
The 3D cursor

- **3D cursor:** The 3D cursor, shown in Figure 1.8, allows you to more accurately perform a large number of tasks. There will be no need for it until later down the road, but it is good to keep it in the back of your mind.

Outliner

The Outliner's primary purpose is to give you a list of all the objects in your scene and allow you to easily select them by clicking on a name with your left mouse button (LMB). But it can do more than just that; it also contains the following features:

- **Outliner view:** This view, shown in Figure 1.9, displays a list of all of the components that make up your scene (Scene, Camera, Lamp, and so on).

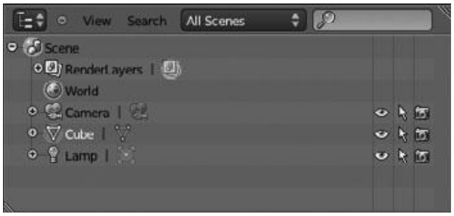

Figure 1.9
The Outliner view

Figure 1.10
Display controls

Each item is displayed based on its parents; if you toggle down an item you will see each of the elements that either make up or are connected to the parent.

- **Display controls:** To the right of each object in the list, you will see three controls displayed as icons—an eye, a mouse pointer, and a camera—as shown in Figure 1.10. These controls allow you to toggle an object as visible, selectable, and/or renderable.
- **Display menu:** The display menu, shown in Figure 1.11, allows you to set what is displayed in the Outliner view. This lets you filter down the list of displayed items. When you begin working with large scenes, the Outliner list can grow very quickly.

Properties

The Properties panel is where most settings that relate to your scene in Blender are stored. From here, you can change the render size, image output path, and much more.

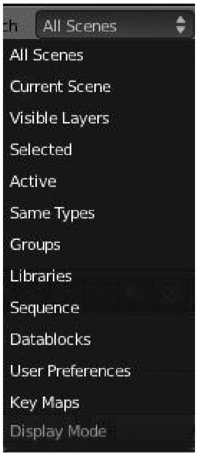

Figure 1.11
Display menu

Figure 1.12
Other properties

- **Render properties:** These settings affect everything from your final image size to the individual render options. Most of these settings will not be in use until later on in your project, in Part IV.
- **Other properties:** If you look at the header of the properties panel, shown in Figure 1.12, you will find a series of icons linking to each of the other properties, such as: Object, Modifiers, Shading, and so on. You'll read about each of these in more detail as you come to them.

Timeline

Blender's Timeline panel allows you to set the start and end frames of an animation and lets you scrub through time:

Figure 1.13
The Timeline's scrub bar

Figure 1.14
Frame controls

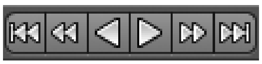

Figure 1.15
Play controls

- **Scrub bar:** This portion of the timeline, shown in Figure 1.13, allows you to scrub back and forth through time quickly by clicking and holding your LMB while dragging. This is particularly useful for previewing animations.
- **Frame controls:** These controls, shown in Figure 1.14, designate the start and end frames of your animation. This area also displays your current frame.
- **Play controls:** The play controls, shown in Figure 1.15, act just as you would expect, allowing you to start, stop, fast-forward, and rewind through your animation. These controls also allow you record all object movement with the Record button.

The Toolbar

Blender's toolbar gives you easy access to many commonly used tools. It is divided into two sections:

Figure 1.16
Object Tools panel

- **Object Tools panel:** This section, shown in Figure 1.16, displays a list of tools pertaining to working with objects. These tools change depending on the active editing mode.
- **Operator panel:** Blank at startup, this panel, shown in Figure 1.17, displays the most recent operation performed. It also allows you to tweak the properties of that operation for fine-tuning.

There are many more aspects to the interface I will be covering later, but due to the raw amount of information I will be breaking it down into pieces as the topic warrants. There is no need to try and learn it all now. Let's move on for now to navigating in the Viewport.

Figure 1.17
Operator panel

Navigating in 3D Space

Making your way around the 3D view can seem difficult at first; it's awkward and unfamiliar. When you are used to working in a 2D space such as a web browser or even an application like Photoshop, the switch to a full 3D space may seem unintuitive and hard to navigate at first. However, with a little guidance it should not be long before navigating the 3D view becomes second nature.

Moving Around the Viewport

Blender's Viewport is your workspace; it provides you with an area in which you can create your scene. The real advantage to the 3D view, versus a traditional 2D space, is the ability to move your view around in 3D, manipulating your scene from any angle. It allows you a much more versatile working environment.

Navigating Blender's Viewport includes panning the view from left to right, up and down; rotating around an axis to change the viewing angle; and zooming your view in and out to adjust the viewing distance. You may also define specific viewing angles: top, front, left, camera, and more.

- **Panning:** The Viewport is activated by holding Shift+Middle Mouse Button (MMB) and moving your mouse.
- **Rotating:** The Viewport can be rotated by clicking and holding the MMB while dragging until the desired viewing angle is reached.
- **Zooming:** The Viewport is achieved by using the scroll function of your MMB, or by using the + and/or – keys on your numeric keypad. You may also zoom by using Ctrl+Alt+LMB.

Using the numeric keypad on your keyboard, you can define a specific viewing angle:

- **Top**: Numpad 7
- **Bottom**: Ctrl+Numpad 7

- **Front**: Numpad 1
- **Back**: Ctrl+Numpad 1
- **Right**: Numpad 3
- **Left**: Ctrl+Numpad 3
- **Camera:** Numpad 0
- **Toggle perspective/orthographic mode:** Numpad 5

Note

If you are working on a laptop or other keyboard without a numeric keypad, you can use the top row 1–0 keys by activating the Emulate Numpad option in User Preferences, under the Input category.

Keeping Track of Yourself

While walking around in the real world you have a very clear sense of what is up and what is down. Gravity makes sure of this. However, in Blender, this isn't the case. It can become quite easy to lose track of which way is what, particularly when rotating the view. To counter this problem, Blender displays a series of directional lines in the Viewport to represent each of the three axes: X, Y, and Z. If you are not familiar with these, it is easiest to think of them like this:

- X is your left and right. It is represented by the red line in the Viewport.
- Y is your forward and back. It is represented by the green line in the Viewport.
- Z is your up and down. It is represented by the blue line in the Viewport. However, the Z line is not displayed by default; it can be turned on via the Viewport properties by pressing N on your keyboard or via the menu by choosing View > Properties. Then click the check box for Z Axis under the Display category, as shown in Figure 1.18.

Note

The Viewport properties window that I refer to here is actually just called Properties by Blender. However, in order to avoid confusion with the Properties window type, I refer to it as the Viewport properties in this book.

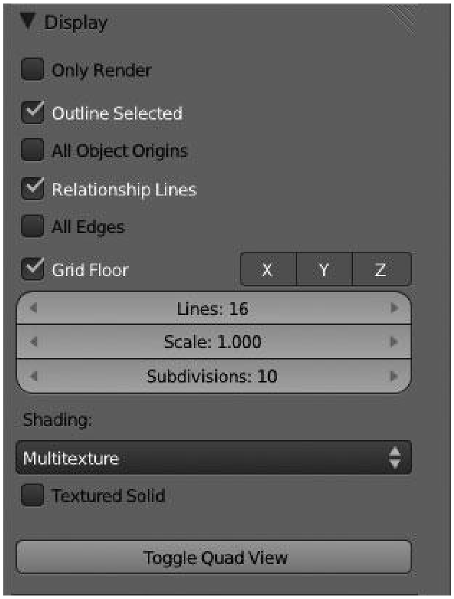

Figure 1.18
Viewport properties

Summary

That is about it for the basics of Blender's interface. In this chapter I have taken you through the interface and navigation of the 3D space. Starting out, these may be the two most important elements to master in Blender. The sooner you can master these the better off you will be. From here I am going to begin showing you objects and how to work with them.

Chapter 2

Working with Objects

Now that you have been through the ropes of the interface and seen the Viewport navigation, you should be ready to move on to the next step: using objects. Objects are the foundation of your scene and learning to work with them is essential to being successful in Blender. Using objects gives you the ability to create the base of anything from product visualizations to fantastical creatures.

Understanding Objects

An *object* in Blender is nothing more than an item designed for a single or series of specific tasks. For example, mesh objects are designed for modeling, whereas lamp objects are there to illuminate your scene. That is not to say an object cannot be used for something that it is not specifically intended. However, I will not get into this much; that is for another day. Let's start by taking a look at some of the objects in Blender. By default there are three placed in the Viewport, a camera, a lamp, and a mesh object. These are shown in Figure 2.1.

- **Camera:** The camera is your eyes, it acts as you would expect, giving you a view of your scene for rendering. The camera defines your final output angle, perspective, and so forth.
- **Lamp:** Lamps light your scene just as the sun or light bulbs do in the real world. Lamps come in several types, including spot lamps, area lamps, and more. I will cover these in more detail as needed.

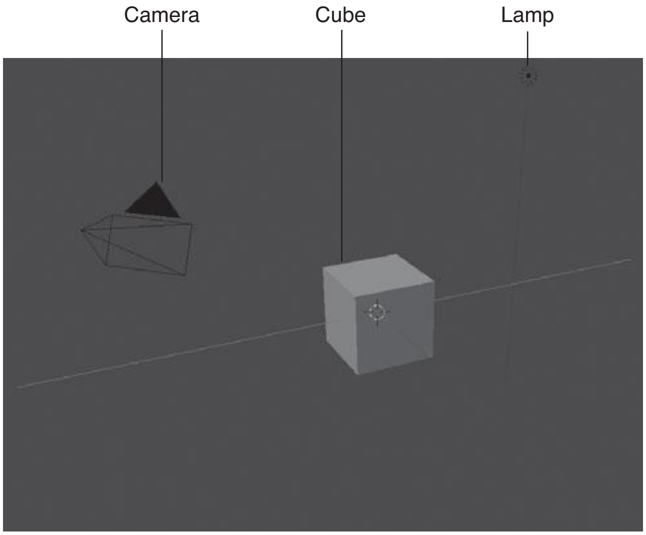

Figure 2.1
Blender's three default objects

- **Mesh:** The mesh object is arguably the most important object in Blender. It is what your model is made out of and allows you to create most anything you want. By default it is in the form of a cube.

However, these are only the default objects; there are many more in Blender that allow you to do a huge number of things in a variety of ways.

Object Types

The following list is a breakdown of the object types available in Blender, as illustrated in Figure 2.2.

- **Mesh:** Mesh objects are the building blocks of your scene. Primarily used for modeling, they come in a variety of shapes and sizes, including cube, circle, and sphere.
- **Curve:** Curves in Blender are the equivalent of vector objects in Photoshop/Illustrator; they can be used for a diverse number of tasks.
- **Surface:** Surfaces fall in the same category as curves, but they provide functionality geared more towards modeling.

Figure 2.2
Object types

- **Metaball:** Metaballs acts much like Mercury in the real world, morphing with and joining with one another, allowing you to create organic shapes quickly.
- **Text:** Text acts exactly as you would expect. The difference in Blender is you can manipulate it in 3D space, unlike most applications.
- **Armature:** Armatures are like human skeletons; they allow you to rig a model and pose it for animation.
- **Lattice:** Lattices give you the ability to deform objects without deforming the actual mesh structure. This is very handy for modifying the shape of a model.
- **Empty:** Emptys act as reference objects; they can be used for everything from particle field controllers to texture placements.
- **Camera:** The camera is your eyes; it allows you to define your output viewing angle, perspective, and so on.
- **Lamp:** Lamps light your scene, just as they do in the real world.
- **Force Field:** These force fields will add an *empty* object and enable it as a force field to affect physics simulations.
- **Group Instance:** These groups are nonexistent by default but are used when linking a group of objects from another .blend file.

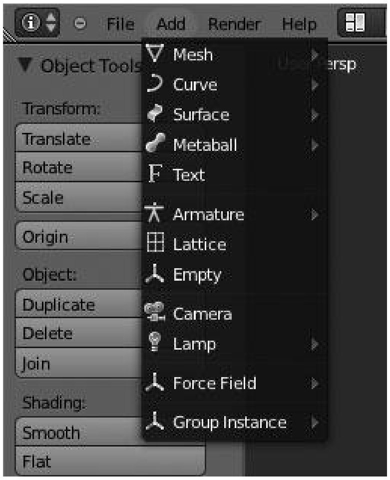

Figure 2.3
Adding an object from the Add menu

Throughout your 3D experiences, you will find yourself using most, if not all, of these objects at some time or another. They each have their individual purposes and when used right they can make your life much easier.

Adding Objects

You now know there are a lot of different object types available to you, but so far you have had access only to the objects that are placed in the scene by default. How do you make use of the other objects? It is remarkably easy. Blender gives you access to all of these objects via its menu system. You can add a new object in one of two ways. Use the menu system by clicking with your LMB on the Add menu from the Viewport header, as shown in Figure 2.3. Or, you can press Shift+A on your keyboard while hovering your mouse over the Viewport, as shown in Figure 2.4. For many object types, you will find that when you go to add the object to your scene you are given multiple choices as to which form of that object you would like to add. For most objects, these choices are called *primitives*.

Primitives

Primitives are the default shapes that objects can be created in. For example, if you want to add a new mesh object, you may add it in the form of a cube,

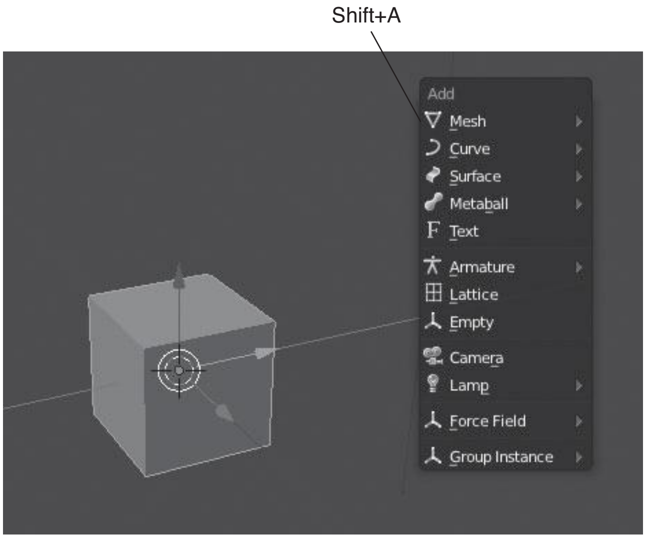

Figure 2.4
Adding objects from the Viewport

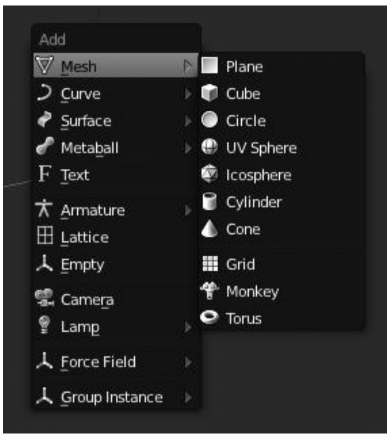

Figure 2.5
Mesh object primitives

sphere, or circle, as shown in Figure 2.5. Having this ability greatly increases the initial accuracy of your object and reduces the time it may take to produce your final model. Primitives are available for meshes, curves, surfaces, and metaballs.

At this point, you've learned about objects and their different forms. You've also seen how to add new objects to the Viewport. However, chances are you will need to move these objects at some point or another. Before you can do this, though, you need to learn how to select and deselect objects, which is covered next.

Selecting and Manipulating Objects

Selecting objects allows you to determine which objects are to be affected by the current process. This may involve transforming the object, adding colors, or even adding a dynamic system such as smoke or fluid to the object. When an object is selected it appears with a bright orange outline. If you have multiple objects selected, the last object selected has a bright orange outline while the others are outlined with a darker shade of orange. These are generally referred to as your primary and secondary selections.

There are numerous ways to go about selecting an object; the method you choose to use depends on what is most comfortable for you. Consider these selection methods:

- **Right-click:** To select an object from the Viewport, click on it with your RMB (right mouse button). To select multiple objects, or to remove an object from your selection, Shift+RMB on the object.
- **Box select:** You can activate box selection while in the Viewport using B, which allows you to click and drag with your LMB (left mouse button) to draw a box around the objects you want to select. You can add to the selection by repeating the action while holding down Shift and you can deselect any objects with this method by substituting the LMB with your RMB while dragging.
- **Lasso select:** This method is done by holding and dragging with Ctrl+LMB and drawing around the selection. This lasso allows you to make very complex selections.
- **Outliner:** The Outliner allows you to easily select objects by simply clicking on their name with your LMB. To select multiple objects or to deselect an object, use Shift+LMB.

Selecting an object gives you the ability to manipulate it as desired. Speaking of which, the next section introduces you to transformation by beginning with duplicating and deleting objects.

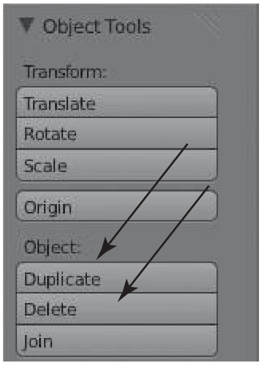

Figure 2.6
The Duplicate/Delete options on the Object Tools panel

Duplicating and Deleting Objects

Duplicating and deleting objects in Blender is as easy as you would expect. Each option is available from the menu or via a hot key on the keyboard.

- **Duplicate:** To duplicate an object, either click the Duplicate button on the Object Tools panel, as shown in Figure 2.6, or press Shift+D on your keyboard.
- **Delete:** To delete an object, either click Delete from the Object Tools panel, shown in Figure 2.6, or press X and then LMB/Enter to confirm the action.

Perhaps more important than duplicating and deleting, however, is the ability to modify the location, rotation, and size of an object.

Translating, Rotating, and Scaling Objects

Adjusting the location, rotation, and size properties of an object in Blender is quite easy. By using either the toolbar or the keyboard shortcuts in Blender, you can very quickly and efficiently modify an object as needed:

- **Translate:** To translate (move) an object, either click Translate from the Object Tools panel, shown in Figure 2.7, or press G on your keyboard.
- **Rotate:** To rotate an object, either click Rotate from the Object Tools panel, shown in Figure 2.7, or press R on your keyboard.

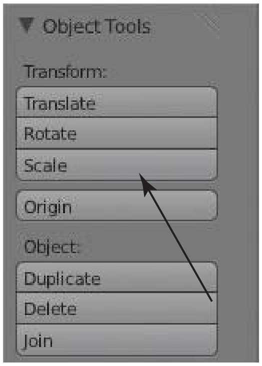

Figure 2.7
The Translate/Rotate/Scale options on the Object Tools panel

- **Scale:** To scale an object, either click Scale from the Object Tools panel, shown in Figure 2.7, or press S on your keyboard.

With each of these transformations, upon activating it, you are immediately placed into the corresponding mode (grab, rotate, or scale), at which point you may move your mouse toward and away from the object to adjust the transformation. Clicking with your LMB or pressing Enter/Return on your keyboard confirms the action and locks the object into place.

You should now have the ability to perform general edits. The next section takes you a step further and examines how to perform these edits with precision.

Precision Transformation

In many cases while working with objects, it is necessary to precisely place the object where it's needed. Precision is often needed when working on mechanical or architectural models where many different pieces must fit together correctly. These precision transformations in Blender may involve entering an exact numerical value, transforming along a specific axis, or simply transforming the object in increments, as described here:

- **Numerical:** In the Viewport properties (N) under the Transform section, there are fields for Location, Rotation, Scale, and Dimension that allow you to control each of these aspects with numerical values. This is particularly helpful when you need to place an object in a specific location, or rotate it an exact amount, as shown in Figure 2.8.

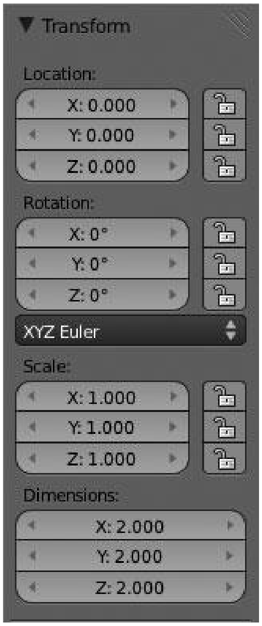

Figure 2.8
Numerical precision from the Viewport properties

- **Specific axis:** During any transformation process, you may press x, y, or z on your keyboard to lock the transformation to that specific axis. This gives you much more control while working with objects. Alternatively, if you want to transform all but one of the axes, you can. After activating the transformation, press Shift+(x, y, z), with x, y, or z being the axis you want to *exclude*.
- **Snapping:** In order to place objects more precisely, Blender enables you to snap objects to a specified parameter, such as other objects, vertices, edges, faces, or even the volume of an object. By default, snapping is activated during a transform by holding down the Ctrl key. If you want to toggle the default state to on, thus using Ctrl to disable snapping, you can press Shift+Tab. You can also change the default state and the snapping type via the button and menu in Figure 2.9. The default snapping type is Increment for snapping to the grid.

None of these precision transformation options is necessary at all times, but when needed they can be a real lifesaver.

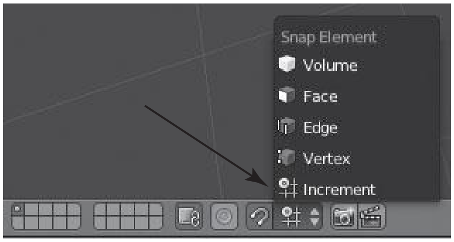

Figure 2.9
Changing the snapping mode from the Viewport

Summary

After looking over each of these selection methods—duplicating and deleting, manipulating selected objects, and the different options for precision transformations—you should be forming an understanding of how Blender works. It is important to become comfortable with the operations in this chapter, as these skills will transfer over to many areas in Blender.

Up to this point, you've learned the basics of Blender's interface, navigating the Viewport, and working with objects. Everything you've learned so far has used the default settings in Blender. However, before digging deeper, it may be helpful for you to customize some options to better fit your workflow style. With the vast amount of information at hand, customizing a few settings can make learning Blender much easier. The next chapter covers the process of customizing Blender for your use.

Chapter 3

Customizing Blender

By this point you have surely come across a hindrance or two that is causing you a headache. For example, perhaps you find it more intuitive to select objects with the LMB rather than the RMB? Or perhaps the trackball-style rotation in the Viewport is sending you for a loop? Each of these, and many more, settings can be customized to better suit your needs. When it comes time to create your character it is important to have an efficient working environment. This chapter addresses these issues and examines other ways to customize your Blender experience, such as user preferences, interface layouts, hot key configurations, and accessing extra features via add-ons.

Setting the User Preferences to Your Liking

User preferences are essential to any application; they allow you to change many basic settings to better suit your needs. In Blender, the user preferences are accessible via File > User Preferences. Nested within the resulting window are seven sub-sections: Interface, Editing, Input, Add-Ons, Themes, File, and System. Each of these preferences is covered in more detail in the following list:

- **Interface:** The Interface preferences, shown in Figure 3.1, allow you to customize how the menus, Viewport, and navigation react to the users. This allows you to adjust features like menu delay, tooltips, and so on.
- **Editing:** The Editing preferences, shown in Figure 3.2, let you customize object properties, snapping, keyframing, and some transform options.

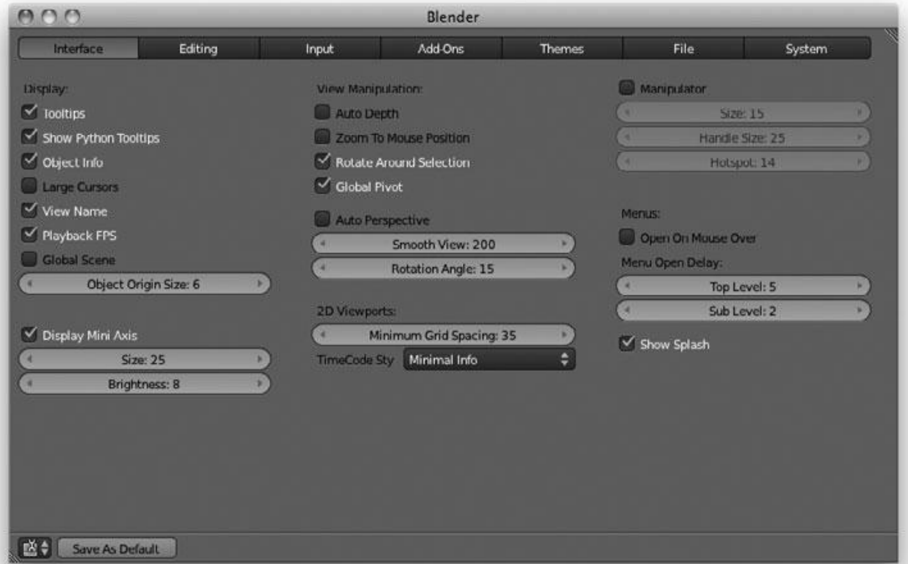

Figure 3.1
Interface preferences

Figure 3.2
Editing preferences

Figure 3.3
Input preferences

- **Input:** The Input preferences, shown in Figure 3.3, allow you to configure custom hot keys for Blender to better suit your workflow.
- **Add-Ons:** This pane, shown in Figure 3.4, gives you access to many add-ons that are available by default in Blender. These act as plug-ins of sorts to extend certain functionalities.
- **Themes:** For those of you who are unhappy with Blender's default interface colors, almost everything can be changed exactly to your liking through this panel. Be warned, though, because creating a full custom theme can be very time consuming. There are a lot of options, as shown in Figure 3.5.
- **File:** The File preferences allow you to change the default directory paths for different file types in Blender. This window, shown in Figure 3.6, also contains settings related to saving and loading .blend files.
- **System:** The System preferences, shown in Figure 3.7, pertain to settings that primarily affect Blender's speed and performance.

Figure 3.4
Add-On preferences

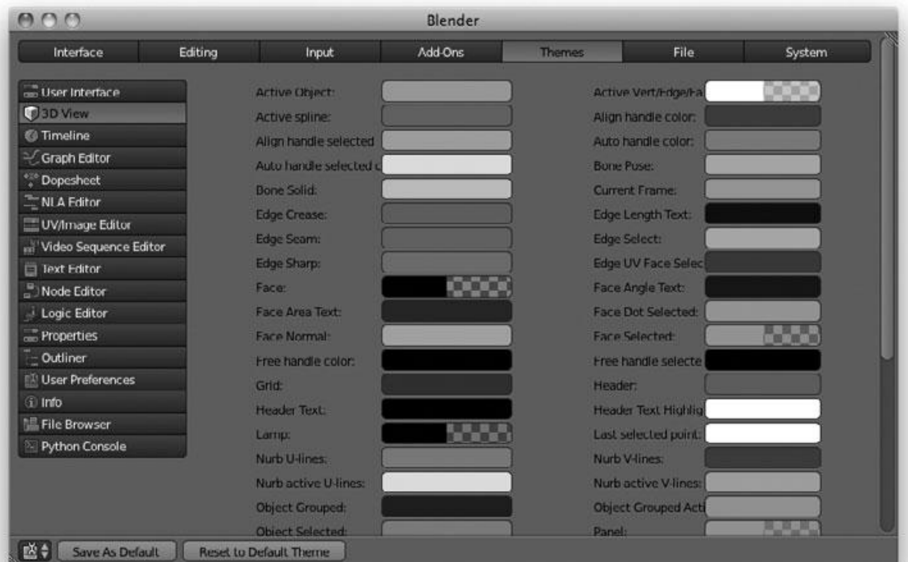

Figure 3.5
Theme preferences

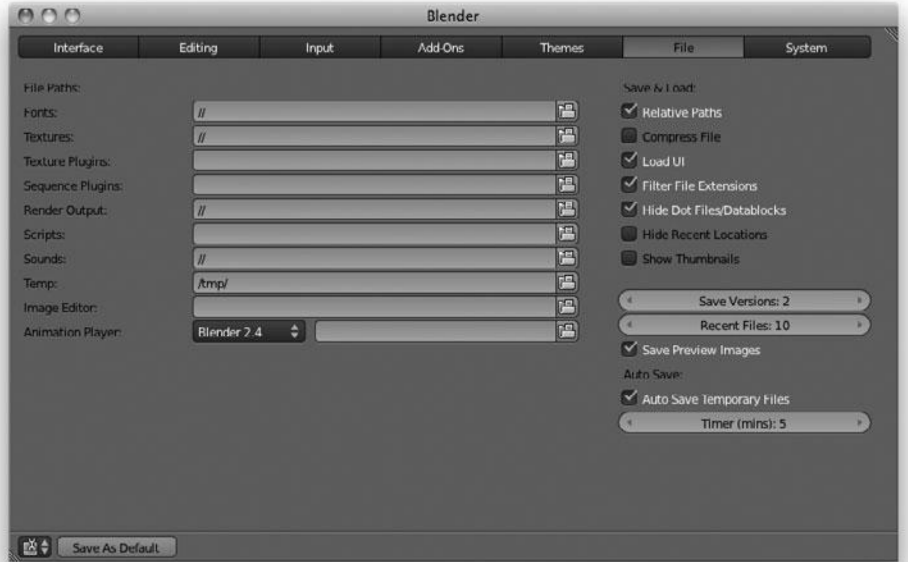

Figure 3.6
File preferences

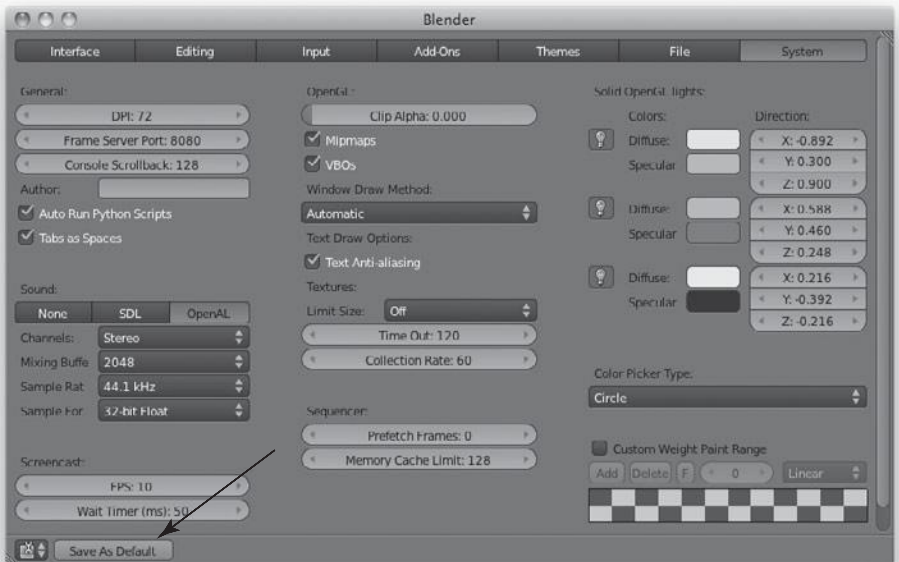

Figure 3.7
System preferences

Once you have gone through all the settings and adjusted them to your liking, simply click the Save as Default button at the bottom of the User Preferences window to make them your default settings each time you open Blender.

Creating Custom Hot Keys

The ability to configure custom hot key layouts is important to many workflows. Custom hot keys permit users to fine-tune their workflow more than any other feature. Blender has the ability to change any hot key and assign new ones to tools that do not currently have a hot key. You can change hot keys by accessing the Input settings from the User Preferences window, shown in Figure 3.8. From there, you choose a category and press the Edit button.

In order to adjust hot keys, it is important to know what tool it is you want to change. Due to the nature of what Blender does there are an enormous number of tools at your disposal, thus there are an equally enormous number of hot keys. You should also note that many of Blender's hot keys are context-sensitive, meaning that depending on which mode you are currently working in the same hot key might do different things. It can be quite daunting at first to change hot keys, which is one of the reasons I am here to help you out.

The first step, as mentioned, is to know what you want to change. This determines where in the interface you need to go. There are many categories of hot keys, including Window, 3D View, Animation, and more. If you toggle down one of these categories, you can see all the tools within it and the hot keys assigned to each tool. Pressing the Edit button allows you to adjust the hot keys.

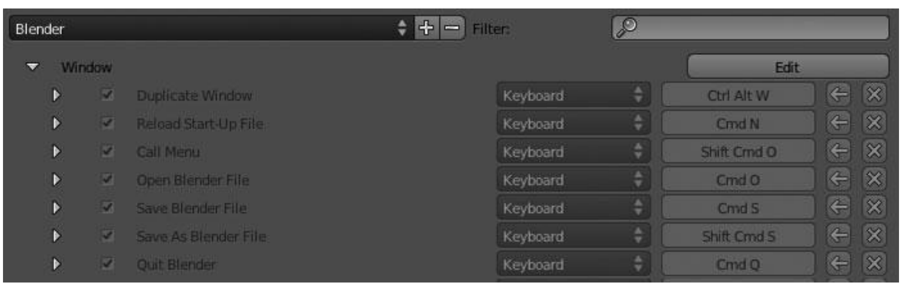

Figure 3.8
Hot key configuration panel

Note

If at any point in the editing process you mess up and want to return to the default configuration you can simply press the Restore button at the top of the list of hot keys.

At this point, you can scroll through the list of commands and adjust the hot key if you choose. In order to make this process easier and clearer, I've included an example. I will change a common hot key used in the Viewport, which is associated with the Window category.

The hot key I am going to change is the one associated with the Search menu, which by default is set to the spacebar key. As you surely have noticed, the list of commands is immense. Within the Window category alone, there are more than 30 items. Finding the correct command, particularly when you do not know the exact name, or even which category it is associated with, can be challenging. One easy way to find a specific tool is to use the search bar at the top right, shown in Figure 3.9. In this case, searching for "search" (because I want to change the Search menu) will bring the correct entry up and display its location.

You can change the hot key by first clicking the Edit button. Then click in the field on the right that reads "Spacebar" and press the new hot key configuration of your choice. In this example, I changed the hot key to Shift+spacebar, as shown in Figure 3.10.

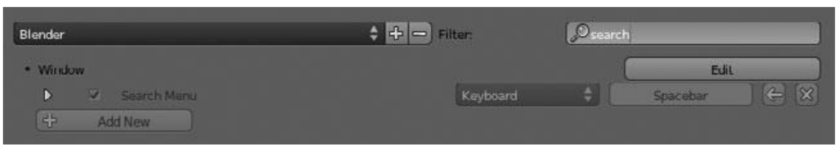

Figure 3.9
Use the search bar to find the command you want to change

Figure 3.10
Custom Search menu hot key configuration

Configuring an entire, custom, hot key map can be incredibly time-consuming, but for some it can be rewarding. In the past, you were not able to assign custom hot keys in Blender, and so most users just learned to adjust, committing the key maps to memory. The ability to change hot keys as needed is very powerful and potentially a huge workflow enhancement to you and other users.

Changing Blender's Layouts

The default interface layout in Blender will suit most user's needs; however, adjusting the layout of your workspace gives you the ability to fine-tune your working environment to enhance your workflow. This greatly increases your efficiency and level of comfort while working. By default, Blender provides a single Viewport, the Properties panel, the Timeline, and a toolbar. However, there are many things you can do to customize Blender's interface layout to better suit your needs. Whether you want to change the number of Viewports, move the Properties panel, or change other window settings, you can do so.

Splitting the Viewport

In Blender, there are two ways to split the Viewport. The first method is done using the handles at the bottom-left and upper-right corners of the Viewport. These handles are represented by a set of diagonal lines in each corner. Using the lower handle, and by clicking and dragging the handle to the upper right with your LMB, as shown in Figure 3.11, you can split the Viewport in two. You can do this as many times as you want, in any direction you want. By dragging up you will split the view horizontally, by dragging to the right you will split it vertically. However, this feature it not limited to just the Viewport; you can do this with any panel. With this feature you have the ability to set up as many Viewports, Properties panels, or other windows as you want. When you split a view, it inherits the window type of its parent. For example, if you split the Viewport into two sections, the new panel will also be set to a Viewport. If you want to change the type of window the panel displays, read the section called "Changing Window Types" later in this chapter.

The second method of splitting windows is done by clicking with your RMB on the divider between the panels. At the prompt you will have the option to Join Area or Split Area, which brings you to the next section, which details how to merge two panels.

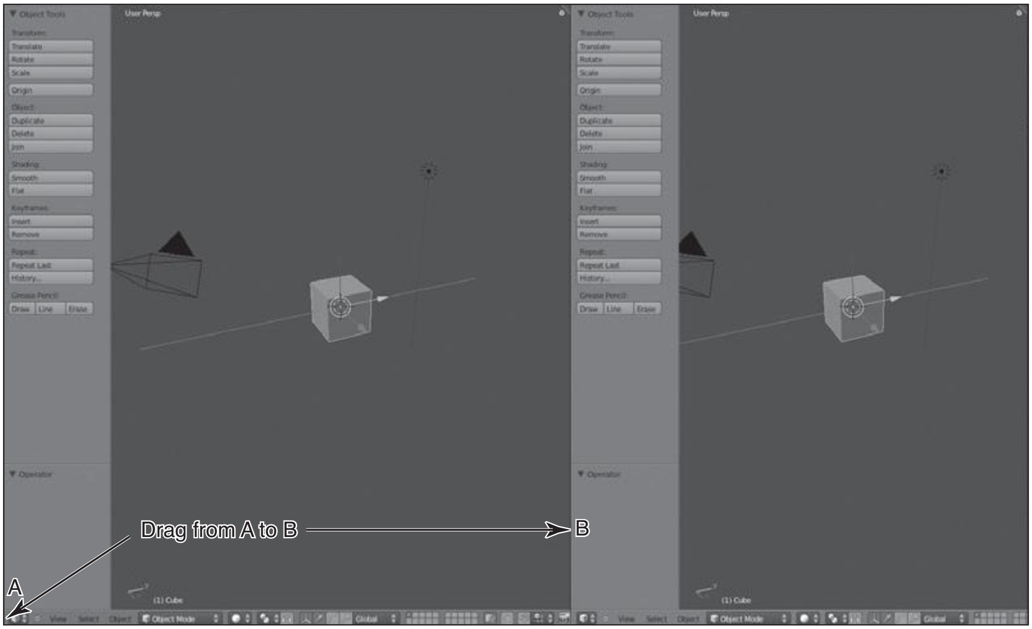

Figure 3.11
Splitting the Viewport

Merging Panels

You can get rid of panels in much the same way as when you add them. You use the splitting handle. However, this time around, rather than dragging to the upper right, you need to click and drag with the LMB to the lower left. As you move your mouse towards the adjacent panel, you will see a large red arrow-overlay previewing the merge, as shown in Figure 3.12. As I stated previously, you can also right-click on the divider between panels and choose the Join Area option.

Changing Window Types

In the bottom left of every panel, just to the right of the splitting handle, is a square icon menu that allows you to specify a window type, shown in Figure 3.13. There are many different window types in Blender, each providing access to a specific set of tools, options, viewers, and so on. Some window types you should already be familiar with: the Viewport, the Timeline, the Outliner, and the Properties panel. There are many more window types available, but I will not cover these until the need arises.

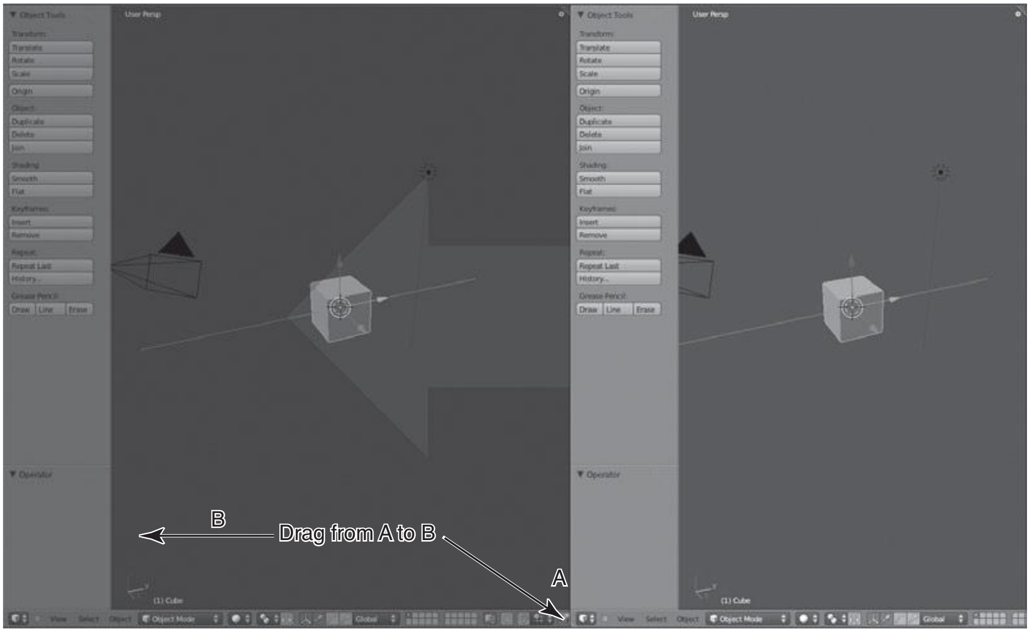

Figure 3.12
Merging panels

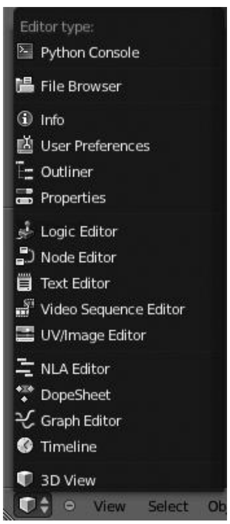

Figure 3.13
Available window types

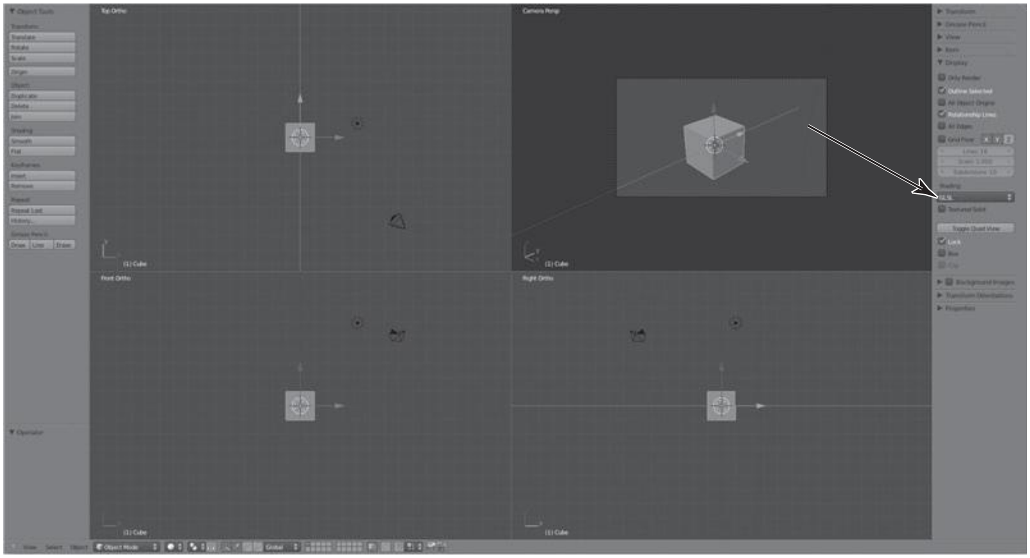

Figure 3.14
Toggle Quad View layout

Activating Quad View

If you have a background in another application, upon playing with Blender you may find yourself missing the Quad View layout that is default to most applications. In Blender 2.5 this is not an issue. You simply press N on your keyboard while hovering your mouse over the Viewport to bring up the Viewport properties, and then click Toggle Quad View from the Display category, as shown in Figure 3.14. This feature is particularly useful for new users, as it provides a view from the top, front, and right, and a camera/user perspective.

Using Multiple Windows

Not only can you split panels into sections and change the window types, you can also duplicate panels, or a whole window, into a new window. To duplicate a single area, you simply hold down Shift on your keyboard while clicking and dragging with your LMB on the splitting handle. You should now have a separate window for that panel which you can move independently of the main Blender window. Even if moved to a different monitor, the window will update in real time as changes are made in the original window, and vice versa. If you want to get rid of the window, simply press the Close button in the upper-right/left corner, depending on your computer's operating system.

Figure 3.15
The Screens drop-down menu gives you access to most of the major layout types

You may also duplicate your entire Blender window, rather than only a single panel, by pressing Ctrl+Alt+W.

Using the Screens Option

If you would rather not worry about customizing the layout and opt for a pre-baked setup, this is also available in Blender. Along the top of the Viewport menu, there is a Screens drop-down menu, shown in Figure 3.15, that gives you access to most of the major layout types you may need. This includes an Animation layout, Compositing layout, Scripting layout, and more. You can switch through these at any time via the drop-down menu or by pressing Ctrl+Left/Right Arrow. You can also add your own custom layouts by pressing the + button or remove layouts using the x button.

Summary

Using any or all of the previously mentioned options, there are endless ways to customize your Blender layout. One thing to keep in mind, though, is that any time you make a change to your layout and want to save it as default, you must press Ctrl+U or choose Save User Settings from the File Menu. However, you should be aware that saving your settings also saves any model or scene that you may have loaded at the time as your default scene. It is advisable to customize your default scene as you want and then save the settings before loading any models or files.

With that rundown of the various customization options in Blender, you should be ready for an introduction to working with meshes. I touched on these lightly when talking about objects in Chapter 2, but now it is time to actually manipulate the vertices, edges, and faces that make up those mesh objects.

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Part II

Getting Comfortable with Meshes

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Chapter 4

Using Mesh Objects

Throughout the development workflow of the book's character, you will primarily be using mesh objects. Mesh objects are essential to the modeling process and so it is vital for you to have a solid introduction of them and for you to fully grasp how to work with them.

Up until now, you've been working in what is called Object Mode. Blender has a series of editing modes for working with specific aspects of Blender, including Object Mode, Edit Mode, and Sculpt Mode. I will not be going into too much detail on these until it's necessary, but I will be covering most of them at some point or another. This chapter gives you a rundown on the Object and Edit Modes and the functionality each provides.

Object Mode

Object Mode allows you to work with objects and their properties. It is primarily used while changing object settings, adjusting camera angles, adding/modifying lights, and working with materials. You will be spending a great deal of time in Object Mode while working with this book's project. However, in order to model the book's character, you need to use Object Mode, Edit Mode, and Sculpt Mode. Part III discusses how to use Edit Mode. It's therefore essential that you understand Edit Mode and its functions.

Edit Mode

Edit Mode allows you to manipulate the underlying structure of an object. Activating Edit Mode lets you modify the individual vertices, edges, and faces that make up a mesh object. Having access to these elements allows you to adjust them as needed and even create new ones. You may toggle between Edit Mode and Object Mode with the Tab key or from the menu shown in Figure 4.1.

Vertices, Edges, and Faces

As you just discovered, mesh objects are made up of three elements: vertices, edges, and faces. Each of these items has its purpose, and together they form the structure of your mesh:

- **Vertices**, shown in Figure 4.2, are the most basic part of a mesh; they are the connecting points that hold everything together.
- **Edges**, shown in Figure 4.3, connect two vertices, forming the side of a face and determining the layout of a mesh.
- **Faces**, shown in Figure 4.4, are composed of three or more edges, respectively forming triangles and quads. Faces in general are referred to as polygons (polys); they act as the surface of a mesh. A face with five or more edges is referred to as an *NGon*.

You will work with each of these constantly throughout the modeling process.

Note

NGons are not currently available in Blender but keep an eye out for them as development on the BMesh project continues.

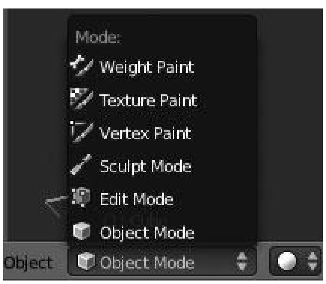

Figure 4.1
The Mode Selection menu

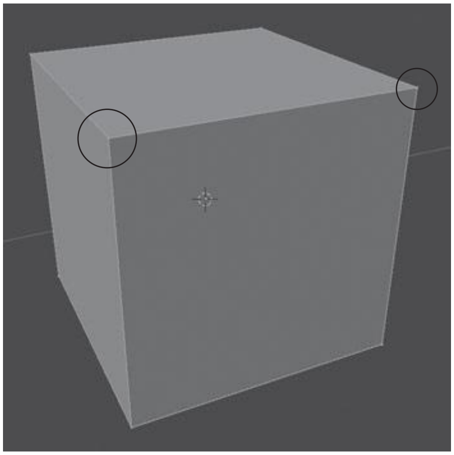

Figure 4.2
Vertices

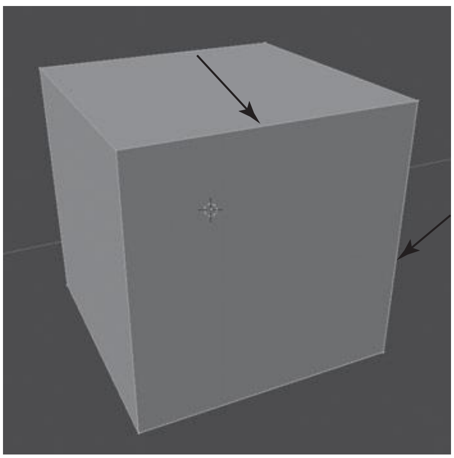

Figure 4.3
Edges

Selecting and Deselecting

Selection in Edit Mode works almost the same as it does in Object Mode. The commands and the shortcuts for selection are identical; however, in Edit Mode, you are able to select individual vertices, edges, and faces.

- **Right-click:** To select a vertex, edge, or face from the Viewport, click on it with your RMB. To select multiples, use Shift+RMB.

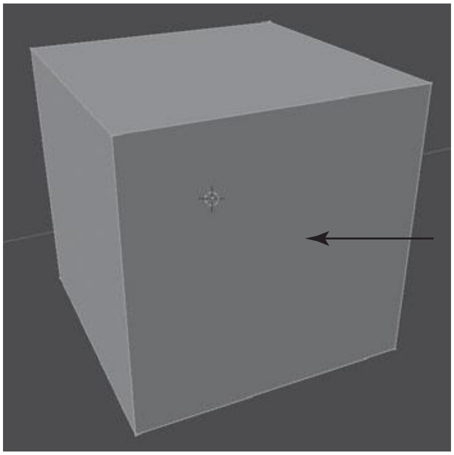

Figure 4.4
Faces

- **Box select:** You can activate box selection while in the Viewport with B, which allows you to click and drag with your LMB to draw a box around the area you want to select. You can add to the selection by repeating the action while holding down Shift. You can deselect any portion with this method by substituting the LMB with your RMB while dragging.
- **Lasso select:** You hold and drag with Ctrl+LMB and then draw around the selection. This lasso allows you to make very complex selections.

Vertex, Edge, and Face Select Mode

Blender gives you the ability to select individual vertices and if you select enough adjacent ones, you will select entire edges or faces. However, this is not an efficient working method if you are performing transformations on whole edges or faces. There is no reason you should be forced to select all of the children vertices just to work with a face. To solve this problem, Blender allows you to switch your selection method, within Edit Mode, between Vertex, Edge, and Face Select Mode by clicking with your LMB on the appropriate button, as shown in Figure 4.5. You can also press Ctrl+Tab on your keyboard to do the same thing. Here are the available modes:

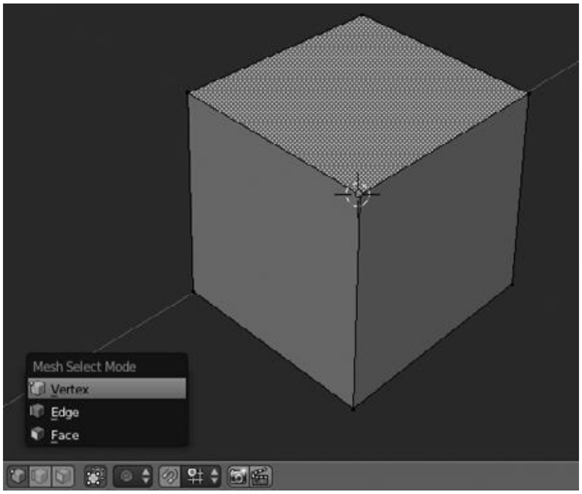

Figure 4.5
Selection modes

- **Vertex Select Mode** is the default selection mode for Blender. It permits you to select individual vertices, or a series of vertices for whole edges and/or faces.
- **Edge Select Mode** enables you to select whole edges at a time. It also lets you select adjacent edges without selecting the respective face.
- **Face Select Mode** allows you to select entire faces without needing to select the individual vertices or edges that make up the face.

Each of these modes can provide a speed increase in your workflow. However, in the case you would prefer to work with a combination of these modes, simultaneously, you can click on them with Shift+LMB to activate any combination of the three you choose.

Duplicating and Deleting

As with selecting, duplicating and deleting act similarly in Edit Mode to the way they do in Object Mode. The two are different only when it comes to deleting an item.

- **Duplicate:** To duplicate a vertex, edge, or face, click Duplicate from the Object Tools panel or press Shift+D on your keyboard.

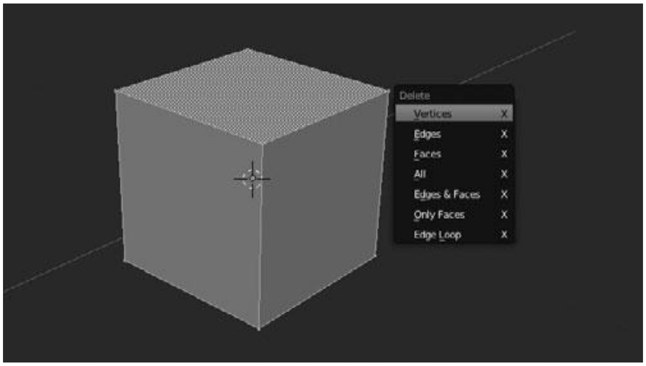

Figure 4.6
Delete menu

- **Delete:** to delete a vertex, edge or face click Delete from the Object Tools panel or press X. You are then presented with a list of options, as shown in Figure 4.6. You can choose which portion of the selection you want to delete, such as vertices, edges, or faces. Clicking with your LMB on the entry of choice confirms the deletion process.

Translating, Rotating, and Scaling

Once again, these processes act the same in Edit Mode as they do in Object Mode.

- **Translate:** To translate (move) a vertex, edge, or face, click Translate from the Object Tools panel or press G on your keyboard.
- **Rotate:** To rotate a vertex, edge, or face click Rotate from the Object Tools panel or press R on your keyboard.
- **Scale:** To scale a vertex, edge, or face, click Scale from the Object Tools panel or press S on your keyboard.

Note

You are not limited to transforming a single item at a time; you can select as many vertices, edges, and faces as you like and then transform them as a whole.

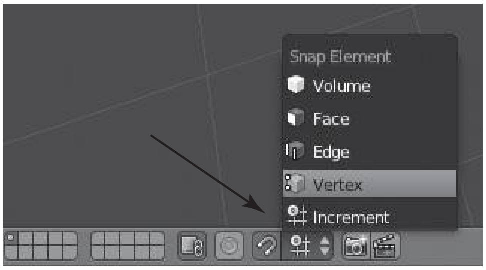

Figure 4.7
Choosing the snapping options from the menu in the Viewport

Snapping

Similar to how you snap transformations of objects to elements in Object Mode, you can also snap transformations of vertices, edges, and faces to elements in Edit Mode. Snapping in Edit Mode works in the same way, by toggling the default state and setting the snapping element via the options along the bottom of the Viewport, as shown in Figure 4.7.

These options work exactly the same as their Object Mode counterparts.

Although you can transform, duplicate, and delete meshes, this does not provide much versatility. Creating an intricate model, such as a character, out of only duplicated and transformed meshes is like trying to build a functional car out of toy blocks. This is where the Extrude tool comes in.

Using Extrude

The Extrude tool might be the most commonly used function in Blender for modeling. Extrude allows you to select any combination of vertices, edges, and faces and extend them to form a new series of vertices, edges, and faces.

You can activate Extrude via the Extrude Region button in the Mesh Tools panel under the Add category, as shown in Figure 4.8, or by pressing E on your keyboard. The behavior is slightly different depending on whether you are extruding vertices, edges, or faces:

- **Vertices:** When extruding a vertex or series of unconnected vertices, pressing E will immediately extrude the vertices, creating new edges between the vertices. You are then in free-form grab mode.

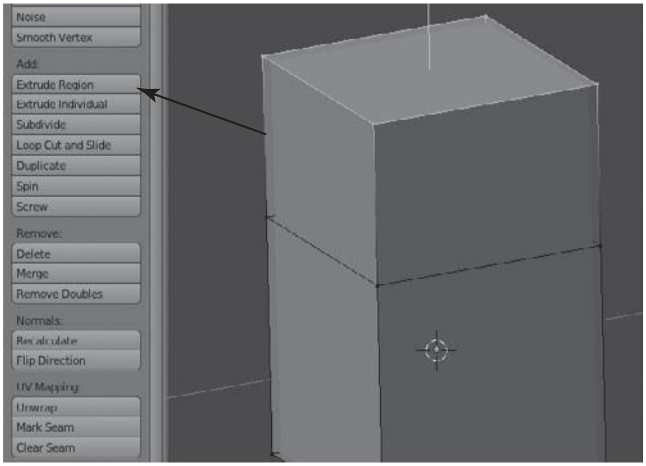

Figure 4.8
The Extrude tool

- **Edge(s):** Upon pressing E, Blender will try to guide the extruded edge along the tangent of the edge. This feature can be beneficial but can also be frustrating to many users. To get around this, simply press RMB or Esc immediately after extruding and then press G for grab mode.
- **Face(s)**: When extruding faces, Blender extrudes the newly created faces along the averaged normal, allowing you to extend the extrusion in the exact direction the face is pointing. Once again, if you do not want this functionality, use your RMB or Esc to cancel the movement and then press G for grab mode.

At all times during the extrusion process, pressing the LMB or the Return/Enter key will confirm the current position of the selection. Pressing the RMB or the Esc key will cancel the extrusion. Blender's extrusion tools are quite good and allow for very fast modeling once you become accustomed to them. As with any tool, though, it may take a bit of time to become truly comfortable with the tool. This is to be expected.

Using Subdivide

There are times during modeling when you need to quickly increase the total number of polys in your mesh. Subdivide allows you to do this by dividing each face in your mesh into multiple faces, as shown in Figure 4.9. You can subdivide

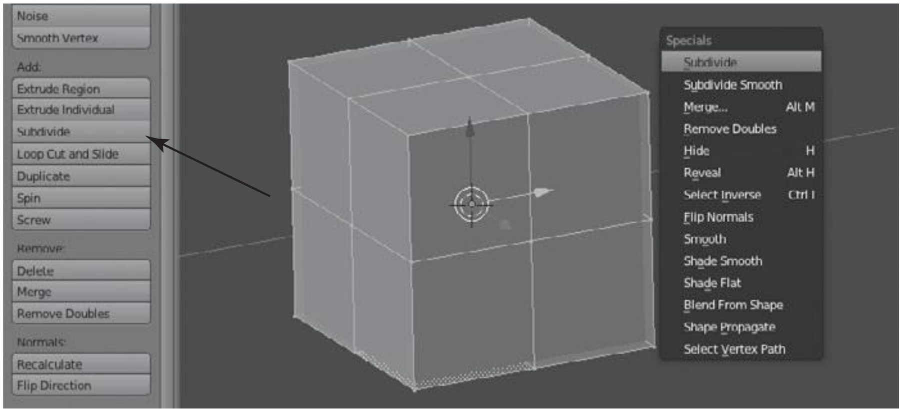

Figure 4.9
The Subdivide tool

a selection via the toolbar by clicking Subdivide, or by choosing W > Subdivide. However, you must be careful with Subdivide, as it can cause your mesh to become quite dense and quite messy very quickly.

Summary

These few tools I have just shown you are only the basics and barely touch the surface. There are many, many more modeling tools that you will discover and put through their paces. However, as with much of the functionality in Blender, these are best left alone until there is a need to dive deeper.

Using the knowledge you have learned so far, you should begin becoming comfortable with mesh objects and the modeling process. This is crucial to developing a productive workflow in Blender. You will be using all of these tools and many more during the modeling process of the character in this book. Currently, you should be growing familiar with the different kinds of objects in Blender, customizing Blender to fit your needs, and working in Object and Edit Modes for manipulating meshes. The next chapter continues looking at mesh objects and discusses how you can extend their capabilities with modifiers.

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Chapter 5

Using Modifiers

Chapter 4 introduced mesh objects and some of the modeling tools at your disposal while working with meshes. However, these tools barely touch the surface and represent only a small portion of how you can work with mesh objects. Perhaps even more powerful than the modeling tools Blender possesses, *modifiers* are an incredibly powerful and adaptable set of features you'll learn about in this chapter.

Modifiers are very powerful tools that allow you to extend the capabilities of objects beyond just what you can model. Modifiers let you manipulate objects in various ways without disrupting the underlying mesh structure. Some modifiers deform the shape of an object while other modifiers allow you to simulate real-world physics and dynamics such as cloth, smoke, and fluid. There are many different modifiers, too many in fact to cover in this book. For that reason, this chapter shows you a few of them. You can see a complete list of available modifiers in Figure 5.1.

The modifiers covered in this chapter are ones that directly benefit or ease the modeling process. These modifiers include the Mirror Modifier, the Subdivision Surface Modifier (also called the *Subsurf* Modifier), and the Solidify Modifier. The chapter will go on to cover some generic settings that apply to all modifiers and will cover the stacking order of modifiers.

Before you examine the individual modifiers, though, I need to take a moment to show you the Modifiers panel, which up to this point has remained hidden. If

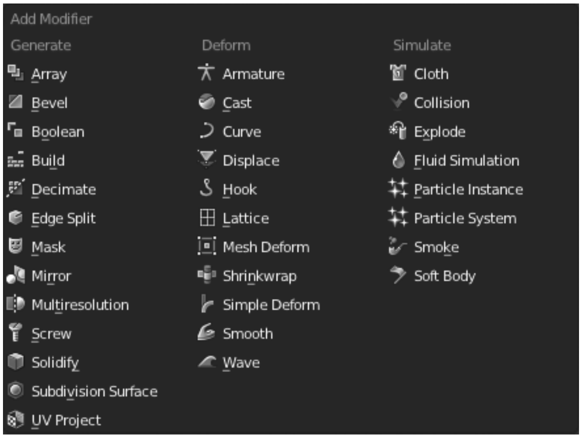

Figure 5.1
Available modifiers

you remember, I referenced the Modifiers panel back in Chapter 1 under the heading "Other Properties." Let's take a look at it now.

Learning the Modifiers Panel

If you look to the title of the Properties window, you will see a Modifiers button mixed in with all of the others, indicated by a blue wrench icon. Clicking on this with your LMB will bring the Modifiers panel to the front. By default, it is empty, except for a single drop-down menu at the top labeled Add Modifier. This menu displays a list of all available modifiers. There are a lot. To grasp modifiers and to understand their potential, you will jump right in by adding some symmetry to a mesh via the Mirror Modifier.

The Mirror Modifier

During modeling, it is quite common to create symmetrical objects, such as packing crates, cars, and even human characters. Each of these objects is normally quite symmetrical, it would be a cumbersome process and prone to error to model each side of the object individually. Instead it is much quicker and preferred to model only one half and then flip it across the central axis, creating a perfectly mirrored copy. There are ways to do this manually, but luckily for you, the Mirror Modifier can do it automatically.

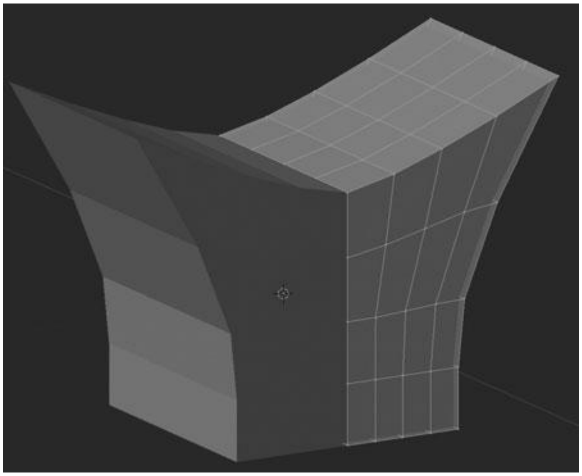

Figure 5.2
Mesh with a Mirror Modifier

You can add a Mirror Modifier to any selected mesh object by LMB clicking on the Add Modifier drop-down menu and selecting Mirror from the Generate category. Doing so will add a new panel for the modifier's settings. Without touching any settings, your object should now be mirrored across the X axis. In order to see this in action, try going into Edit Mode by pressing Tab, and then selecting and moving any part of the mesh. You should see the mesh mirrored across the central axis to the opposite side, as shown in Figure 5.2.

In some cases, the default settings are not sufficient. For example, perhaps you want to mirror your object across the Y axis versus the X axis, or maybe even mirror it across all three axes? You can adjust the mirror axis by toggling any of the X, Y, or Z buttons with your LMB in the Mirror Modifiers panel, as shown in Figure 5.3.

Note

> Be sure to select the object you want to add a modifier to before selecting one from the list. Modifiers are always applied to the active selection. They are also generally added in Object Mode.

The Subdivision Surface Modifier

When working with organic objects (such as a character, clothing, vegetation, and so on), and sometimes even mechanical objects (such as cars, furniture, and

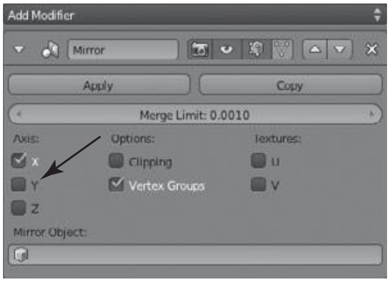

Figure 5.3
X, Y, and Z axes toggles

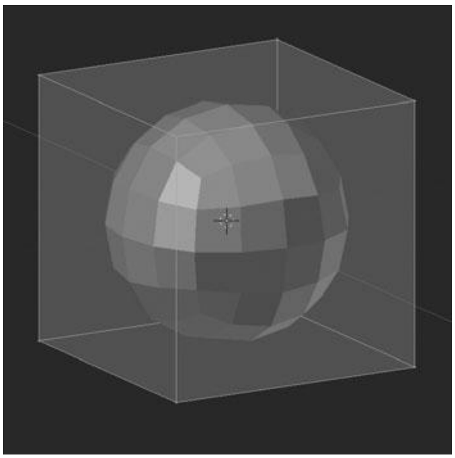

Figure 5.4
Default cube with Subdivision Surface (Subsurf) Modifier

tools), it is necessary to create a very smooth surface with no visible edges. Using only what you have learned thus far, you would need to create an obscenely dense mesh in order to achieve such a result. This is far from practical; it would be best if you could create a simple object and then smooth it out. Luckily, the Subdivision Surface Modifier does just that.

The Subdivision Surface modifier, commonly referred to as *Subsurf*, allows you to work with what is called an *editing cage*. For all practical purposes, the editing cage is nothing more than your regular mesh, which you should already be familiar with from Chapter 4. The important part is that when you add a Subsurf Modifier, the underlying mesh is subdivided and smoothed, as shown in Figure 5.4, leaving you with a much smoother, rounded shape. Each of these processes is done on the fly, in the background of your workflow. This is important as it allows you to continue working with the cage mesh without ever touching the higher-resolution, smoothed counterpart.

Adding a Subsurf Modifier, and any other modifier, is done the same way as the Mirror Modifier. It too is listed under the Generate category. After adding the modifier, there are several options that can be adjusted to fine-tune the modifier. The most important of these options are Preview and Render. These two settings control the number of subdivisions in the Viewport and at render time:

- **Preview** determines the number of times your mesh will be subdivided while viewed from the Viewport. In most cases going any higher than level 2 or 3 is overkill.
- **Render** sets the number of subdivisions during rendering. Setting this to 2 or 3 is sufficient for most uses.

Note

It can be very tempting to raise the subdivision levels as high as they will go for the smoothest result possible, but keep in mind that with every level of division your CPU takes a hit. If you find your computer slowing to a snail's pace, try lowering the levels on some (or all) of your objects. Anything over level 2 is generally unnecessary.

The other three options available are Simple, Subdivide UVs, and Optimal Display. The Simple option can be set to prevent the modifier from smoothing the mesh, only subdividing it. The second option tells Blender to subsurf the UV coordinates of the model, which is discussed in Chapter 15. The third option optimizes the model in the Viewport to display only the original wireframe, rather than the subdivided wireframe.

Mirror Modifier and Subsurf Modifier are most commonly used in the modeling workflow. You will use them extensively during the modeling process of your character in this book. However, there is another modifier that was only recently added to Blender that is very useful and can speed up your workflow significantly while creating certain objects. This is the Solidify Modifier, covered next.

The Solidify Modifier

The Solidify Modifier enables you to add depth to an object without having to manually create that depth. A good comparison is a single sheet of paper versus a piece of cardboard. The paper is essentially flat, like a face (polygon) in Blender, whereas cardboard has a thickness to it. Normally you would need to create this thickness on your model by extruding the perimeter vertices and edges for depth, but with the Solidify Modifier, you can do this automatically. Figure 5.5 shows an example of the Solidify Modifier in action. As you can see, it is very useful for creating things like bowls and boxes. Perhaps my favorite use, though, is for adding depth to clothing, as shown in Figure 5.6.

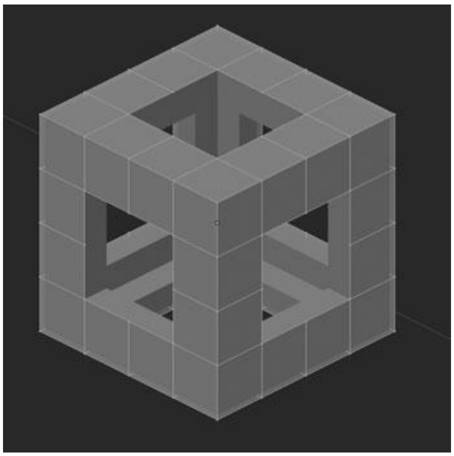

Figure 5.5
Using Solidify to save geometry

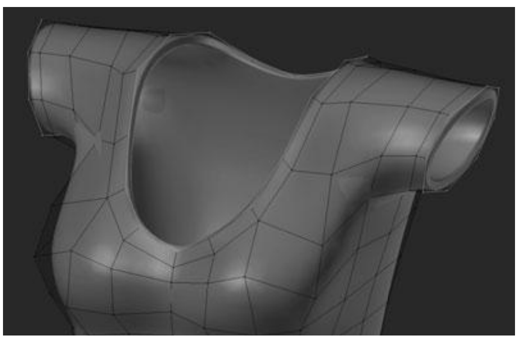

Figure 5.6
Using Solidify for clothing

Figure 5.7
Solidify Modifier's settings

As with all other modifiers, the Solidify Modifier provides you with a series of settings and options that enable you to fine-tune the modifier's effects. These are shown in Figure 5.7 and explained here:

- **Thickness** adjusts the depth of the solidification.
- **Offset** modifies the location where the thickness is added. A positive offset will extend the thickness away from the original surface, a negative offset extends the thickness inwards from the original surface, and a neutral offset extends the thickness evenly in both directions.
- **Vertex Group** restricts the modifier's effect to a vertex group.
- **Inner Crease** sharpens the inner edges to create a harder, more defined edge to the thickness. This is needed only when a Subsurf Modifier is also used.
- **Outer Crease** sharpens the outer edges to create a harder, more defined edge to the thickness. This is needed only when a Subsurf Modifier is also used.
- **Rim Crease** sharpens the rim of the thickness in the case of a Subsurf Modifier's presence.
- **Fill Rim** creates faces along the edge loops that make up the inside and outside thickness.
- **Even Thickness** maintains thickness by adjusting for sharp corners.
- **High-Quality Normals** calculates the normals (direction of faces), resulting in a more even thickness.

Figure 5.8
Generic modifier settings

That is the Solidify Modifier; with it and the other two modifiers examined, it's a good time to move to some of the general options that apply to all modifiers.

Generic Settings

By this point, you have surely noticed a series of buttons along the top of the Modifiers panel, next to the modifier's name, as shown in Figure 5.8. The four buttons immediately to the right of the name control the modifier's visibility. From left to right, they are as follows:

- **Rendering:** On by default, this button determines whether the modifier's result is applied (visible) at render time.
- **Real-Time Display:** On by default, this button enables real-time display of the modifier. Real-time refers to an object's display in the Viewport.
- **Edit Mode:** On by default, this button turns on the modifier's display during Edit Mode.
- **Editing Cage:** Normally when a modifier is displayed, the final effect is displayed as a ghost of sorts, leaving the original mesh for you to edit. Clicking this button will apply the modifier to the editing cage while in Edit Mode. This is best demonstrated with a picture. Figure 5.9 displays the mesh without the modifier applied to the editing cage, and Figure 5.10 displays the mesh with the modifier applied to the editing cage.

These settings are present for every modifier and can be quite useful as both a performance boost and a visual aid. For example, when working with a large number of modifiers, meshes, and the like, you may start to see a drastic performance slow down in the Viewport, and turning off real-time display can greatly cut back on such performance cuts.

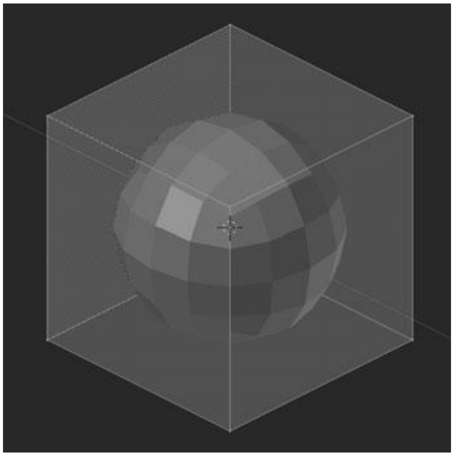

Figure 5.9
No editing cage

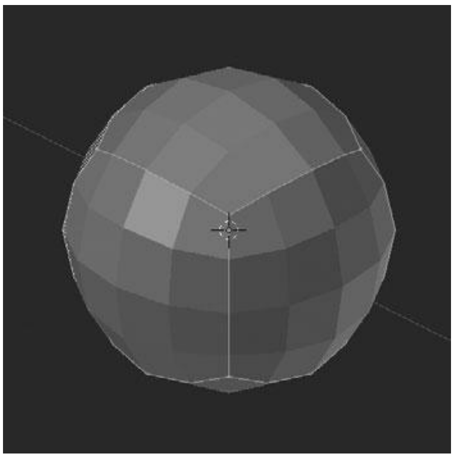

Figure 5.10
With editing cage

Understanding Modifier Stack Order

Before moving on to other things, I want to bring one more key point about modifiers to your attention. Modifiers work in a stack, with each modifier being placed before or after the adjacent modifiers. The order of the modifiers designates the order in which the modifier's effects are applied, as well. This stack is ordered from top to bottom, with top-most modifier being applied first,

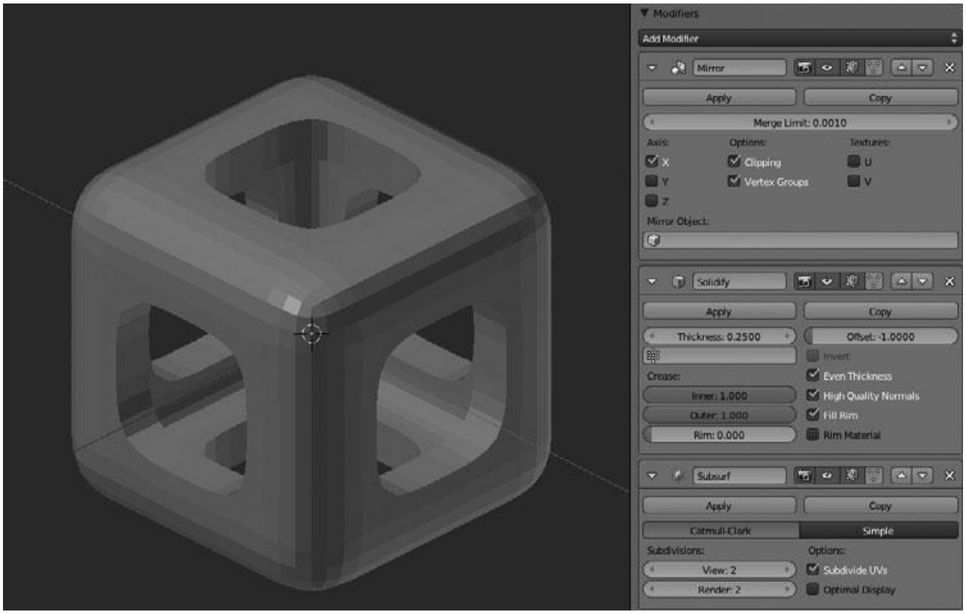

Figure 5.11
Modifier stack order

then the second, then the third, and so on. What this means for you is that you must be aware of where you position certain modifiers in the stack. As you go along and become more aware of all the different modifiers, you will discover the order that they work best in. As far as the three modifiers discussed in this chapter go, the general rule of thumb is Mirror Modifier first, Solidify or other modifier second, Subsurf Modifier nearly always last. You can see this stack order present in Figure 5.11.

The reason for this order is simple but important for understanding how the stack order works. Using the same three modifiers as previously discussed for an example, it works like this:

- First the Mirror Modifier is added, making the mesh symmetrical.
- Second, the Solidify Modifier is added, giving thickness to the entire mesh, including the mirrored half.
- Third, the Subsurf Modifier is added, smoothing out the entire mesh; improving the final result.

It may seem odd to place the Subsurf Modifier last, since it smoothes out the mesh, which might not be desirable. However, this is because the Subsurf Modifier should generally be used as a final polishing step, rather than relying on the Subsurf Modifier to give you a pleasing result. Your mesh should be able to stand on its own with or without a Subsurf Modifier.

If you need to change the order of your modifier stack, you can use the up and down arrow icons on the right side of each modifier.

Summary

With that, you have just learned how to use three of the most common modifiers in the modeling workflow. This chapter should have given you a basic idea of what modifiers are and how to use them. You will examine each of these modifiers in more depth when the need arises during the modeling process of the book's character.

As apparent from the modifiers list, there are many, many more modifiers at your disposal. Many of these modifiers you may never use, at least not while modeling; others will become common tools in your workflow. Don't be afraid to experiment as you work.

Chapter 6

Sculpting

Up until now, I have been showing you how to work with the vertices, edges, and faces that make up whole objects. Now I am going to change the pace a bit and work on the surface of the object by sculpting. Blender's sculpting abilities allow you to sculpt on the surface of an object, much like you might sculpt clay, to achieve results near impossible through poly modeling (poly modeling is what I have been showing you up to this point). Sculpting has become very prominent in both the film and video game industries. In film, it has allowed artists to create realistically detailed models, even down to the individual pores in a character's skin. Sculpting in the video game industry, when combined with normal mapping technology, has permitted developers to create much richer levels of detail in their games, that otherwise would not be possible due to hardware limitations.

This chapter introduces Blender's Sculpt Mode, examines the Multiresolution Modifier, and teaches you the basics of sculpting. Then you will take a look at using the brush system and read about the various options that affect those brushes and sculpting in general.

Using Blender's Sculpt Mode

Just like the other working modes I have shown you thus far (such as Object Mode and Edit Mode), Blender has a mode for sculpting called Sculpt Mode. You can switch to Sculpt Mode by selecting it from the drop-down menu in the Viewport, as shown in Figure 6.1. Sculpt Mode gives you access to all of the

Figure 6.1
Sculpt Mode

sculpting tools available in Blender and allows you to sculpt on the surface of your model.

Sculpting works using a series of brushes that enable you to manipulate the surface in different ways. Using these brushes, you can create complex forms from a simple mesh and even draw in fine details on the surface of your model. In Sculpt Mode, you will find a variety of brushes and options that allow you to refine your sculpting workflow and provide you with the versatility to achieve a wide range of results. I will cover all of this in more detail later in this chapter. Most of the time sculpting is done by working on a model that has what is called a *Multiresolution Modifier*. This modifier allows you to achieve higher levels of detail with cleaner, sharper results. Let me go ahead and examine that now.

Multiresolution Modifier

The Multiresolution Modifier is a very powerful tool because of what it allows you to do when combined with the sculpting system. This modifier subdivides your mesh similarly to a Subsurf Modifier, with one key difference—the Subsurf Modifier only allows you to manipulate the cage mesh, whereas the Multiresolution Modifier allows you to manipulate the actual smoothed surface via the sculpting system while leaving the cage mesh intact. If you look at Figure 6.2a and Figure 6.2b, you can see this clearly. The mesh on the left has a Subsurf Modifier; the mesh on the right has a Multiresolution Modifier with some simple sculpting applied. You can see that in Edit Mode, each mesh looks the same, but in Object Mode the multiresolution mesh has been deformed. It is this ability to manipulate the surface of multiresolution meshes that makes the sculpting system so powerful.

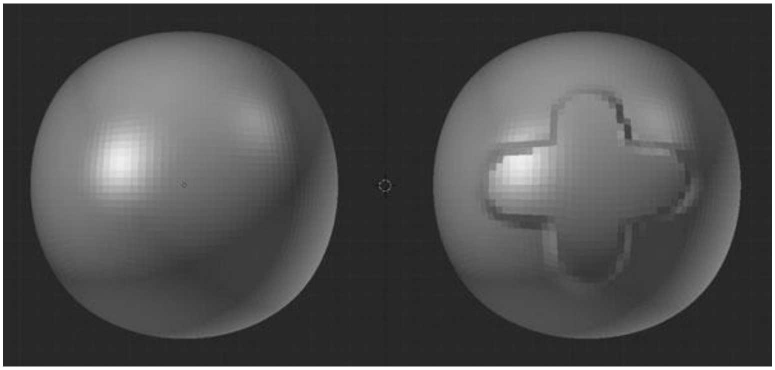

Figure 6.2a
Comparison of Subsurf and Multiresolution Modifiers in Object Mode

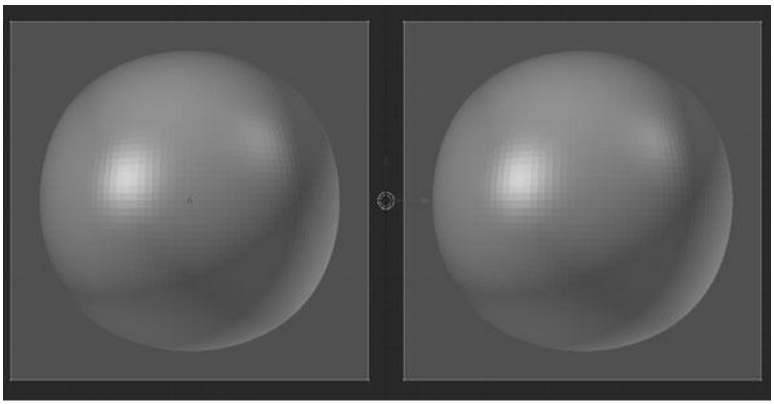

Figure 6.2b
Comparison of Subsurf and Multiresolution Modifiers in Edit Mode

The Multiresolution Modifier is, in many ways, the basis behind the sculpting system in Blender. Although it is not necessary to use Multiresolution when sculpting, and in fact sculpting on a normal model can be quite useful as a means for tweaking its shape, using Multiresolution allows you to reach the level of detail generally desired for a sculpted model.

In the previous chapter, I showed you the Multiresolution Modifier's settings, but I have not yet explained when and why to use many of those settings. I will do that now, demonstrating each of the major settings. The three settings you will use the most often are: Preview, Sculpt, Subdivide, and Delete Higher. Let's cover these one at a time.

Preview Setting

The Preview setting determines which level of subdivision is displayed in the Viewport while in Object Mode. Clicking on the left or right sides of the value will lower/raise the level by 1. When you first add a Multiresolution Modifier, this value will be set to 0 and you will be unable to go any lower or higher. This is because you need to first subdivide the mesh in order to raise the subdivision level. You may do this by pressing the Subdivide button, adding an additional level of subdivision to your mesh.

Sculpt Setting

The Sculpt setting allows you to select which level of subdivision you want to display while in Sculpt Mode. Clicking on the left or right sides of the value will lower/raise the level by 1. Like the Preview level, this will be set to 0 until you press Subdivide at least once. By having these two settings separate from one another, you are able to view the mesh at different levels while in Object Mode and Sculpt Mode. This helps to optimize your memory usage while not sculpting.

Subdivide Setting

Subdivide, like I have already mentioned, subdivides the mesh, increasing the resolution and thus raising the amount of detail you may reach while sculpting. At any time in the sculpting process when you find yourself unable to add detail due to too few polygons, you can click Subdivide to increase your resolution/polygon count. That being said, this is a feature you need to use sparingly and with care as you may quickly overload your computer's memory and bring it to its knees. Sculpting can use immense amounts of memory and requires a fairly high-end machine to be used effectively.

When sculpting, it is very easy to get overzealous and quickly add too many levels of subdivision. It is, after all, a very fun tool to play with. This is where Delete Higher comes in.

Delete Higher Setting

The use of this feature should be pretty obvious; it deletes any levels of division that are higher than your current level. For example, say you have five total levels but you are displaying level 3. If you click Delete Higher, you will delete levels 4 and 5. This is used often when you accidentally add too many levels or when you find your computer is unable to handle the number of levels you have.

What I have just shown you is the gist of the Multiresolution Modifier. But you still have a lot to learn about sculpting in Blender. I would now like to begin showing you the essentials to sculpting.

Sculpting Basics

The basics of sculpting are very, very simple. In fact, if you were to switch over to Sculpt Mode right now, chances are you would figure it out within a minute or two. That being said, I am going to give you a rundown of the essentials and how to use them.

Sculpting works by using your mouse cursor as a brush of sorts, with which you are able to raise and lower and otherwise manipulate the surface of your mesh by drawing across it. However, before getting to the specifics of sculpting I would like to give you a rundown of the main tools and settings available in Sculpt Mode. There are many different tools and settings at your disposal to make the sculpting process easier and more efficient.

Most all tools and settings for sculpt are located in the toolbar (T), as shown in Figure 6.3. As you can see there are quite a few things to play with; let's go through these bit by bit.

Starting out, in Figure 6.4, you can see the most important of the sculpting tools, the brushes. This Brush panel allows you to quickly select a different brush to change how you manipulate the surface. I will go over the details of each of these brushes in just a moment. These are a several key sliders and options pertinent to the brushes that I would like to look at, as shown in Figure 6.5.

- **Radius** adjusts the diameter of the brush. You can access this from the Viewport by pressing F on your keyboard.
- **Strength** controls the amount of deformation that will be applied with each stroke. You can change this from the Viewport using Shift+F.
- **Autosmooth** is the amount of smoothing that is automatically applied to the brush stroke while sculpting.
- **Area Plane** lets you determine which axis will be affected by your brush strokes.

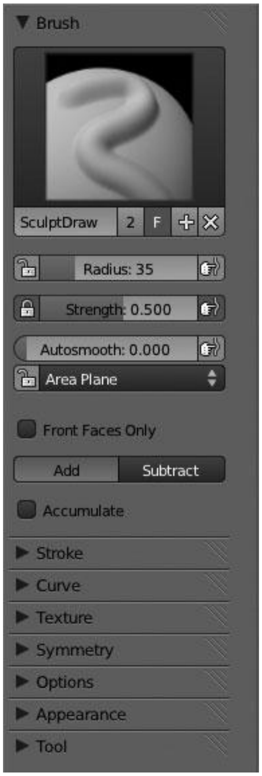

Figure 6.3
Sculpting toolbar

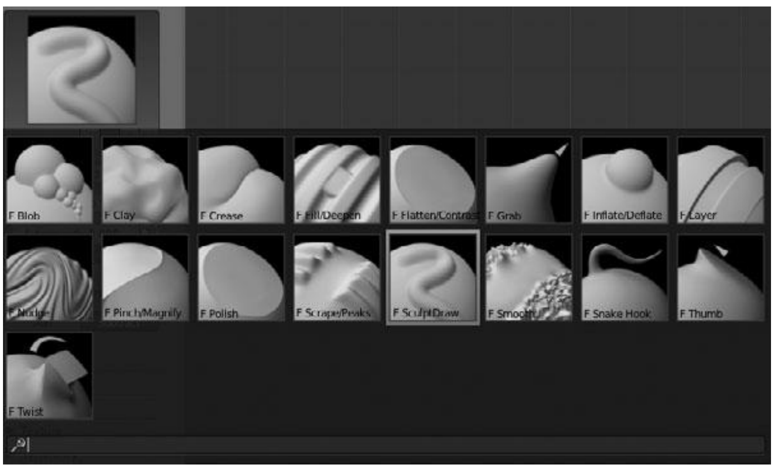

Figure 6.4
Sculpting brush presets

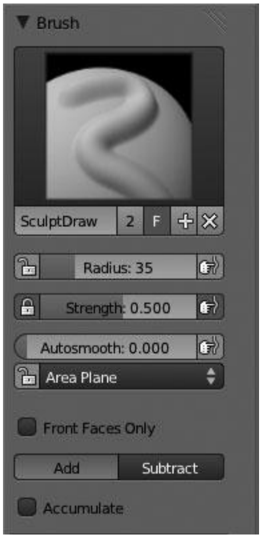

Figure 6.5
Main brush settings

- **Front Faces Only** allows you to restrict the brush stroke only to faces that are pointing at you.
- **Add/Subtract** determines whether the brush stroke raises or lowers the surface. You can toggle this on the fly by holding down Ctrl.
- **Accumulate** causes each stroke to add on top of the previous stroke rather than reapplying the stroke each time.

These are a few of the features you will change frequently while sculpting. There are a couple of additional features that are specific to particular brush types and I will address these as they come up.

Along with these are many more features that will also be of great help and you'll probably use often. However, before going over those, I would like to go back to the brushes and give you a rundown of how each one behaves.

Using Blender's Sculpting Brushes

Just as a traditional sculptor retains a variety of tools for different tasks, Blender has a series of different brushes that make it easier to perform specific tasks. For example, the Smooth brush is excellent for getting rid of unwanted lumps and rough spots; the Inflate brush works wonders if you need to expand a small

Figure 6.6
Default Brush presets

object; and the Crease brush makes it very easy to create wrinkles. These brushes are actually just presets that make use of specific tools and settings available in Sculpt Mode. I will talk a bit more about this later, though.

Figure 6.6 shows the default brush presets in Blender and how each of them works.

The following sections cover each of these default brush presets in more detail.

The Blob Brush

The Blob brush, shown in Figure 6.7, creates either smooth or bulbous protrusions on the surface of the model. This brush works best when the stroke method is set to Anchored. You can adjust the Pinch slider to control the sharpness of the edge of the blob.

The Clay Brush

The Clay brush is shown in Figure 6.8 and works by adding/removing volume to/from an area based on the actual surface variation rather than by simply

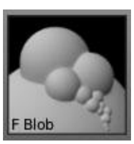

Figure 6.7
The Blob brush

Figure 6.8
The Clay brush

moving all vertices in one direction like the Draw brush does. This enables you to easily fill holes and sculpt much like you would with real clay. The Plane Offset slider determines the maximum distance up or down the surface the brush can travel. The Trim features fine-tunes the Plane Offset to determine the maximum distance for vertices to be affected from the sculpting plane.

The Crease Brush

The Crease brush, shown in Figure 6.9, lets you draw wrinkles or creases on a surface while also pulling the surrounding vertices closer so as to create a tighter edge. The amount of pinching can be set with the Pinch slider.

The Fill/Deepen Brush

This brush, shown in Figure 6.10, allows you to increase or decrease the depth of valleys on the mesh surface. This is often used for filling in valleys or digging them deeper while leaving the surrounding surface alone.

Figure 6.9
The Crease brush

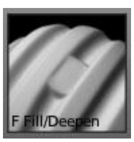

Figure 6.10
The Fill/Deepen brush

Figure 6.11
The Flatten/Contrast brush

The Flatten/Contrast Brush

Displayed in Figure 6.11, this brush works in two ways. When used with a positive value, it levels out the surface of a mesh based on the direction of the normals to create a flat plane. When used with a negative value, by holding Ctrl, the brush pushes vertices within the brush radius toward the outer edge to increase contrast. The Plane Offset and Trim may also be set for this brush.

The Grab Brush

The Grab brush, shown in Figure 6.12, lets you move a group of vertices in the direction of your brush stroke. This brush is often used to adjust proportions or other attributes of a model. The Normal Weight setting enables you to adjust how much the brush will pull vertices out of the surface.

The Inflate/Deflate Brush

The Inflate/Deflate brush, shown in Figure 6.13, causes all of the faces to expand in/out along their normals, which means to move in the direction the surface

Figure 6.12
The Grab brush

Figure 6.13
The Inflate/Deflate brush

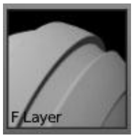

Figure 6.14
The Layer brush

faces are pointing. This enables you to easily increase the volume of a particular area or shape.

The Layer Brush

This brush, shown in Figure 6.14, raises/lowers the surface under your brush a specified amount. This is particularly useful, as the brush strokes will not overlap as long as you don't release your mouse.

The Nudge Brush

The Nudge brush, shown in Figure 6.15, acts similarly to the Grab brush except it only acts on vertices for a short time before grabbing new vertices. It is a bit like using a Smudge brush in an image-editing application.

The Pinch/Magnify Brush

Similar to the Crease brush, the Pinch/Magnify brush, shown in Figure 6.16, pulls the nearby vertices toward the center of the brush. This allows you to

Figure 6.15
The Nudge brush

Figure 6.16
The Pinch/Magnify brush

Figure 6.17
The Polish brush

create sharp edges and creases. If Subtract is enabled, the vertices are pushed away from the center.

The Polish Brush

The Polish brush, shown in Figure 6.17, is actually the same as the Flatten/Contrast brush.

The Scrape/Peaks Brush

This brush, shown in Figure 6.18, allows you to either scrape away or enhance peaks on the surface. It works almost exactly opposite of the Fill/Deepen brush. The Plane Offset and Trim may also be set for this brush.

The SculptDraw Brush

SculptDraw, shown in Figure 6.19, displaces the vertices under the brush in the direction of the average normal. This is the default brush and perhaps the most commonly used.

Figure 6.18
The Scrape/Peaks brush

Figure 6.19
The SculptDraw brush

Figure 6.20
The Smooth brush

Figure 6.21
The Snake Hook brush

The Smooth Brush

The Smooth brush, shown in Figure 6.20, averages out the surface, smoothing the vertices. This is useful for cleaning up a model after you're done with the major sculpting. Hold the Shift key to access this brush.

The Snake Hook Brush

The Snake Hook brush, shown in Figure 6.21, is another variant of the Grab brush that works by releasing some of the outermost vertices as you move your cursor. This is a fantastic brush for creating tentacles or other protrusions from a surface.

The Thumb Brush

Yet another variant of the Grab brush, the Thumb brush, shown in Figure 6.22, acts exactly as if you were pushing the surface with your real thumb. It can be used for gently pushing a surface around.

Figure 6.22
The Thumb brush

Figure 6.23
The Twist brush

The Twist Brush

The Twist brush, shown in Figure 6.23, does exactly what its name implies. It allows you to twist parts of the mesh surface. However, the behavior is a bit erratic and most of the time proves not to be useful.

You can imagine how difficult many features would be to create without some of these brushes. For example, creating sharp, mechanical objects with lots of hard edges, such as an engine, would be all but impossible with only the SculptDraw brush. However, with the Pinch brush, those sharp edges are a snap to create.

Note

If you find yourself switching through brushes a lot you may find it helpful to use the 1–0 keys to cycle through brush slots 1–10 and Shift+1–0 to cycle through slots 11–20. You may also add or remove brush presets at anytime by pressing the + or X buttons next to the brush's icon.

These presets will be saved only in the current .blend file you have open. If you want to make your new presets default when you open Blender, you must customize these presets when you first open Blender and then save the defaults using File > Save User Settings.

If you want to modify a preset (one you've added or an existing one), you can do so by adjusting the settings covered in the next sections. These settings give you much more refined control of each of the brush presets.

Adjusting a Brush's Stroke

If you look directly below the Brush panel, you will see a panel entitled Stroke, as shown in Figure 6.24. The settings found on the Stroke panel allow you to customize how the brush stroke behaves.

- **Airbrush** creates a continuous flow of deformation under the brush, allowing you to continue adding/removing depth without moving your mouse. You may adjust the flow rate with the Rate field. You may also

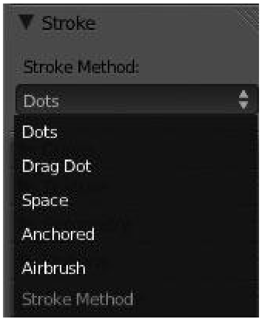

Figure 6.24
Adjusting a brush's stroke

enable Smooth Stroke and Jitter to even out your stroke's path and the randomness between daubs.

- **Anchored** keeps the brush locked to the initial location and then expands the deformation outward. Anchoring the brush is very useful for creating circular objects such as nuts and bolts. The Edge to Edge option allows you to rotate the stroke to better position it from the origin of the stroke.
- **Space** is the default stroke method and enables you to adjust the spacing between each daub of the brush. If you increase the Spacing value this can be useful for creating a repetitive series of shapes, such as rivets, threads, and so on. You can also use the Smooth stroke or Jitter for this method.
- **Drag Dot** acts similarly to the Anchored option except it allows you to move the daub around the surface of the mesh before applying the stroke. The downside here is that you are locked into the strength value used when you add the stroke.
- **Dots** is similar to the Space option except that it applies a new daub with each movement of the brush rather than applying them based on the spacing value. You can also use the Smooth stroke or Jitter for this method.

Although you probably won't change these stroke methods too often, when needed, they can be a lifesaver.

Moving on down the Sculpting toolbar, the Curve options are covered next.

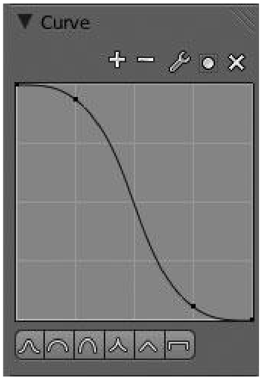

Figure 6.25
Curve falloff

Adjusting a Brush's Curve

The Curve feature presents you with an editable curve to adjust the falloff of the active brush. This feature is used to adjust the smoothness/sharpness of your brush shape, as shown in Figure 6.25.

You may modify the curve shape by clicking and dragging on the curve handles with your LMB. The curve is particularly useful for creating different falloff effects that otherwise would be quite challenging to create with only the default brushes. Or, if you would rather not adjust the curve manually you can use one of the provided presets found along the bottom of the curve panel.

Using the Texture Panel

The Texture panel allows you to apply a texture to your brush in order to add variety to your brush strokes. This can be useful for creating anything from rough rock surfaces to skin pores.

You can set a texture by clicking the New button and then modifying the texture from the Texture properties, as shown in Figure 6.26. Be sure to change the Texture display mode to show the Brush Textures, as indicated by a small paintbrush icon. This option is under the Texture properties bar. From there you can assign a texture of your choosing. If you are not familiar with textures yet, I suggest you ignore this bit for the time being. You'll learn more about them in Chapter 16, which covers normal maps.

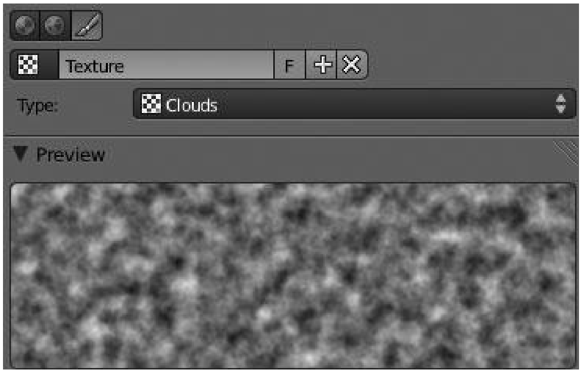

Figure 6.26
Adding a brush texture

Aside from actually choosing a texture source, you can also adjust the way that the texture is used by the sculpting brush by modifying the Brush Mapping, Angle, Offset, Size, Sample Bias, and Overlay options.

Brush Mapping

These three settings—Fixed, Tiled, and 3D—control how the texture is applied to the surface while sculpting:

- **Fixed** uses the whole texture for each daub of the stroke. Unless the brush spacing is adjusted, this will cause overlap of the texture.
- **Tiled** forces the texture to repeat at the edge of each brush daub. This will prevent overlap but causes repetition.
- **3D** makes the texture fit the whole 3D view so that you do not get overlap or tiling. The downside, though, is that generally you will need a very large texture to use this effectively.

Angle

To fine-tune the way the texture is applied to the surface, you can adjust the angle of the texture (see Figure 6.27) in one of three ways—User, Rake, or Random.

User allows you to define the angle of the texture in degrees. You can also adjust this angle from the Viewport by pressing Ctrl+F.

Figure 6.27
Texture angle

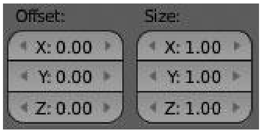

Figure 6.28
Texture Offset and Size

Rake forces the texture to rotate dynamically based on the direction of the brush stroke. This behaves exactly like an actual garden rake might. You can also define a starting angle for the texture.

Random does exactly what it says. It randomly rotates the texture as you apply a stroke. As with Rake, you can also define a starting angle.

Offset and Size

The offset and size options, shown in Figure 6.28, allow you to shift the texture along the X, Y, or Z axes and to increase or decrease the size of the texture along the X, Y, and Z axes. The only thing that needs pointing out is that the size value is based on how many times the texture is to repeat within the brush diameter. For example, setting the size values to 10 will make the texture repeat 10 times within the diameter of the brush, effectively making it smaller. To make it bigger, you should set the value to less than 1.0.

Sample Bias

This slider adds or removes value to the texture samples. Ninety-nine percent of the time you can just ignore this setting.

Overlay

The Overlay option, shown in Figure 6.29, allows you to enable the texture to overlay the Brush icon in the Viewport at all times. By default the texture will

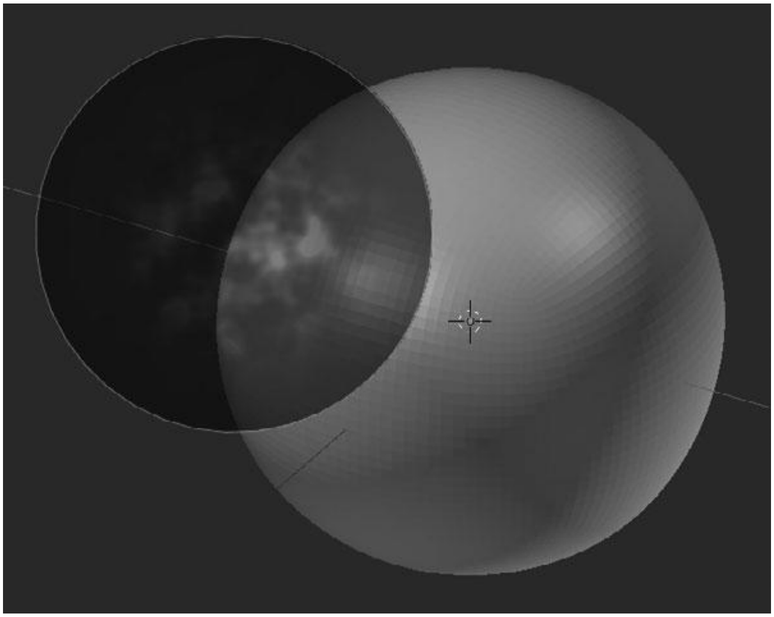

Figure 6.29
Texture overlay on a brush

display only if you adjust the scale, strength, or angle of the brush. Using the overlay, you can also adjust the transparency of it by changing the Alpha slider.

That covers all of the Texture options, but there are still a few more panels of settings to review. Next up is the Symmetry panel.

Using the Symmetry Panel

Aside from the brush presets, the Symmetry options, shown in Figure 6.30, are perhaps the most vital for Part III of this book when I show you the sculpting process for your sample character. These options are fairly self-explanatory, so I will go over them very quickly.

- **Mirror** allows you to enable symmetry across any of the X, Y, or Z axes. This is similar to the Mirror Modifier.
- **Radial** allows you to replicate brush strokes around a circular object or a central point. An example of this can be seen in Figure 6.30. You can set

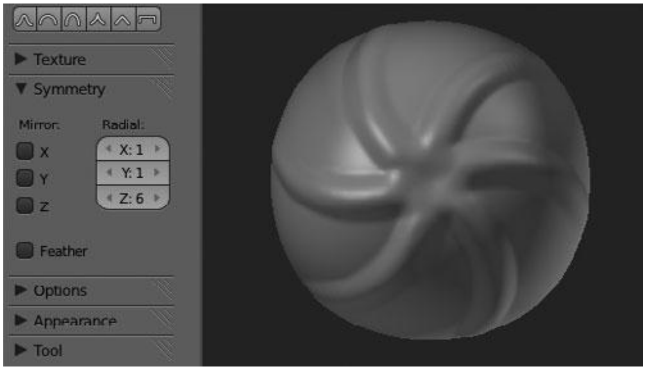

Figure 6.30
Sculpting Symmetry options

the number of steps to be repeated by increasing the value for any of the three axes.

- **Feather** reduces the strength of the brush where it overlaps symmetrical daubs.

You will likely find yourself using the Symmetry panel a lot, particularly when creating characters.

Using the Options Panel

The Options panel in the Sculpting toolbar, shown in Figure 6.31, provides access to a series of settings that can help you tweak sculpting performance and behavior.

- **Threaded Sculpt** enables Blender to take advantage of multiple CPU cores while sculpting for increased performance.

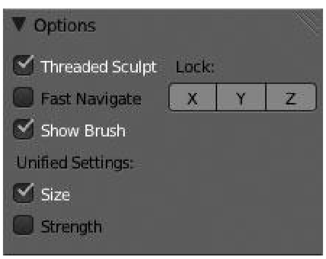

Figure 6.31
Sculpting Options panel

- **Fast Navigate** lowers the sculpt level of the Multiresolution Modifier while rotating around the model in order to increase the navigation speed.
- **Show Brush** displays the actual brush when changing size, rotating, or adjusting the strength. This is a handy visualization tool to give you a more accurate idea of your settings.
- **Size** makes the size setting for all presets identical.
- **Strength** makes the strength setting for all presets identical.
- **Lock** allows you to restrict transformation along any of the three axes while sculpting.

More often than not, you will never change these settings but they can be helpful from time to time.

Using the Appearance Panel

Like the Performance options, the Appearance settings will not likely be used much. They simply allow you to change the brush color for Add and Subtract modes. There is also an option to use a custom icon for the brush, which may be useful if you are creating a large number of presets.

Using the Tool Panel

Once again, these settings will not be in use much except when you're creating new brush presets. These options allow you to change the tool type that the brush uses, to reset the brush, and to enable the brush in Sculpt Mode, Vertex Paint Mode, Weight Paint Mode, and Texture Paint Mode. Note that brush presets are nothing more than a series of mostly generic settings that are applied to a single tool type. These special presets allow you to create many variations on the default presets.

Summary

That wraps it up for all of the sculpting settings and options. I know that was a long list and you may be feeling a bit fried, but rest assured that you will be using most of these settings only from time to time. There is no need to master them all just yet.

This chapter explored the basics of sculpting in Blender. You learned how to switch into Sculpt Mode, how to use the Multiresolution Modifier, and the basics of the brush system. You then learned about all the various settings and options available to you in the sculpting system. Sculpting plays a huge role in the 3D production pipeline and I strongly suggest you become comfortable with the workflow early on.

At this point in the book, you have made it through all of the tedious, introductory subjects. Congratulations! It is now time to begin actually creating a character and to test everything you have learned so far. Before you can truly begin creating your character, it is best to first become familiar with the character you will be creating and to streamline the process by adding references to the background of the Viewport.

Part III

Modeling the Character

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Chapter 7

Introducing the Character, Preparing Your Workspace, and Using Background Images

During the character-modeling workflow, it is important to understand the character you are creating. This applies not only to the design of the character but at times also to the style, history, and genre of the character. Understanding who/what your character is can greatly influence your design decisions throughout the modeling process. These decisions could relate to the amount of detail in the character, the accessories and/or clothing for the character, or most anything else. The point is, it is important to have a solid image in your head or on paper of the character you are creating before you begin modeling. In most cases this preconceived image can make the creation process easier and faster.

This chapter covers three main things. It starts out by introducing you to the character that you will be creating. The chapter walks you through a few things to make your workspace more efficient. Finally, the chapter takes you through the process of using the provided concept art and modeling sheets as backgrounds in Blender to make the modeling process more streamlined and easier.

Introducing the Character

The character you will be creating in this book is one developed by concept artist David Revoy—see http://davidrevoy.com—who was the primary concept artist for the Blender Foundation's Durian Project, Sintel. The character's concept was developed in conjunction with David's Chaos and Evolutions Training DVD, also from the Blender Foundation, and is licensed under Creative Commons Attribution 3.0. David has kindly provided a full-color perspective shot of the character and a superb set of modeling sheets, showing the front, side, and back views of the character.

Concept Art

As you can see from the concept art for the character shown in Figure 7.1, the character displays a mix of retro, futuristic, punk, and fantasy elements. All of these elements merged to create an enthralling concept that will provide an excellent modeling experience. Between the combination of soft, organic forms of her body and clothing to the hard surfaces of her sword and other accessories, the workflow for this character will provide you a look at many different modeling techniques and styles. By the end of this book, you should have a good understanding of how to model many types of objects, ranging from organic objects such as cloth to hard-surface subjects such as metal.

Figure 7.1
Character's concept art

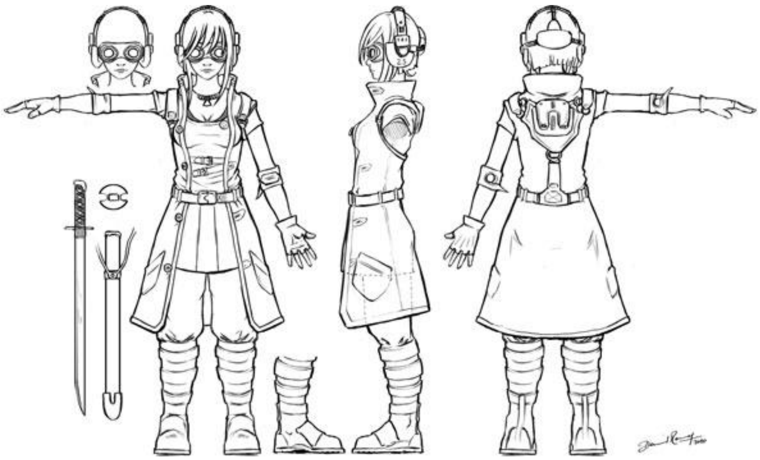

Figure 7.2
Character's modeling sheets

Modeling Sheets

Along with the concept shown in Figure 7.1, David produced a set of modeling sheets, shown in Figure 7.2, that will greatly ease the modeling process and allow much more accurate modeling without the need to constantly refer back to other references. These modeling sheets, which display orthographic front, side, and back views of the character, can be used by placing them into the 3D Viewport of Blender as background images. I will show you this in a moment, in the section called "Gathering References and Using Background Images." Next, let's move on to preparing your workspace.

Preparing Your Workspace

As with any workflow, having a good workspace in the character modeling workflow can be a great help. In many traditional art forms, this workspace would involve a good desk, easel, or other form. In the case of 3D modeling, it involves setting up Blender in such a way as to be comfortable to you. This could mean dividing your Viewport, adjusting Blender's layout, or simply placing background images into the Viewport to work from. Let's start by taking another look at dividing the Viewport.

Dividing the Viewport

I have already shown you how to divide the Viewport in Chapter 3 and if you remember, there are two ways you can do this. You can manually split the view or use the Quad View function. This section takes it a step further and gives you a rundown of some advantages of these two separate options.

The differences between Split view and Quad view are relatively small, but they can make a big difference. Mostly it comes down to personal preference.

Here are some advantages to Split view:

- Offers full range of customization in regards to layout.
- Each Viewport maintains its independence from the other Viewports.
- Allows you to view from any angle in any Viewport, rather than locking you in to a specific view.

Here are some advantages to Quad view:

- Provides one view of the top, front, side, and camera.
- By default, locks rotating the Viewport in all but the camera view, preventing orientation mishaps.
- Consolidates space by keeping all four views within a single Viewport, including the properties and toolbar panels.

Figure 7.3 shows a Split View layout and Figure 7.4 shows the Quad view.

Note

If desired, you may use a combination of both techniques since you can use the Quad View function in any Viewport. In order to make this very usable, though, it's necessary to have a very large display.

In my workflow, I tend to adhere to a custom Split view. I prefer the total freedom it offers as I am constantly rotating each of my Viewports to examine my model from every angle. However, orientation mishaps are quite common when you are starting out, so if you find yourself getting lost in the Viewports, using the Quad View function may be better. You can access Quad view by pressing Ctrl+Alt+Q while your mouse is hovering over a Viewport or by pressing the Toggle Quad View button in the Viewport properties (N).

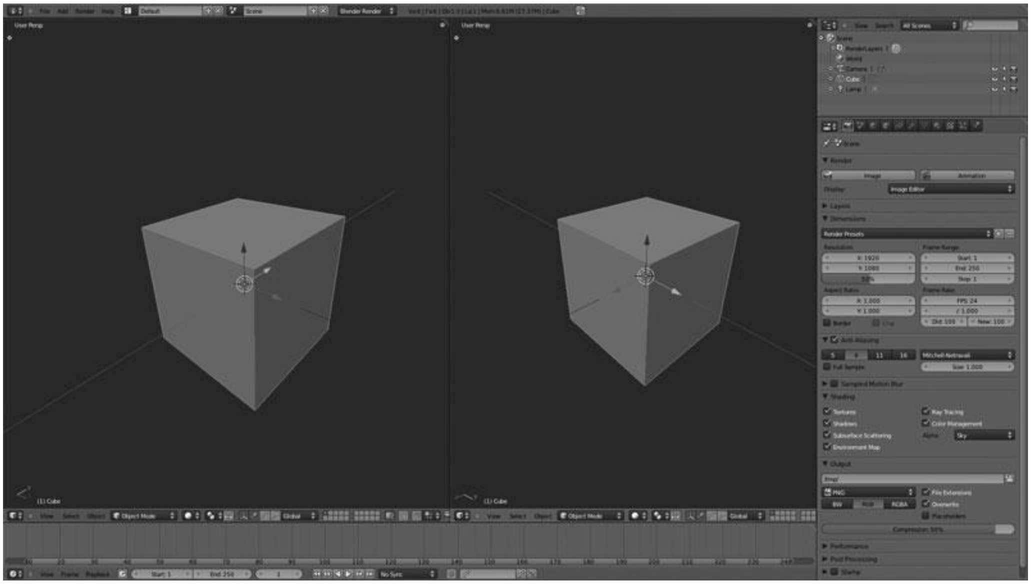

Figure 7.3
Split view

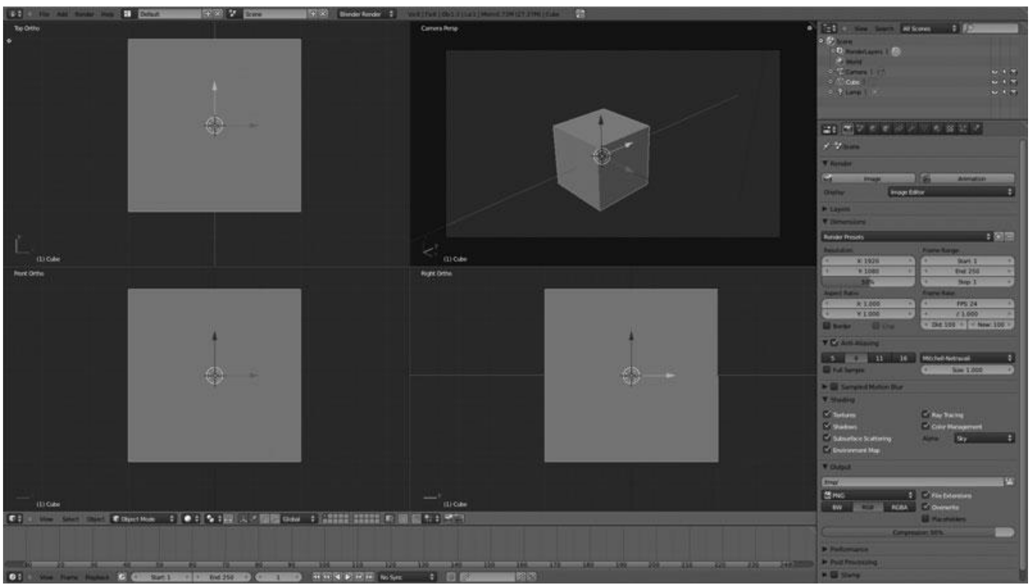

Figure 7.4
Quad view

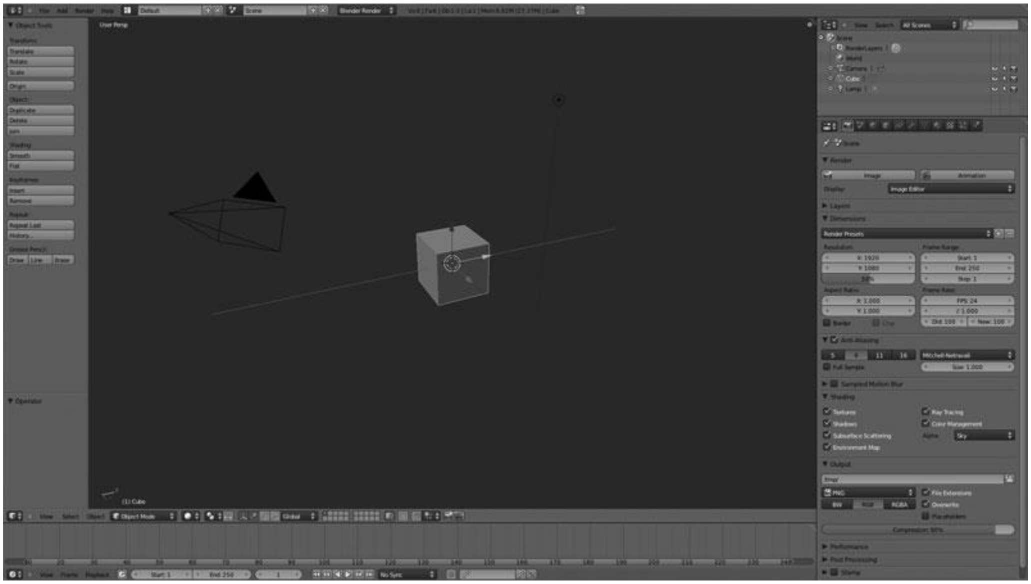

Figure 7.5
Default layout

Figure 7.5 shows the layout I use throughout the remainder of this book. You will notice that I am using the default layout. This is in order to keep things as simple as possible for you while following along. I wanted to be sure to point out the advantages of using a customized layout before getting started, though, as many of you may find it useful.

Enough about interface layouts. In the end, it will all come down to what you find works for you.

Gathering References and Using Background Images

When developing a character, regardless of the intended realism or style, it's best if you work with references on hand. Whether this is to aid in anatomy, design, or otherwise you will find it very helpful and chances are it will be shown through the quality of your final work. From my experience, I have found references to not only be of great assistance in the design and accuracy of the character, but they also help with the development flow of the piece. Having references nearby allows you to make better use of your time by lowering the amount of time needed to make design decisions. Much of the time, this is subconscious. You may not even realize you are pulling ideas from the references, but most likely you are. It will also likely lessen the need to redo work later.

Gathering References

Even though David has provided an excellent piece of concept art and modeling sheets, oftentimes when working on a character you will not have such a modeling sheet to work from and so it can be beneficial to gather further references. I will not be using any other references outside of David's for this project for the sake of simplicity but I highly encourage you to become familiar with ways to gather references for other projects.

There are numerous sources out there with excellent collections of references but I particularly recommend looking through anatomy books, character art websites, and any other sources you can find. The key is to gather a large number of references so that you may pick and choose the best.

What I like to do is to create a sub-folder within my project folder dedicated to all of the references for the character I am currently working on. Any time I find something that catches my eye, particularly ones that fall in line with the design I am considering, I save those images to the folder. This leaving me with a pool of inspiration and reference material with which to pull from.

Note

List of recommended reference sites and resources:

- http://commons.wikimedia.org
- http://flickr.com
- http://3d.sk
- http://deviantart.com
- http://cghub.com
- *Atlas of Human Anatomy for the Artist* by Stephen Peck
- *Anatomy for the Artist* by Sarah Simblet

Using Multiple References

Once you have your collection of references, modeling sheets, or concept art it is always a good idea to make use of a combination of them. If there is something you like in one reference but you dislike the rest of it, fine. It is okay to pick and choose. It can even help to go in and literally highlight what you like in each image to save time down the road. In the end, if your character is based off of 20 different references, chances are not only will you have a more diverse character but you will also have a more original one.

When it comes to using these references in Blender, there are a couple of things you can do. Obviously you do not want to divide your Viewport into 20 sections just so you may see all of the references. Instead it works well to place a few images (such as a front and side modeling sheets) in the Viewport and then open your other images in another program. I normally just use Mac OS X's Preview or Window's Explorer Image viewer. Each of these options allow me to quickly switch over from Blender and then scroll through my images. This is particularly efficient if you have a dual monitor set up—one monitor for Blender and one for your references. Regardless of how you choose to do this, the important part is that you use them. Make use of all the references you can, the more the better.

Speaking of modeling sheets, let me give you a brief rundown on how to add these to your Viewport.

Adding Background Images to the Viewport

Blender allows you to place images into the background of your Viewport, enabling you to overlay your model on them and more accurately create the model. You can do this very easily by following these steps:

1. Open the Properties panel of the Viewport with N.
2. Scroll down to the Background Image category and click the checkbox next to it.
3. Choose Add Image and click the small arrow next to Not Set.
4. Finally, navigate to your image of choice by pressing the Open button. Figure 7.6 shows the background image options.

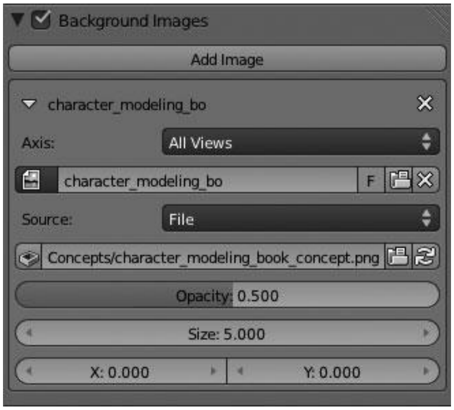

Figure 7.6
Background image options

After loading in the image, you will be provided with a series of options that, among other things, enable you to adjust the transparency of the image, the size of the image, and the location along the X or Y axis in the Viewport. Using these controls you can adjust the image to fit the scale of your model or to make two images line up more accurately with each other. You may add as many images as you like by pressing Add Image again.

The only other option you need to work with is the Axis drop-down menu. This menu allows you to choose whether the image is displayed in all viewing angles of the Viewport or only a specific one. For example, if you set the axis to Front, the image will only be displayed in the background while in front view (Numpad 1). This gives you great control of your background images and also allows you to use a single Viewport but have multiple views of your reference.

Another way you can add images to the background of your Viewport is to simply drag and drop them from a directory on your computer onto Blender's Viewport. This will still require you to manipulate the positioning and size, but can save time from having to navigate to the image.

For this project, I have used multiple instances of the same modeling sheet, each offset in order to place the corresponding side of the character correctly in the Viewport, as shown in Figure 7.7.

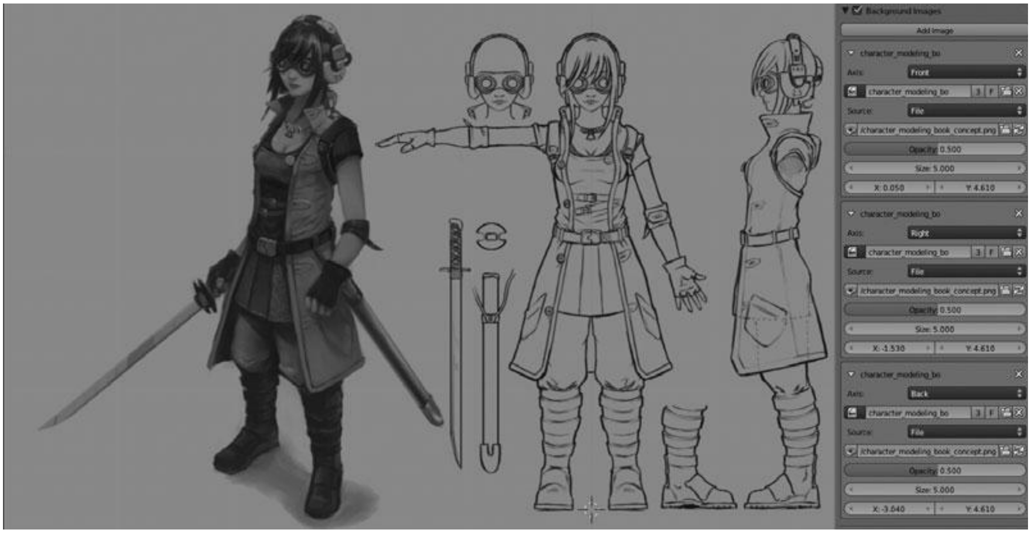

Figure 7.7
Modeling sheet placed with multiple instances

Note

> You may need to adjust the images X/Y offset slightly in order to make them line up with each other. It is easiest to do this while both images are set to All Views so that they are overlaid, one on top of the other.

Summary

Now that you have the images placed front, side, and back, you are ready to move to the next chapter and begin modeling!

Chapter 8

Box Modeling a Base Mesh

Before jumping right into the modeling of the character, this chapter explains some of the methods you will be utilizing in these first stages.

If you have delved into modeling at all, chances are you have heard the term *box modeling* thrown around a bit. This term, or technique I should say, is one of the things I am going to focus on in this chapter. The box modeling technique allows you to easily model a basic form relatively quickly. This "basic form" is referred to as the "the block" in this chapter. This blocking stage is very important to the character modeling workflow as it allows you to visualize the character in its simplest form without the need to bother with details.

Box modeling works by extruding the form from a basic shape, normally a cube. You start simple and then add more and more detail, or complexity, as you go. Many people find box modeling to be an easy and more natural way to model. It should provide you with a great starting point. Rather than simply describing the process, this chapter just shows you. Let's go ahead and begin modeling the character.

Blocking in the Forms with Box Modeling

From the previous chapter you should already have your modeling sheets set up in the Viewport. If you have not done this, I recommend referring back to Chapter 7. The way this is going to work is that you will start from a cube, you will add symmetry to the cube with a Mirror Modifier, and then you will begin the extrusion process to first create the torso and arms of my character.

First things first, select the cube with the RMB, press Tab to enter Edit Mode, and then add a loopcut down the center of the cube. You can add a loopcut by pressing Ctrl+R and hovering your mouse over the edges of the cube. A purple line should show up, highlighting the loopcut position. Place the cut vertically with your LMB and then immediately press the RMB to leave the cut centered on the cube. If you do not press the RMB or Esc, you can slide the new loop along the adjacent edges to place it where you like. However, in this case you're going to add a Mirror Modifier and so you want to put the loop in the center, so that you can create exactly one half of a cube.

With the loopcut placed, select the left side of the cube by pressing B and then clicking and dragging your mouse over the relevant vertices. Now that the left side is selected, you can just choose X > Delete Vertices, to delete half of the cube. You should be left with what you see in Figure 8.1.

The next step is to add a Mirror Modifier from the Modifier properties. You should also enable clipping to prevent the center vertices from pulling away from the center line.

Now that you have a symmetrical mesh from which to model, you can begin creating the actual base mesh. This is where it gets fun! Using the Extrude tool that I showed you in Chapter 4, you will begin selecting faces and extruding them

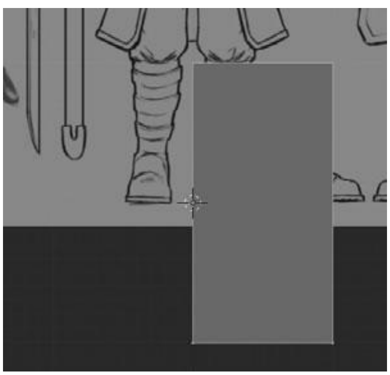

Figure 8.1
One half of a cube

to start forming the shape you want. I will keep things very simple at first and gradually make the model more and more complex. Along with the Extrude tool, you will also use the Loop Cut tool (Ctrl+R) and the Scale (S), Rotate (R), and Translate (G) tools for adding more detail and adjusting the shape of the model.

Creating the Torso and Arms

The first thing you need to do is center the mesh on the waist and resize it to be more accurate. You can do this by selecting everything with A (you may need to press it twice if you already had a selection) and then pressing G to activate the Translate tool. You can then move the mesh up from the Front view (Numpad 1) to be roughly centered on the character's waist. You may also move the mesh in along the X axis at the same time to make the width of the mesh more accurate. You now want to select the four vertices on the right side and extrude them out on the X axis and scale along the Y axis. Next, you should scale all of the top vertices slightly in all directions to get something similar to what you see in Figure 8.2.

Continuing to use the Extrude tool, you can select the top vertices and extrude them up several times to the top of the shoulders. Then using the Translate, Scale, and Rotate tools, you manipulate either a single vertex or multiple vertices at a time to shape the mesh according to the modeling sheet. This is best done while switching between your various views (front, side, back, and so on) to get a more accurate model. I have also extruded the bottom of the mesh down several

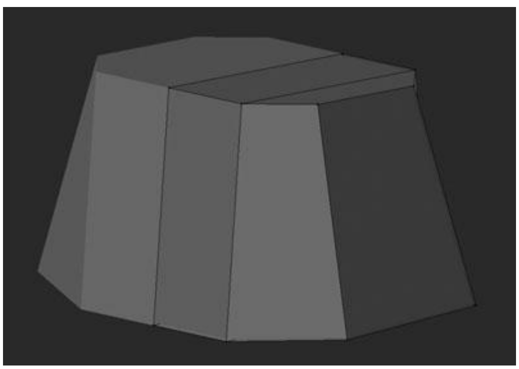

Figure 8.2
Start of the torso

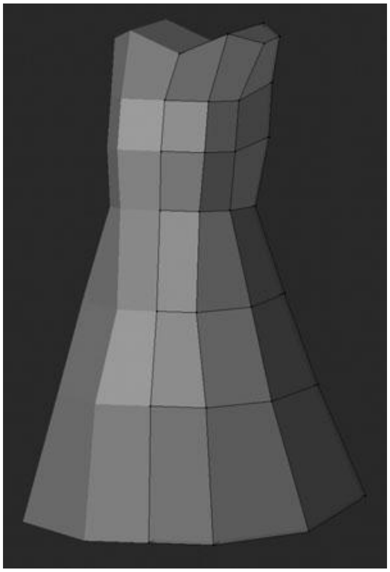

Figure 8.3
Basic shape of the torso and coat

times to form the shape of the coat hem. You can see my result in Figure 8.3. You will notice that I am keeping things very simple right now; the goal is not to focus on the details but on creating an approximation of the character that you will learn to refine over the next few chapters.

Note

If at any point you forget how to use a modeling tool, refer back to Chapter 4, where I covered most of the basic tools.

Using the same previous techniques, you now need to extrude a starting point for the arms by selecting a single face, either through Face Mode (Edit Mode, Ctrl+Tab) or by selecting the four appropriate vertices and pressing E to extrude. Try extruding the face four times until reaching the wrist. If you check Figure 8.4 you will also notice I have done some very simple shaping with the Translate tool to better approximate the arm.

Creating the Head

To get the head started, extrude the neck area first by selecting the innermost face at the top of her body. Once it's selected, you can just extrude the face up

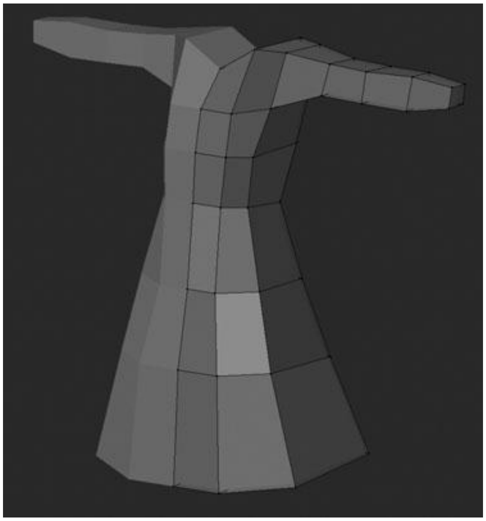

Figure 8.4
Basic arm shape

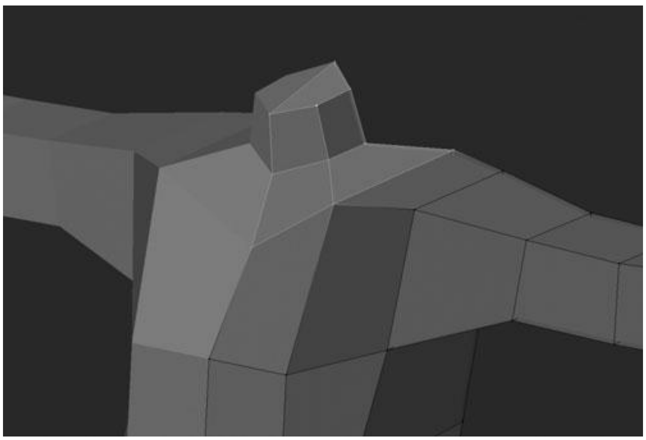

Figure 8.5
Starting the neck

along the Z axis and then scale it down slightly. It may also be necessary to move the face along the Y axis to better position it with the side modeling sheet. This first step of the neck is shown in Figure 8.5. This is all you need to do on the neck for now; it is time to create the head.

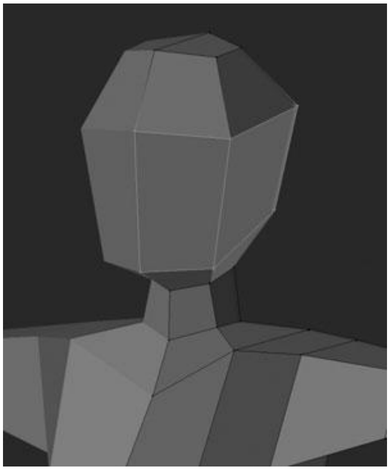

Figure 8.6
Basic head shape

The next step, modeling the head base, can be done by extruding the face that makes up the cap of the neck; you'll want to extrude it to the top of the head. This will essentially create a pillar, which you can then add two loopcuts to (Ctrl+R > Scroll-wheel up). After adding the two loopcuts, they will automatically be selected and you can just scale them out to fit the size of the head. Figure 8.6 shows the initial head extrusion and the effect after adding the two loopcuts and scaling out. This completes the basic head for the time being.

Creating the Pants and Boots

Up to this point, you have extruded everything from a single cube, staying true to the box-modeling name. However, to make the modeling process easier for the pants and boots, not to mention to make a more efficient mesh, you will now add in a new mesh primitive. First, double-check that you are still in Edit Mode. Place your 3D cursor at the character's thigh by clicking with the LMB. This allows you to place the new primitive exactly where you wish. It is necessary to place the cursor from both the Front and Side views in order to position it correctly. You can now add a new cube at the 3D cursor's location by pressing Shift+A > Cube. Before doing anything else, you need to scale the cube down to fit the profile of the character's thigh; in order to do this, though, you need to first disable clipping on the Mirror Modifier. Otherwise, you will find the inside of the cube locking to

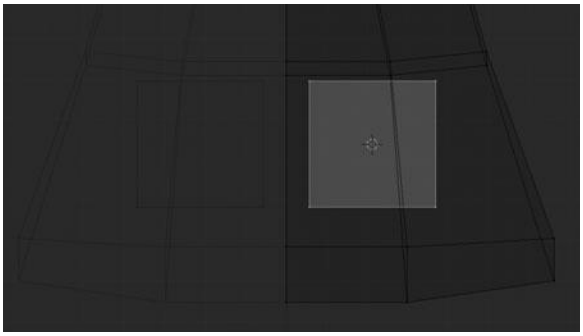

Figure 8.7
Starting point for the pants and boots

the center line. You can see the new, scaled cube in Figure 8.7. This is your starting point for the pants and boots.

With the new cube as a starting point, you can now extrude the bottom face down to the top of the boot, then to the ankle, and lastly to the bottom of the boot. After these three extrusions, you need to add in two loopcuts—one between the top of the boot and the top of the thigh and one between the top of the boot and the ankle. These extra loops will give you just enough mesh to roughly shape the model. The last step in the boot and legs is to select the bottom-most, front-facing face and extrude it out once to form the toe of the boot. After some shaping, you should have something like Figure 8.8 to finish off the boot.

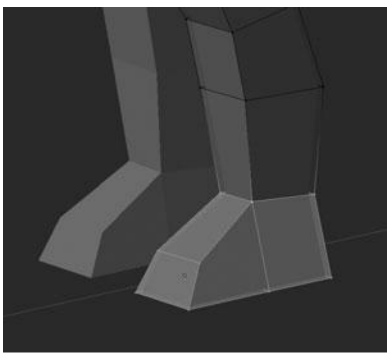

Figure 8.8
Blocking in the boots

Creating the Coat

The coat is going to be created a bit differently than everything else you have done up to this point. You will model it by duplicating the basic shape of the coat from the mesh that you have already made for the torso area. After doing this, you can simply scale it up slightly and extrude in the edges to add thickness.

The first step is to select the bottom faces of the torso mesh and delete them with X > Faces. This will leave a hollow mesh, which is important for when you start sculpting all the details in Chapter 10. The next step is selecting the parts of the torso mesh that you want to duplicate. You can see the selection in Figures 8.9 and 8.10. You should notice that the selection roughly resembles the shape of the coat in the modeling sheet. Once selected, you can press Shift+D to duplicate the mesh. Upon duplicating, press Alt+S to scale out along the normals, effectively expanding the mesh. The result can be seen in Figure 8.11.

Note

If you find your mesh becoming very distorted while using Alt+S, with faces going in all different directions, you should select the entire mesh and press Ctrl+N to recalculate the normals.

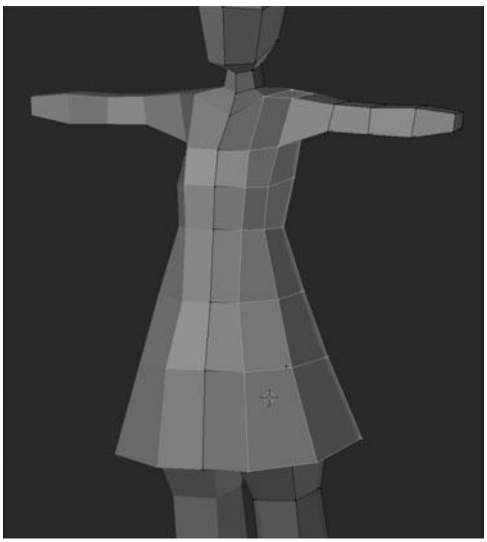

Figure 8.9
Coat selection front

Figure 8.10
Coat selection back

Figure 8.11
Starting point for the coat extracted from the torso mesh

With the coat selection expanded away from the torso mesh, all you need to do is delete the bottom-most edgeloop from the shirt by selecting it and choosing X > Delete Vertices. You can now call the blocking complete! From here, you have a great starting point to begin adding Subdivision Surface modifiers and start refining the mesh to look more like the actual character. You will start by separating all the different parts into their own objects and then refining them. Separating them will allow you to better isolate your focus later down the road.

Separating and Refining the Pieces

Now that the blocking is complete, you can begin refining each part so that you have a better starting point for the sculpting portion in Chapter 10. While refining the parts, you will also learn to separate each part into its own object for better organization and control. For example, there will be a boots object, a coat object, a head object, and so on. You are also going to start working with a Subdivision Surface modifier to improve the result even further. Let's go ahead and do that first.

To add the Subdivision Surface modifier all you need to do is select the base mesh in Object Mode (Tab) and select Subdivision Surface from the Add Modifier drop-down menu in the Modifier's properties panel.

Note

Another way to add modifiers is to use the Search function. Press the Spacebar and type **modifier**, followed by the Return/Enter key. This method works for just about any tool in Blender; you just type the name and choose it from the list.

With the Subdivision Surface modifier added, the base mesh should look pretty horrid now since it's been smoothed out. However, that is okay because this is only a starting point. Currently, the mesh you have made is very lowpoly and you cannot do much with it before adding more polygons. An easy way to fix this is to simply make the Subdivision Surface effects real by choosing Apply on the Modifiers panel. If you now enter Edit Mode, you will find you have a much higher poly count on your mesh. This way it is not necessary to manually add all that detail. Now it's time to begin separating and further refining the pieces.

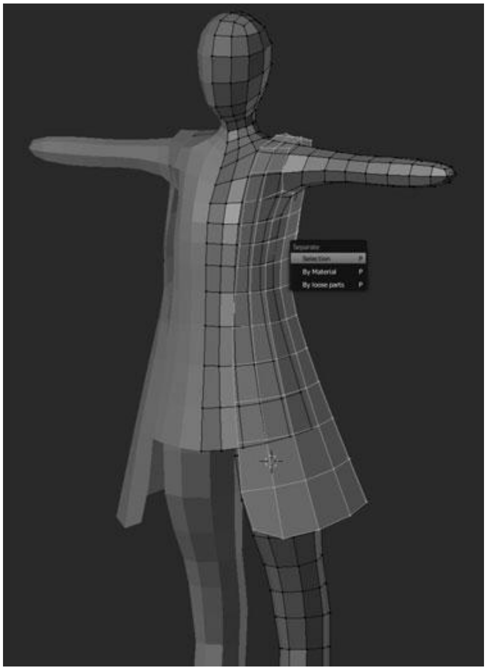

Figure 8.12
Separating the coat into a new object

Separating the Coat

You will separate the pieces one at a time, starting with the coat. First, go into Edit Mode by pressing Tab. Then select the coat by hovering your cursor over one of the vertices that makes it up and pressing L. This will select all "linked" vertices to the vertex under your cursor. With the coat selected, you simply need to choose P > Separate Selection, as shown in Figure 8.12. After separating the coat you can easily rename it by pressing Ctrl+LMB on it in the Outliner view.

Shaping the Chest and Head

The next step is to add some subtle shape to the character's chest and head. The current model is shown in Figure 8.13 (notice that the coat is currently hidden). If you were to sculpt everything from this single model, you would not need to add any more definition to the shapes; you could do that through sculpting. However, since you want to create a separate mesh for the character's body

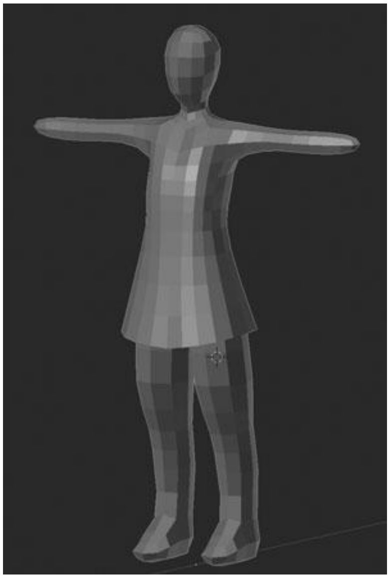

Figure 8.13
Result after separating the coat and applying the Subdivision Surface modifier to the model

(including chest and head), her shirt, her pants, and so on, it will be easier if you add some definition and separate them for individual sculpting.

To get started, you can shape the chest area by just selecting the adjacent vertices and moving them out a bit along the Y axis to give the indication of breasts. You can also tweak the vertices a bit around all the axes to get a better approximation. This point of the process is all about approximating. Nothing needs to be exact. You can see my result in Figure 8.14. I also slightly tweaked the shoulder and lower neck areas.

For the head, all you need to do is give some slight shape to the jaw line area. This means you need to move the vertices around the jaw appropriately from the side view and perhaps a little from the front view until you get something that looks good. This is a good time to be making use of the modeling sheets to identify where to place things. Once again you can see my result, comparing the front and side views, in Figure 8.15.

Now that the chest, neck, and head are shaped, you can go ahead and separate them into their own objects simply by selecting the area roughly shown by the neckline of the shirt in the modeling sheet and then choosing P > Separate selection.

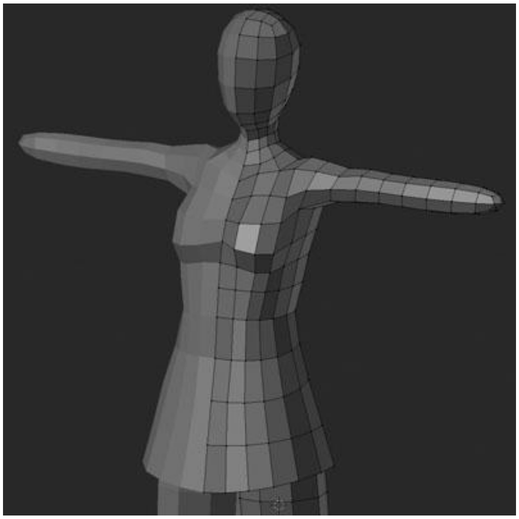

Figure 8.14
Shaping the chest area

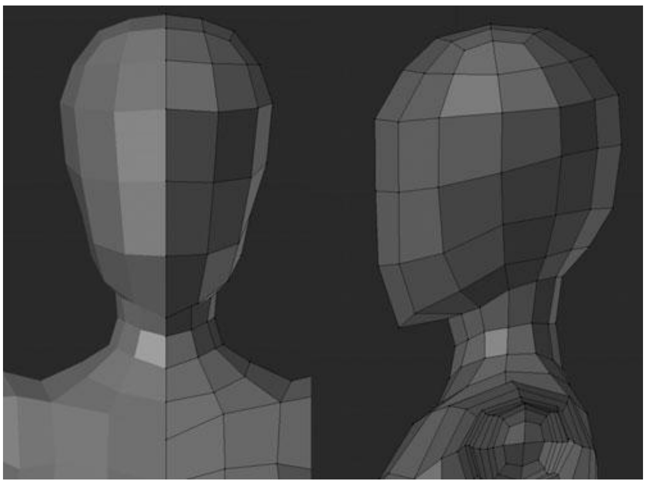

Figure 8.15
Shaping the jaw line

Refining the Arms and Modeling the Hands

Not too much needs to be done with the arms, but you do need to model the hands completely, fingers included. For the sake of simplicity, I will start with the easy part by refining the arms.

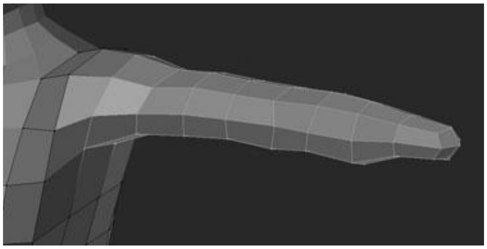

Figure 8.16
Slightly refined arm shape

In order to refine the arms, all you need to do is manually push and pull vertices around to give them a better shape. Using the modeling sheet as a template, you will roughly form the shapes of the shoulder muscles, biceps, triceps, and forearm muscles. This may sound complicated but really all it means is very, very loosely shaping the mesh to fit the contours of the modeling sheet. If you look at my mesh in Figure 8.16 you can see what I mean. I have added a subtle bulge for the shoulder, pulled the vertex over in the crook of the elbow, and pulled up some of the wrist. If necessary while modeling your version, you can also add a slight bend at the elbow to the arm. The last step on the arm is to add in the definition for the sleeve of the shirt. You can do this by adding a new edgeloop with the Loop Cut tool and then scaling it up.

Now for the tricky part, modeling the hands. Many people become overwhelmed at first when trying to model hands, understandably so as they are very difficult. However, you are in luck this time since your character has gloves, which will actually make it much easier down the road. For the time being, all you need to do is model a rough hand shape that can then be sculpted on. In this case, you extrude the hand from the current stump of the arm, much like you extruded the head from the body. This will be pretty simple except for when it comes time to add the fingers; at which point things will get a bit more challenging since it is necessary to add a good deal more geometry to the model so as to be able to extrude the fingers.

Before getting started let me point out that I have included more screenshots than normal for this section due to the complex nature of the subject matter. The actual modeling process is not too difficult as long as you have a visual guide to help you along the way.

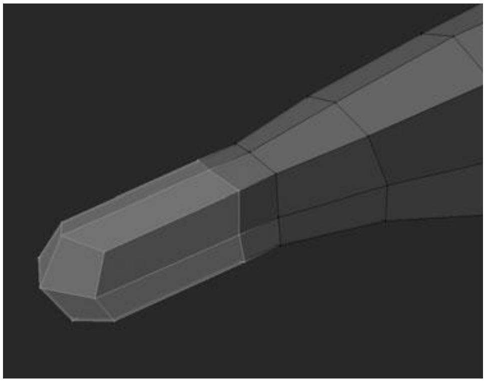

Figure 8.17
Extruding the basic hand shape

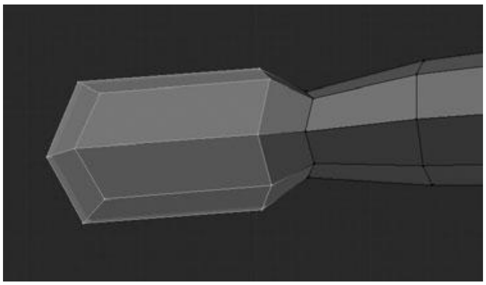

Figure 8.18
Scaling for the palm

To get started, first create the palm shape by selecting the stump of the wrist and extruding it twice by pressing E. The result is shown in Figure 8.17. Next, select all the vertices you just extruded and widen them along the Y axis by choosing S > Y to scale constrained to the Y axis. This will create a better palm shape, as shown in Figure 8.18.

Before you go any further with the hand, you need to think about how you're going to create the thumb, it is modeled differently than the rest of the fingers, due to its position on the hand. Since the thumb is attached roughly at the base of the hand, you can prepare for it by placing a new edgeloop across the center of the palm with the Loop Cut tool (Ctrl+R), as shown in Figure 8.19. You don't extrude the thumb just yet, but a little planning ahead always helps in the end. You may see a side view of the hand shape so far in Figure 18.20.

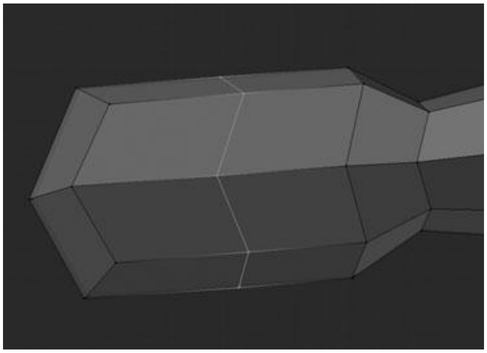

Figure 8.19
Adding a loop for the thumb

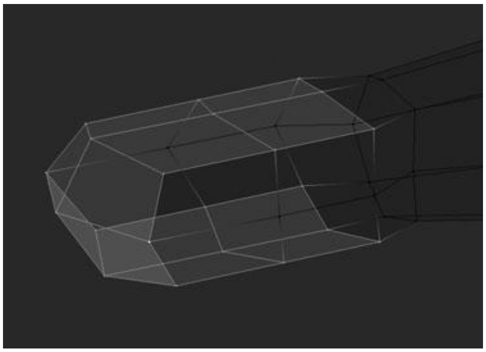

Figure 8.20
Side view of the hand shape

In order to extrude the fingers from the palm, you need to add some more geometry. This is easily done by first selecting the top, tip, and bottom of the palm shape and then extruding. Immediately after pressing extrude, you scale in along the Y axis and move out along the X axis to get something like Figure 8.21. That last step leaves you with a rounded off palm, which you don't want, so select the whole tip and scale it to zero along the X axis by choosing S > X > Numpad 0, as shown in Figure 8.22. The final step in preparing for the finger extrusion is to straighten up the sides of the tip of the palm as shown in Figure 8.23.

With all that done, now comes the fun part! You will notice that the tip of the palm has four sets of two vertically aligned faces; each of these sets will be the

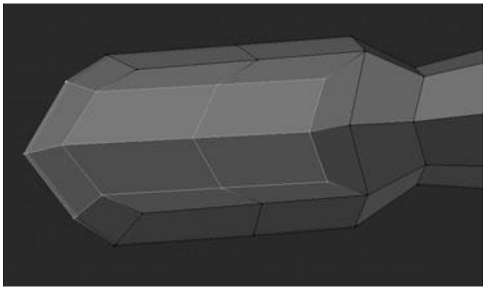

Figure 8.21
Extruding the inner hand for the fingers

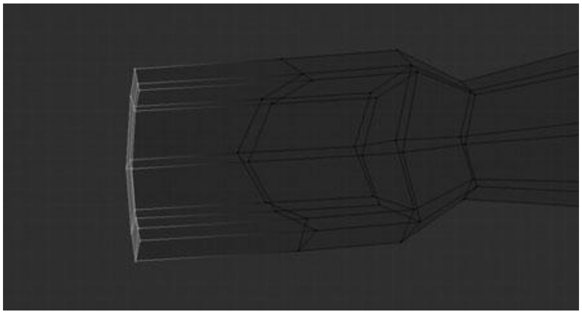

Figure 8.22
Flattening the end of the palm shape

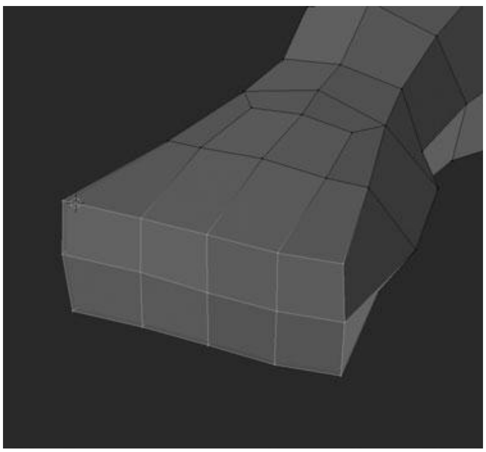

Figure 8.23
Straightening the sides of the palm shape

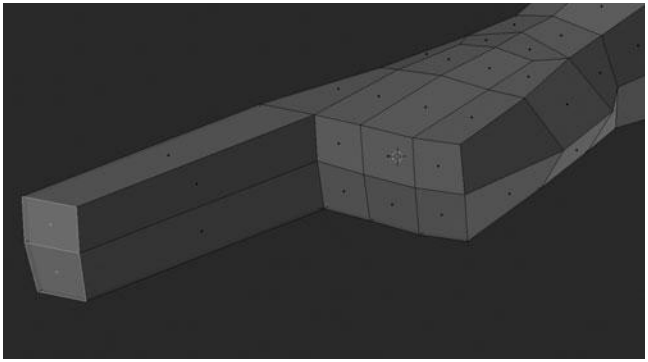

Figure 8.24
Extruding the basic finger

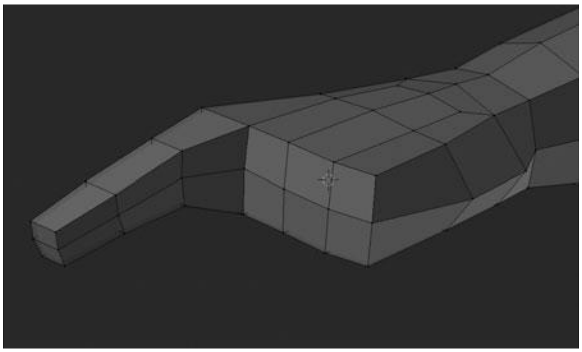

Figure 8.25
Adding joints to the finger with loopcuts

starting point for the fingers. You first select one set of faces and extrude it out to the tip of the finger on your modeling sheet, as shown in Figure 8.24. Then you can add two new edgeloops to this fresh extrusion with the Loop Cut tool by pressing Ctrl+R and scrolling up once on the scroll wheel and then clicking the LMB. After adding the new edgeloops, you can transform them slightly to form the basic shape of the finger joints, as shown in Figure 8.25. Repeat this process for all four fingers; the result is shown in Figure 8.26.

The thumb is created with the same basic process as the rest of the fingers but there is much more shaping involved. First you select the two faces on the back half of the middle edgeloop you added earlier, as shown in Figure 8.27, and then you extrude like you did with the fingers, as shown in Figure 8.28. Then, just like

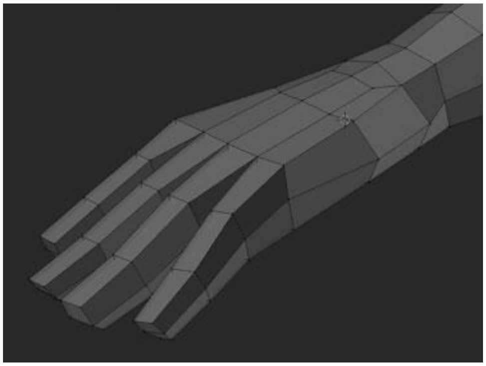

Figure 8.26
Result after extruding the other three main fingers

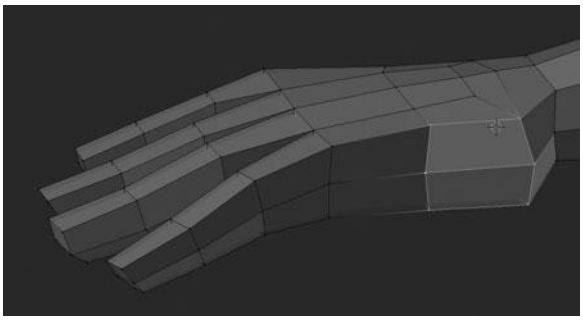

Figure 8.27
Selection from which the thumb will be extruded

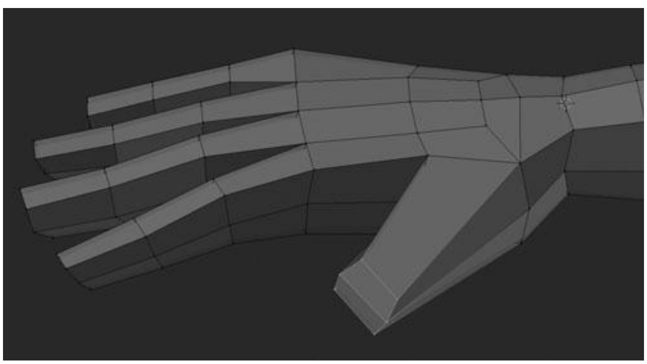

Figure 8.28
Extruding the thumb

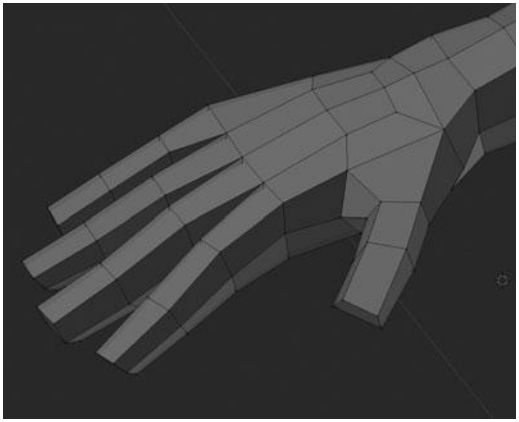

Figure 8.29
Adding shape and joints with loopcuts

the fingers you add two edgeloops with the Loop Cut tool, place them around the knuckles, and shape as needed. The result can be seen in Figure 8.29. This last step completes the finger portion of the hand but there is still one last thing that needs to be done. You may remember that you are actually making gloves, not hands. Adding the cuff of the glove and separating the mesh is the final step.

Turning the hand into a glove is actually quite simple. All you do is add a new edgeloop at the wrist, sliding it up to butt up against the hand, as shown in Figure 8.30. Then you can select the adjacent loop on the hand and just scale it up, forming the cuff, as shown in Figure 8.31.

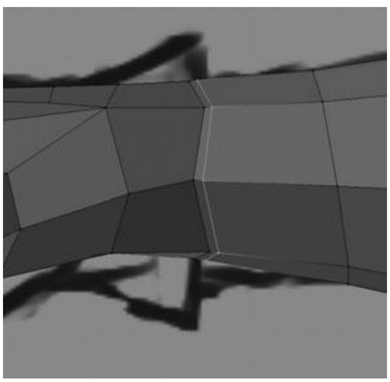

Figure 8.30
Adding the edgeloop to from the glove cuff

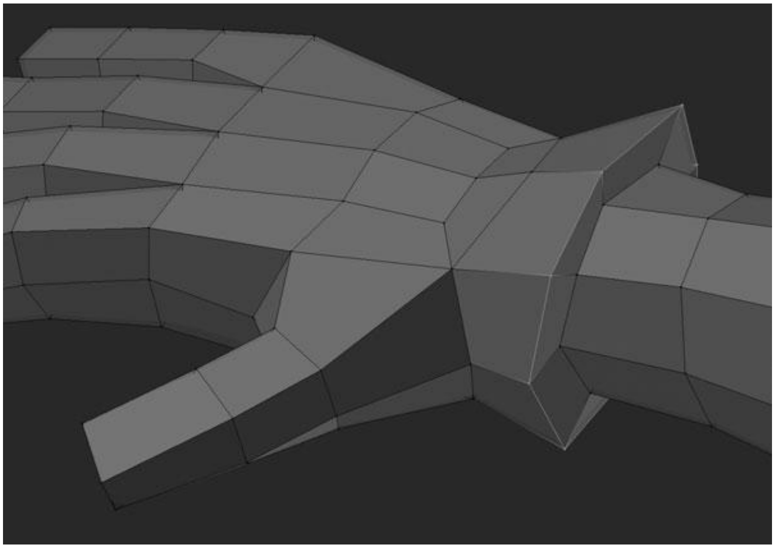

Figure 8.31
Scaling up the cuff loop

Finally, you separate the mesh by selecting the whole glove and choosing P > Separate Selection. At this time, you can also separate out the arm, starting from the wrist up to the edge of the shirtsleeve.

Refining the Boots and Pants

The workflow on the boots and pants, along with the remaining parts of the base mesh, are all going to be handled much like the head, arms, and hands. You will first refine the shape and then you will separate them.

To get started on the boots, you select the entire boot and leg mesh and then isolate it by pressing Shift+H. This will hide all other parts of the mesh, allowing you to focus just on the boots and pants. If you look at Figures 8.32 and 8.33, you will see how the mesh currently looks.

The first thing you need to do is flatten out the sole of the boot by selecting it and scaling to zero along the Z axis. You also need to scale it slightly along the X and Y axes to make up for the smoothing caused by the Subdivision Surface modifier. Next, you can shape the top part of the foot and the back of the heel to give what you see in Figure 8.34. You also need to shape the leg of the boot as needed to fit the modeling sheet. Lastly, add another edgeloop at the top of the

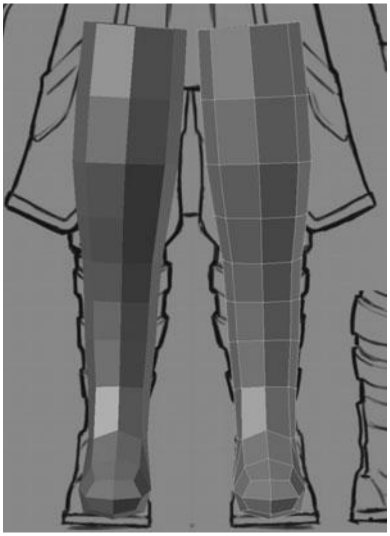

Figure 8.32
Front view of the leg and boot

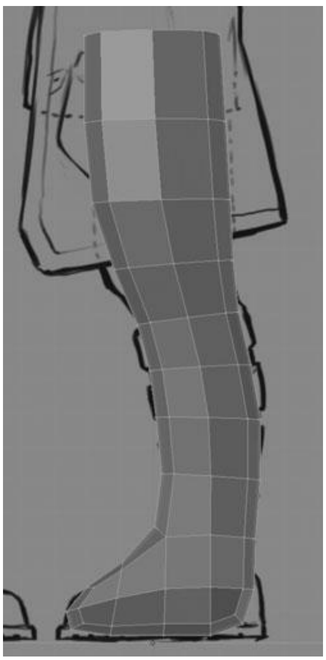

Figure 8.33
Side view of the leg and boot

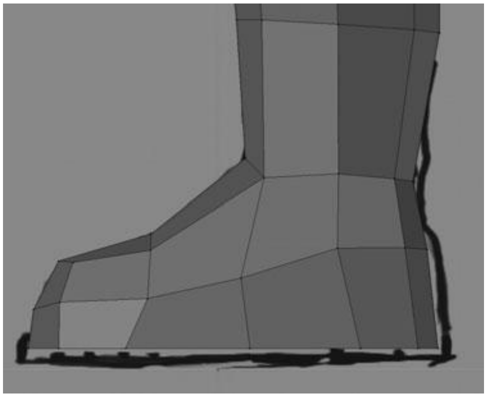

Figure 8.34
Result after shaping the boot

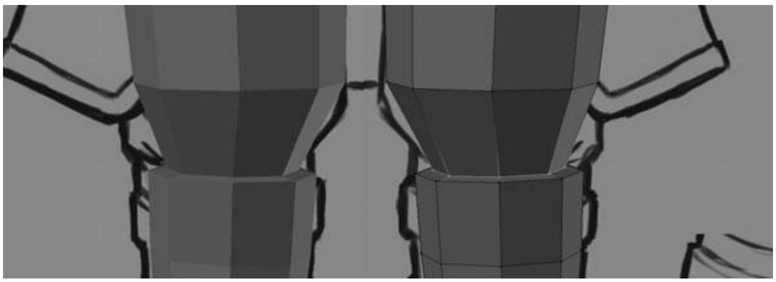

Figure 8.35
Adding a loop where the pants are tucked into the boot

boot and scale it in to form the area where the pants are tucked into the boot, shown in Figure 8.35. This polishes off the boots.

Since you already created the rough shape of the pants while doing the initial modeling, the only thing you need to do with them is separate them from the boots mesh. This is of course done the same way as the previous parts: you select the mesh and then choose P > Separate Selection. Figure 8.36 shows all of the various parts of the model moved away from each other to give an indication of how everything should look and how it should be separated.

All of the pieces are now their own individual objects, but you still have a little work to do before moving on to the accessories and the hair. You need to add some thickness to the shirt and the coat.

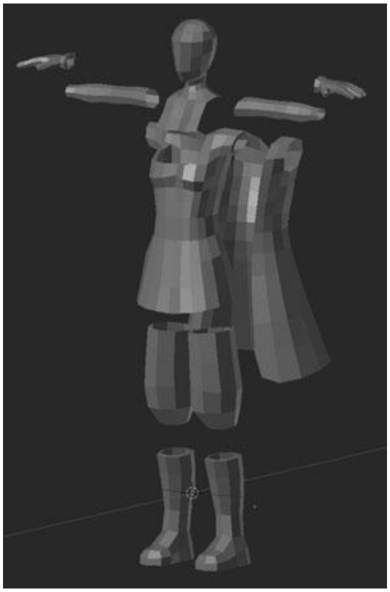

Figure 8.36
Disassembled parts of the current model

Refining the Shirt and Coat

This stage of the process is quite simple. All you need to do is select the interior edges of the shirt and coat, along the same edges as the edges of the shirt and coat in the modeling sheet, and extrude them in slightly to add thickness.

The easiest way to select the inside edge of both the shirt and the coat is to press Alt+RMB on one of the edges that make up the inside series of edges; doing so activates the Edgeloop Select tool. After selecting just the inside of the shirt, you can extrude it in slightly and scale it down just a bit to give what you see in Figure 8.37. Repeat this process for the bottom of the shirt, as shown in Figure 8.38. Repeat it again for the outside of the coat, as shown in Figure 8.39. Then repeat it once again for the inside of the coat sleeve, as shown in Figure 8.40.

After adding the thickness, the final step in this chapter is to work with the shape of the shirt and coat a bit. This is simply a process of pushing and pulling vertices to better fit the modeling sheet. You can see a before/after comparison in Figures 8.41 and 8.42.

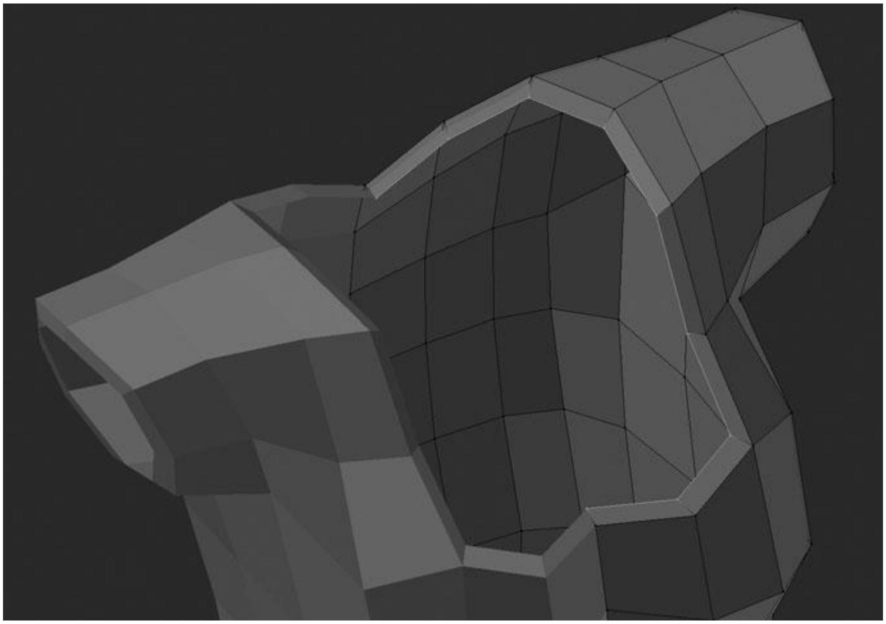

Figure 8.37
Adding depth to the neckline of the shirt

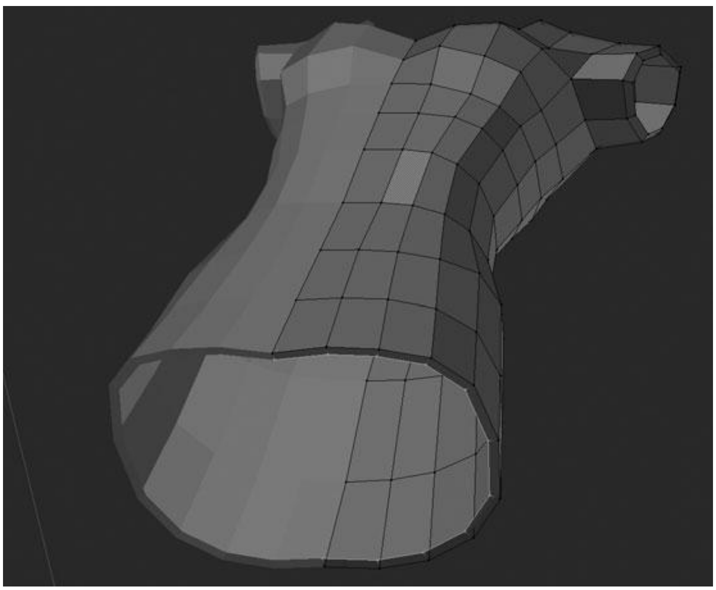

Figure 8.38
Adding depth to the bottom of the shirt

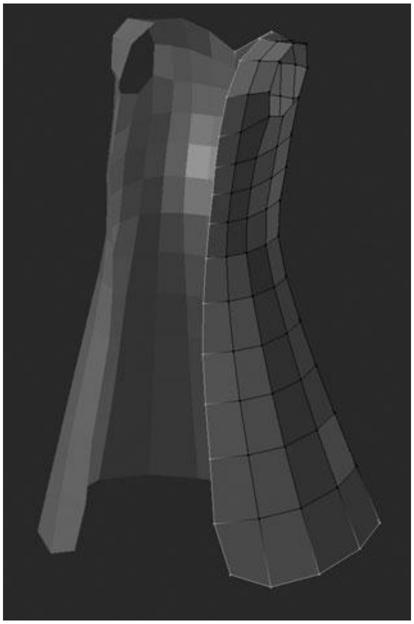

Figure 8.39
Adding depth to the inner edge of the coat

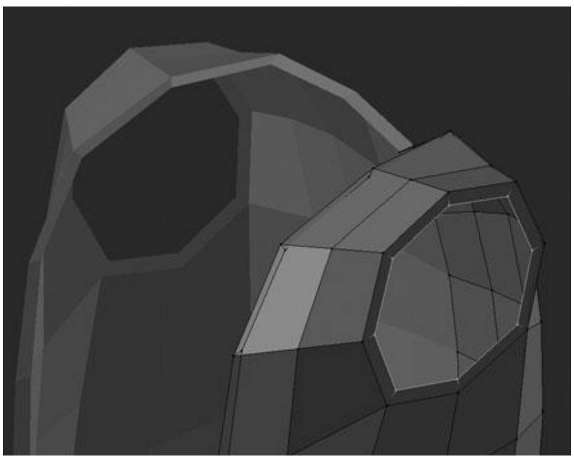

Figure 8.40
Adding depth to the cutoff sleeve of the coat

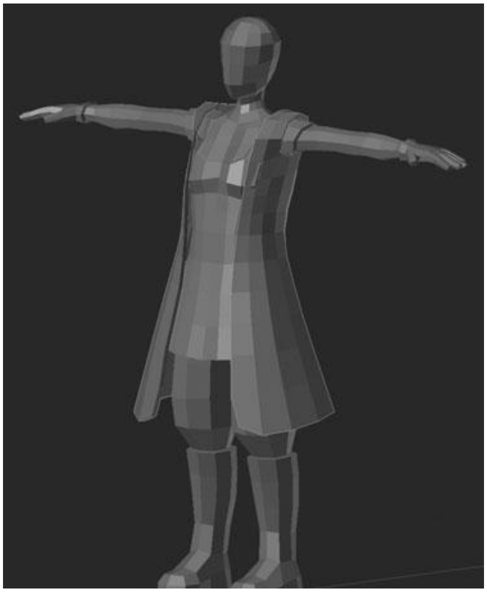

Figure 8.41
Complete model before tweaking

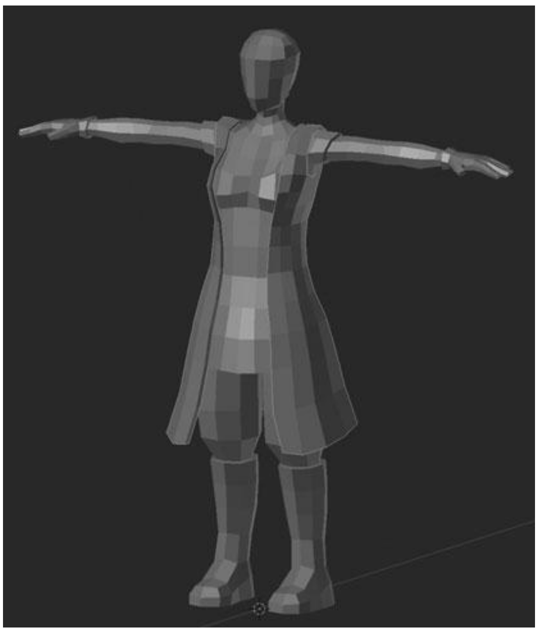

Figure 8.42
Complete model after tweaking

Summary

You should now have the base mesh for everything but the accessories done, which are covered in the next chapter. The next chapter will be a little less in-depth, as it uses all the same modeling techniques covered in this chapter, just with different subject matter. The chapter continues to list the different tools and/or features you should use, but it will be more of an overview of the creation process rather than a specific walk-through. Many of the accessories will have a very, very simple base mesh, as you'll add the detailing later.

Chapter 9

Blocking in the Accessories and Hair

This chapter teaches you how to block in all of the accessories and the hair. Before diving into this chapter, however, I encourage you to take a step back and look over everything you have learned thus far. At this point you should be quite comfortable with Blender's interface, you should be able to create and manipulate objects with ease, and you should have a solid understanding of how the basic modeling process works. If you do not have a firm grasp on each of these topics, I strongly urge you to get a breath of fresh air and then take another shot at them. As I mentioned at the end of Chapter 8, I will not be going into quite as much detail during the modeling process of each accessory. Instead I will provide ample screenshots and a general walk-through of how the parts are created. I will not be using any new modeling tools and so everything performed in this chapter can be done with the exact same tools used for blocking in the main character. At the end of this chapter, you will be left with a final base mesh that you can use to begin sculpting and detailing on the way to the final character. Let's get started! The first accessory you will model are the goggles.

Modeling the Goggles

Before you start learning to model the goggles, I want to first point out that I recommend that you add each of these accessories as a new object. What this means is that when you begin each one, in this case starting with the goggles, you will add the initial mesh from Object Mode. By doing this it will not be necessary to separate the pieces like you had to in the previous chapter. That being said, you will make all of the components of each piece part of the same object.

To get started on the goggles, you need to add a new circle roughly in the location of the goggles. You can do this by first placing the 3D cursor at about where her bridge of the nose would be, ensuring that the cursor is centered along the X axis so that when you add a Mirror Modifier, it will mirror correctly.

Note

A good way to position the cursor correctly and exactly in line with the grid is to roughly place it where you want and then press Shift+S > Cursor to grid.

With the cursor now placed, you can add a new circle from Object Mode by pressing Shift+A > Add Mesh > Circle. Immediately upon doing this, before pressing any other keys or activating any other tools, you need to press F6 or go to the Operator panel and then change the vertex count of the circle to 12. Then press Tab to enter Edit Mode on the circle. Rotate the circle 90 degrees around the X axis by pressing R > X > "90" and then pressing Return/Enter. If you're following along, you should have something like what you see in Figure 9.1. This is a good starting point for the goggles, but you still have a ways to go.

The next step is to move the cursor off center, roughly over the character's eye socket, and to add a Mirror Modifier, as shown in Figure 9.2. Following this, you

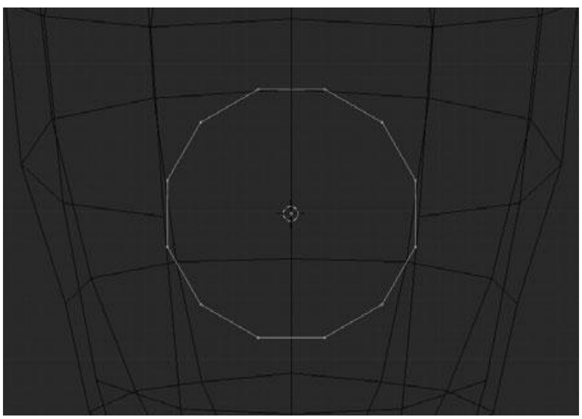

Figure 9.1
Circle starting point for goggles

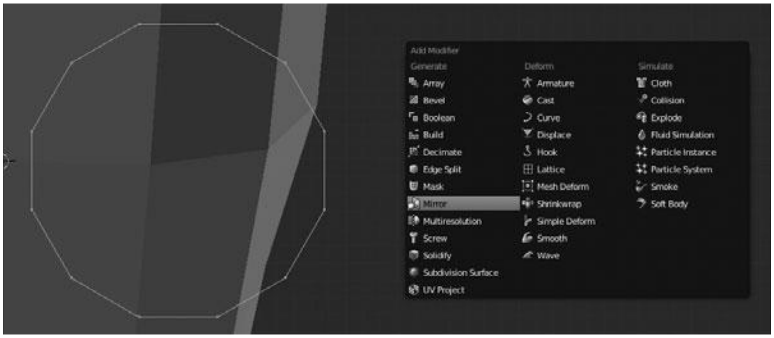

Figure 9.2
Adding a Mirror Modifier to the goggles

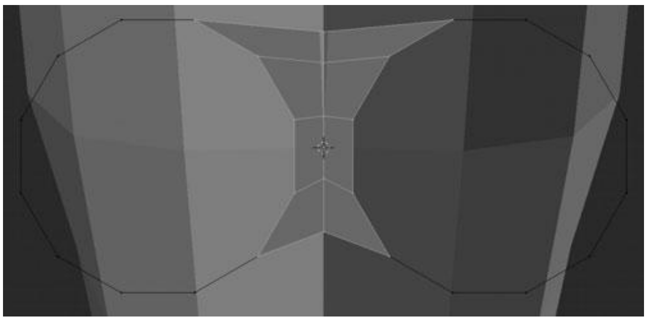

Figure 9.3
Extruding the inside edge of the goggles to the centerline

need to add the bridge over the nose and so you can select the middle vertices and press E to extrude, moving the new vertices along the X axis until they lock to the centerline, as shown in Figure 9.3.

Note

Clipping must be enabled on the Mirror Modifier in order for the vertices to lock to the center.

After adding the center portion, you can begin adding the actual goggle surface by selecting all of the vertices in the original circle and extruding them in several times. This is done by selecting the circle, pressing E to extrude, immediately

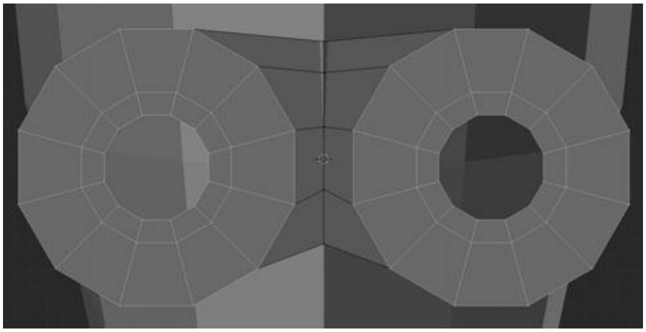

Figure 9.4
Extruding inwards on the goggles

followed by pressing S to scale (before pressing Return/Enter on the extrusion). You can see the result in Figure 9.4.

Now you have most of the surface for the goggles, but there is still a hole in the center. One option to fill this would be to extrude the circle again and then merge the vertices together by pressing W > Merge > At Center. However, this is not ideal, as this will create a lot of triangles, which tend to cause pinching and other problems when used with a Subsurf Modifier. So instead you can select the two vertical edges on the sides of the circle and press F to fill a face. After creating the face, you can add two edgeloops with the Loop Cut tool (Ctrl+R) to create edges with which to connect the top and bottom of the circle. With the two edgeloops added it is just a matter of selecting four vertices at a time and pressing F to fill in the face. There should be six faces to fill, leaving you with a result similar to Figure 9.5.

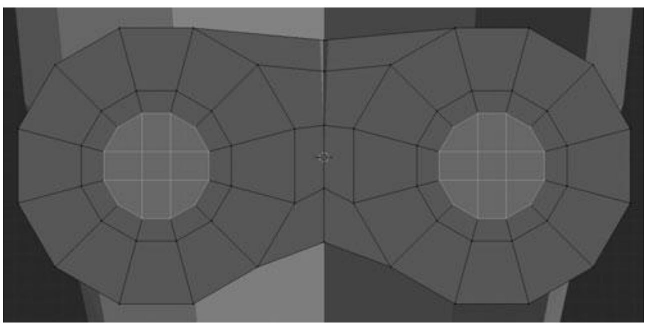

Figure 9.5
Filling the inside of the goggle lens

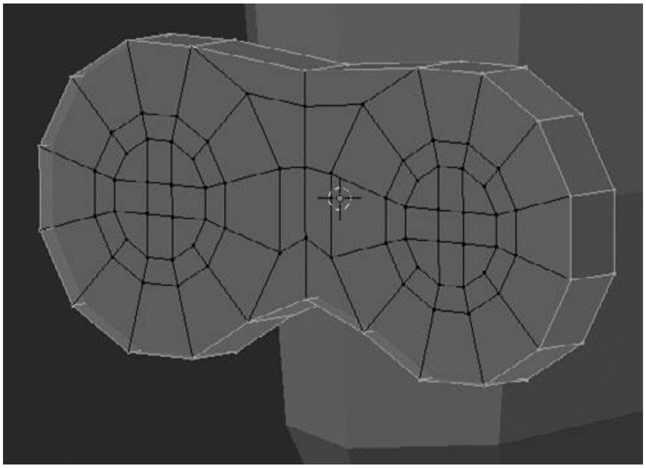

Figure 9.6
Adding depth to the goggles

At this point, you have all you need for the front of the goggles, initially. However, currently the goggles have no depth and so you will just select all of the perimeter vertices by clicking Alt+RMB on one of the edges that connect them to select the entire loop. To add depth, it is just a matter of extruding them back along the Y axis by pressing E, as shown in Figure 9.6.

The final few steps in modeling the block for the goggles is to wrap the goggles around the head slightly and to extrude a single face back along the Y axis to form the strap.

The first bit, wrapping the goggles is actually easier than it sounds. The way you are going to do this is to select the furthermost, vertical face on the side of the goggles, enable Proportional Editing by pressing O, and then press R > Z to rotate around the Z axis. You do not need to rotate too far, just enough to roughly fit the goggles to the head of the character. If necessary, while rotating, you can scroll your mouse wheel up and down to adjust the amount of influence on the surrounding vertices. After rotating, it may also be necessary to move the same selected vertices, with Proportional Editing still enabled, back along the Y axis to fit the head. You should be left with the result in Figure 9.7.

The last step then is to extrude the strap. This is quite quick and easy. It is done by extruding that same, furthermost vertical face along the side of the head to roughly where the front of her ear would be, as shown in Figure 9.8.

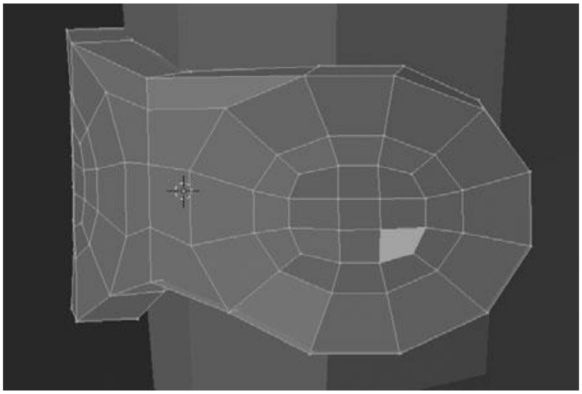

Figure 9.7
Warping the goggles to fit the face

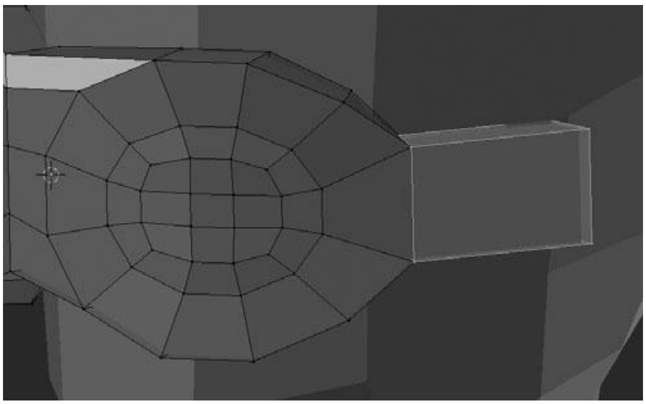

Figure 9.8
Extruding the strap

This may not look like much yet but it is actually a great starting point for the goggles. After blocking in the rest of the accessories, you will come back to this and do detail modeling. For the time being, let's move on to blocking in the headset.

Creating the Headset

You will start the headset the same way as the goggles by adding a new Circle object from Front View (Numpad 1), changing the total vertices to 12, changing the radius to .249, and checking Align to View. See Figure 9.9. This will give you

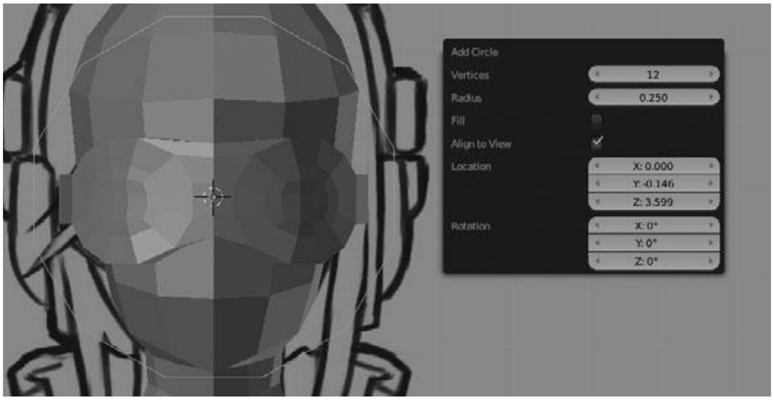

Figure 9.9
Adding a circle for the headset

a good starting point to create the headband. With the circle added—remember you should add it from Object Mode so that it is created as a new object—go into Edit Mode and rotate it 15 degrees around the Y axis by pressing R > "15" > Enter/Return. Once the circle is rotated, select everything to the left of center and delete it so that you can add a Mirror Modifier. On the Mirror Modifier, you should also enable clipping.

Note

Since the circle was rotated in Object Mode it may be necessary to press Ctrl+A > Apply Rotation in order for the Mirror Modifier to mirror correctly.

At this point, you should have a mirrored half-circle, but you really only want a semi-circle. Therefore, you need to delete everything below the halfway point. After this, perform two extrusions on the entire selection: first extrude it straight back along the Y axis to create a band. Next, press A twice to ensure everything is selected and then press E to extrude again, immediately followed by Alt+S to scale out along the normals slightly for thickness, as shown in Figure 9.10. With this done, you can tweak the shape a little bit to better fit the modeling sheet.

Note

Keep in mind that throughout this entire modeling process it is beneficial to continually tweak your model to better line up with the modeling sheet.

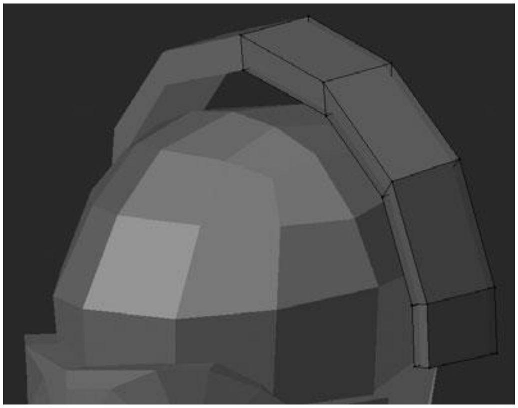

Figure 9.10
Adding depth and width to the headset band

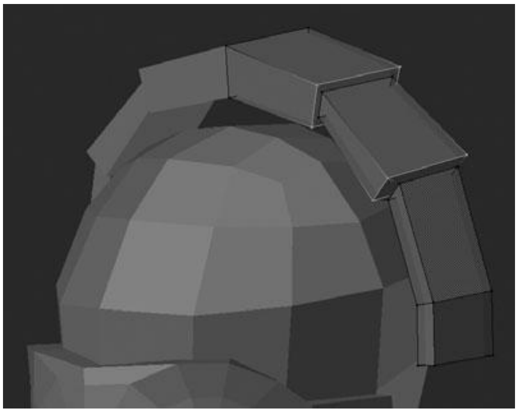

Figure 9.11
Adding ridges to the headset band

Now that you have the shape of the headband created, you need to go ahead and add in the basic detailing to give the impression of the final shape. In order to do this, you will simply add two new edgeloops along the top, slide them over to their adjacent loops, and then scale them up to form ridges of sorts, as shown in Figure 9.11. Remember, you can add loops by pressing Ctrl+R. Upon doing so you are immediately placed in Edge Slide Mode. It may also be necessary to scale up the innermost loop to fit the size of the new loops. This just about finalizes the headband. Now you can start in on the earpieces.

Figure 9.12
Place 3D cursor here for earpiece

To get started on the earpiece, first place your 3D cursor with the LMB on the side view and front view where the earpiece is located on the modeling sheet, as shown in Figure 9.12. Now you need to add a new Cube mesh (while still in Edit Mode on the headband) and scale it down to roughly the size of the top of the earpiece. It may be necessary to disable clipping on the Mirror Modifier temporarily while scaling or else the inside edge of the cube will lock to the center. Next, you need to scale the cube down further along the X axis and the Z axis to better fit the final shape, as shown in Figure 9.13.

Next, in order to create the small middle part of the earpiece, you need to duplicate your current cube, move it down a bit, scale it along the Y and Z axes, and add a new vertical edgeloop directly in the center. Then you move the central, bottom edge down slightly to form an upside-down house shape, as shown in Figure 9.14. Notice I have also extruded down the bottom of the headband one more time to better fit the shape of the outer headphone.

Following that last extrusion, you will now center the 3D cursor in the middle of the earpiece, based on the modeling sheet, and then switch to side view and add a new circle with 12 vertices that is aligned to the view, as shown in Figure 9.15.

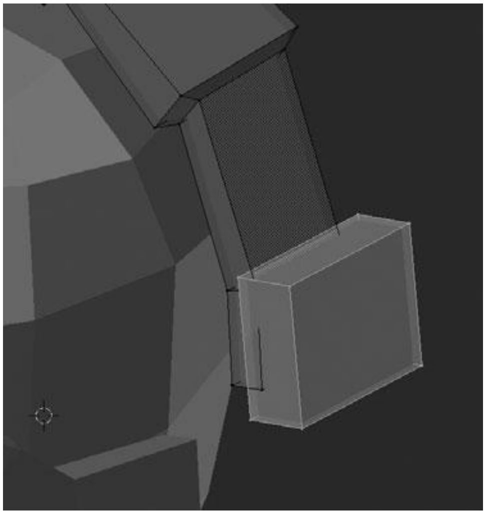

Figure 9.13
Result after scaling the cube appropriately to fit the modeling sheet

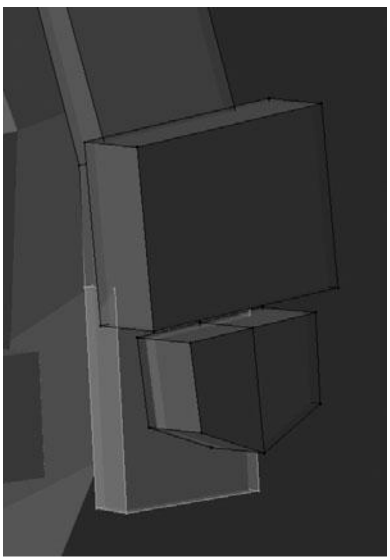

Figure 9.14
Additional earpiece added

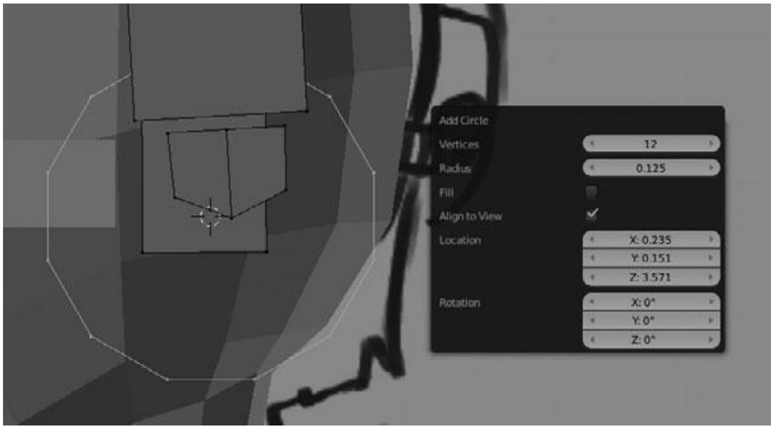

Figure 9.15
Adding circle for outer earpiece

Immediately after adding this circle, you should extrude it with E and press S to scale it down about 50 percent. After scaling it down, rotate the circle 15 degrees around the X axis in order to make the middle two loops parallel with the Y axis. Now select the top half of the circle and delete the faces, leaving exactly half a circle, as shown in Figure 9.16.

Now that you have a half circle, you need to extrude the edge nearest her face straight up about one Blender unit along the Z axis and scale down the opposite edge slightly, as shown in Figure 9.17.

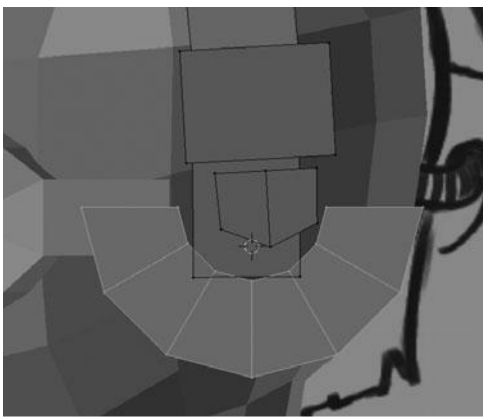

Figure 9.16
Extruding and removing half of the circle for outer earpiece

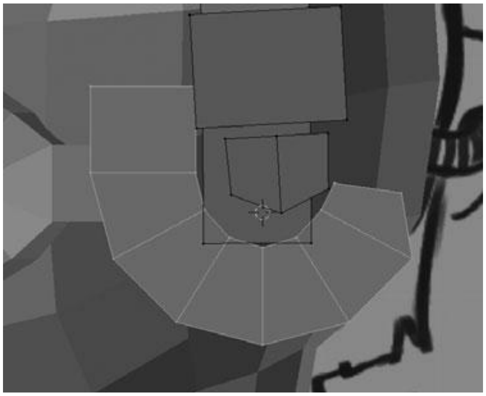

Figure 9.17
Extruding and shaping the outer earpiece

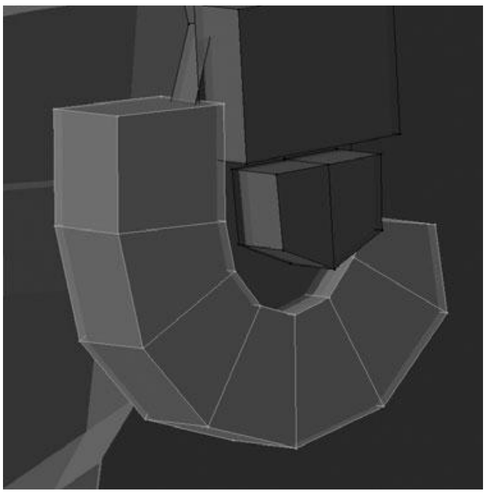

Figure 9.18
Final outer earpiece

This leaves you with the general shape of the outer earpiece, which you will now extrude along the X axis in order to add depth. See Figure 9.18. At this point, you are almost done with the earpiece; there are just a few more steps.

First you need to scale the bottom of the headband out along the Y axis so as to fill the space sufficiently, as shown in Figure 9.19.

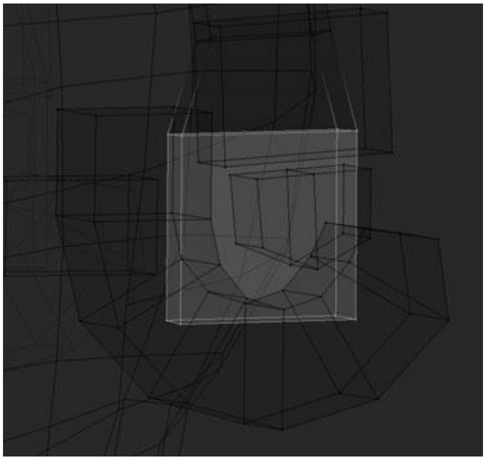

Figure 9.19
Scaling the bottom of the headband to fill the space

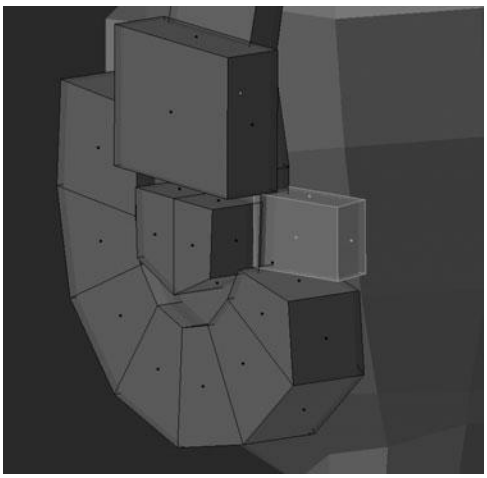

Figure 9.20
Adding the back cable connector

Then you add another cube at the back of the earpiece, scale it down, and then rotate in order to get something similar to Figure 9.20. Then, add another circle for the inner earpiece with six vertices. Then extrude this circle twice, once along the X axis to add thickness and then scaled down for the surface. After

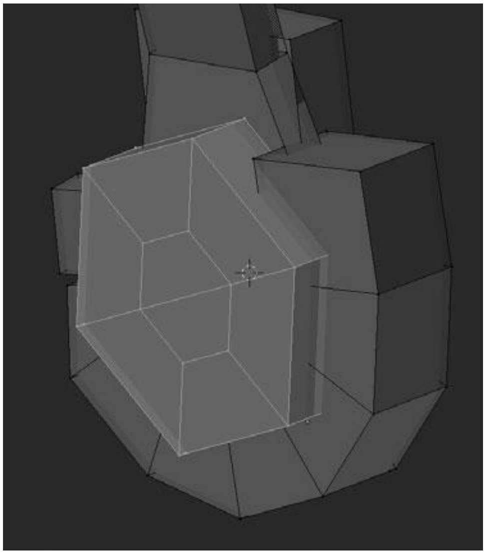

Figure 9.21
Adding the inner earpiece

scaling down the inner circle, select one half at a time, four vertices, and press F to fill in a face. Then fill the second face so that you end up with something like Figure 9.21. Lastly, with all pieces in place, select the entire earpiece with the Box-Select tool (B) and then rotate them slightly from the Front view to fit the modeling sheet better. See Figure 9.22. This completes the earpiece so now you can move on to the support at the back of the head.

To get started on the support, you need to add a cube, scale it down along the X and Y axes, and then move towards the X axis in order to lock it in place. After doing this, delete the inside face so as not to obstruct the Mirror Modifier, as shown in Figure 9.23.

Note

Remember, at this point I am giving more of an overview of the modeling process, rather than a step-by-step description. If you get lost, please refer back to Chapter 8 for reference on how to use each of the tools mentioned here.

With the cube added at the back of the head, you now need to add two new horizontal edgeloops with the Loop Cut tool (Ctrl+R) and then scale them out

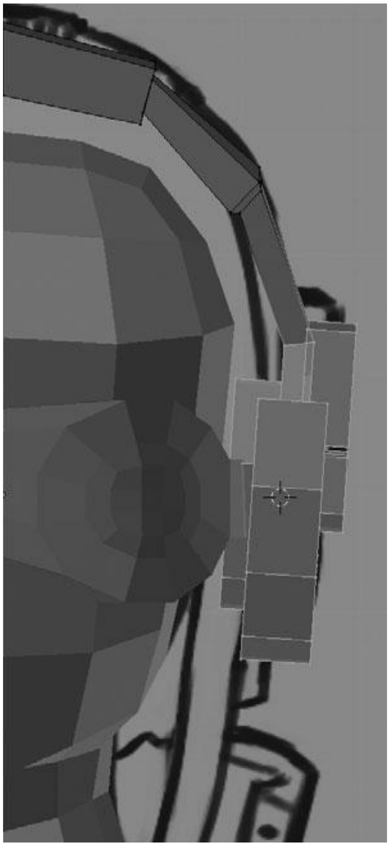

Figure 9.22
Shaping the headset to fit the character's head

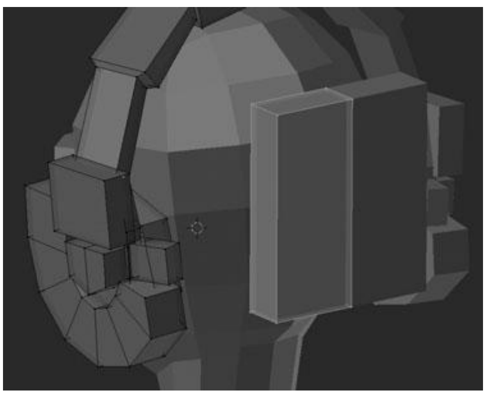

Figure 9.23
Adding a cube and scaling for the back support

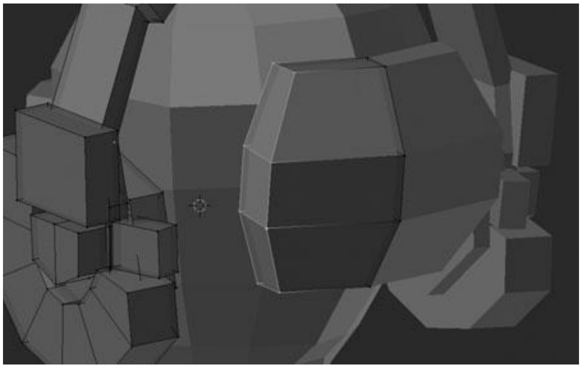

Figure 9.24
Adding loops to and shaping the support

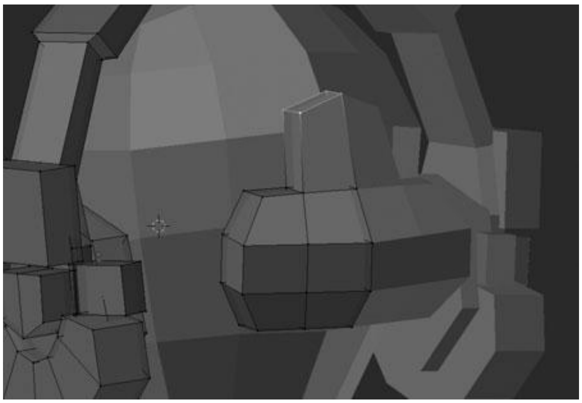

Figure 9.25
Shaping and extruding the support

to form Figure 9.24. Next, scale the whole thing down along the Z axis and extrude the inner, top face along the Z axis to form Figure 9.25. After this, extrude the same face and scale it down a bit, followed by two more extrusions, for Figure 9.26. This completes the back support and you are now ready to move on to blocking in the hair.

Modeling the Hair

So far, you've been using basic box modeling to model the accessories you've created. For the hair, you will start with a box, and then smooth and subdivide it a few times, and then start extruding the basic shapes of the major hair strands.

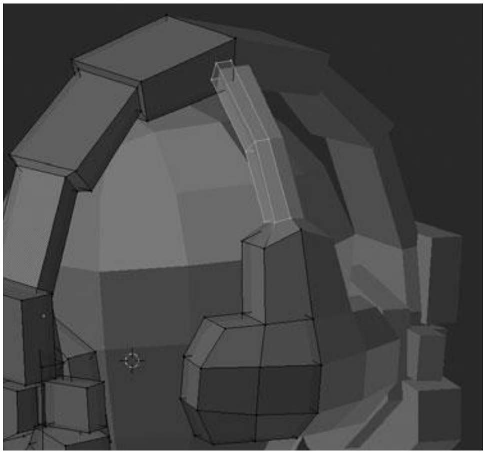

Figure 9.26
Extruding the top of the support

The first step is to center the 3D cursor along the X and Y axes in the center of the head and then add a new cube mesh object from Object Mode, as shown in Figure 9.27. After doing this, enter Edit Mode with Tab and then subdivide and smooth the cube by pressing W > Subdivide with the cube selected. Immediately after pressing subdivide, you should increase the number of cuts to four and the smoothness to 1.250; these can be set either from the Operator panel or by pressing F6 in the Viewport. See Figure 9.28. This leaves you with a mostly spherical object, which you may notice is comprised of entirely quads. If you had used a UV Sphere as a starting point, there would be a large number of triangles.

After smoothing out the sphere, you need to make it fit the overall head shape a bit better, which you can do by scaling it along the X axis primarily and a bit along the Y and Z axes too, if necessary. See Figure 9.29.

Now that the rough shape is done I want to open the front of the mesh by selecting what you see in Figure 9.30 and deleting the vertices. This will leave you with roughly the same shape of the typical hair-growth pattern, making a perfect starting point for the hair. In a moment you will begin extruding clumped strands of hair but first you need to clean up the mesh slightly, since this will be used for sculpting, by merging the two vertices you see in Figure 9.31. The merge is done by pressing Alt+M and choosing At Center. With this complete, you can begin extruding the strands.

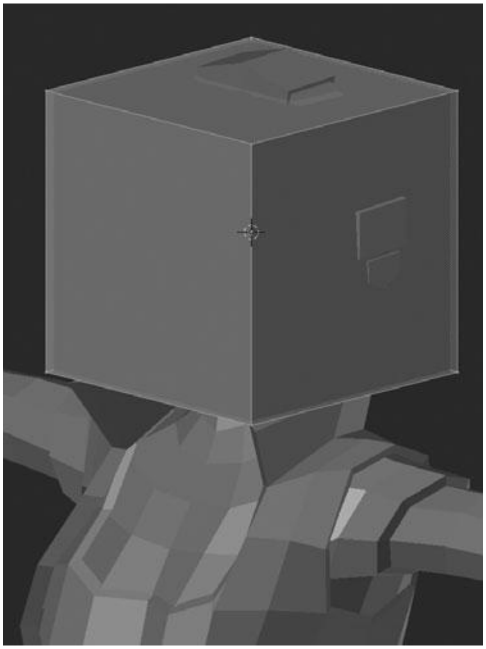

Figure 9.27
Adding a cube as the starting point for the hair

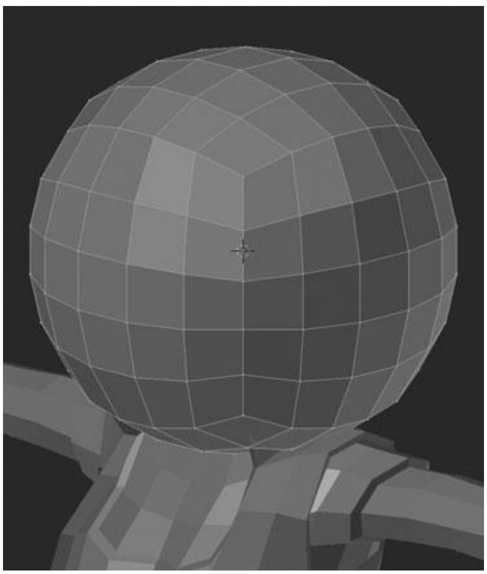

Figure 9.28
Subdividing and smoothing the cube to form a sphere

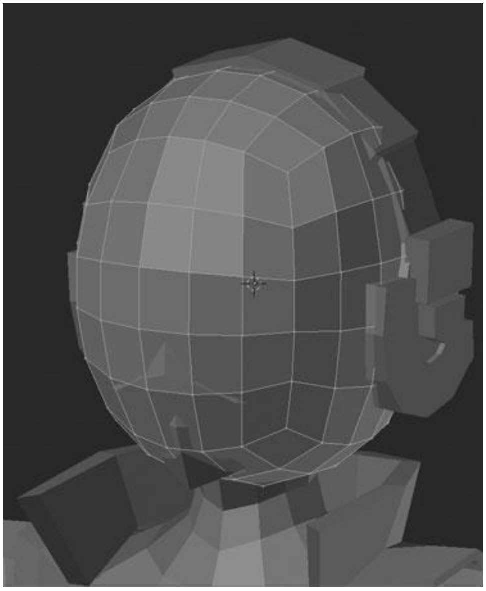

Figure 9.29
Shaping the sphere to fit the head

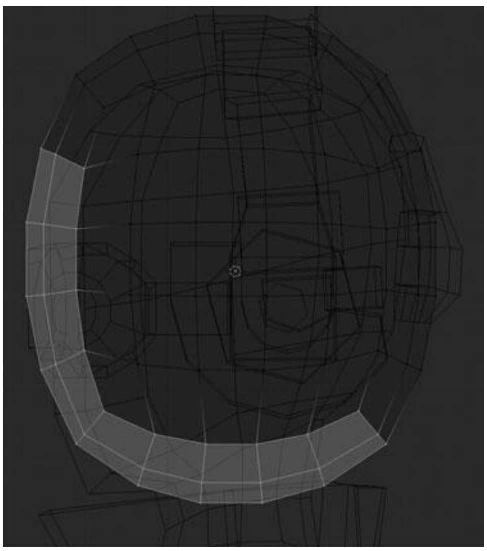

Figure 9.30
Deleting front of the sphere to form hairline shape

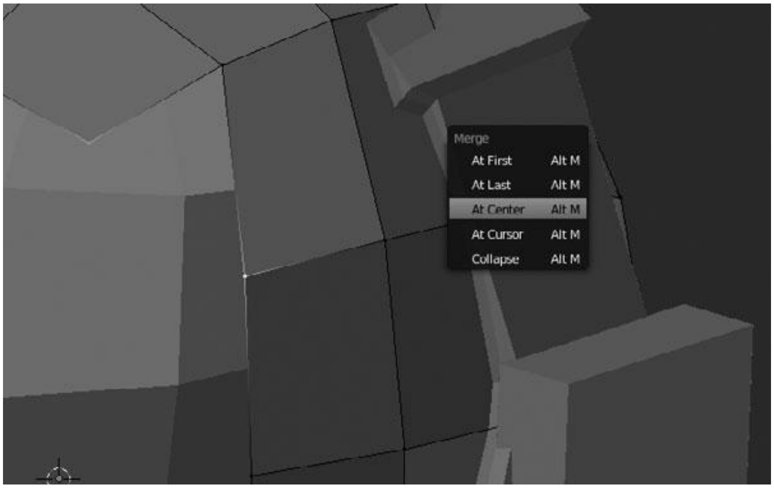

Figure 9.31
Merging vertices to form a smooth edge

Note

Since you are not using a Mirror Modifier on the hair, you need to be sure to merge the two vertices shown in Figure 9.31 and merge the same two on the other side of the model.

Extruding the strands of hair is quite simple; select one or more edges along the perimeter and then extrude them down several times, following the basic shapes shown in the modeling sheet. The first set of strand extrusions can be seen in Figure 9.32, notice that I have extruded strands on both the left and the right

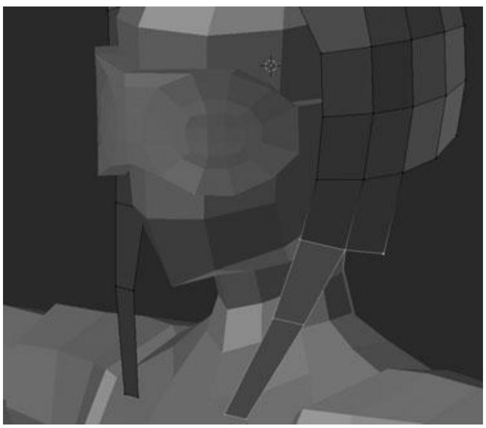

Figure 9.32
Extruding the first strand

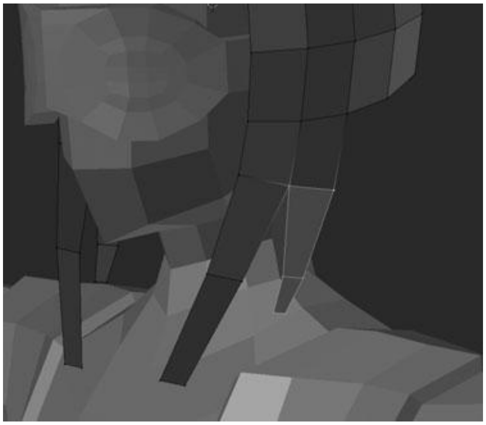

Figure 9.33
Extruding the second strand

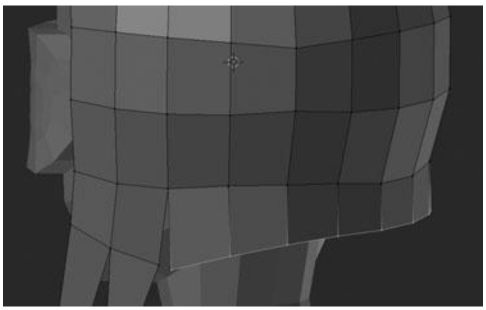

Figure 9.34
Extruding the full length along the back

sides of the model and that I first extruded two edges, and then proceed to extrude the front-most of those two edges a couple more times. This extra edge that was left behind will become the next strand, as shown in Figure 9.33.

Next you extrude the back of the hair along the whole length, and then extrude a few single edges to add variety and to match the modeling sheet. Figures 9.34 and 9.35 show this process. Once again, you should extrude roughly the same strands on both sides of the head. It's better not to use a Mirror Modifier here so as to help add asymmetry.

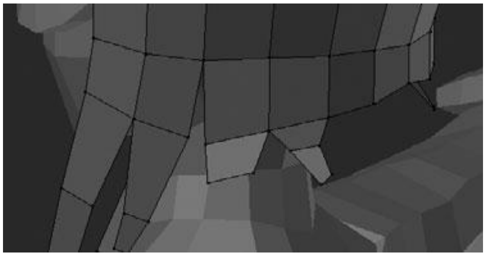

Figure 9.35
Extruding smaller strands along the back for variety

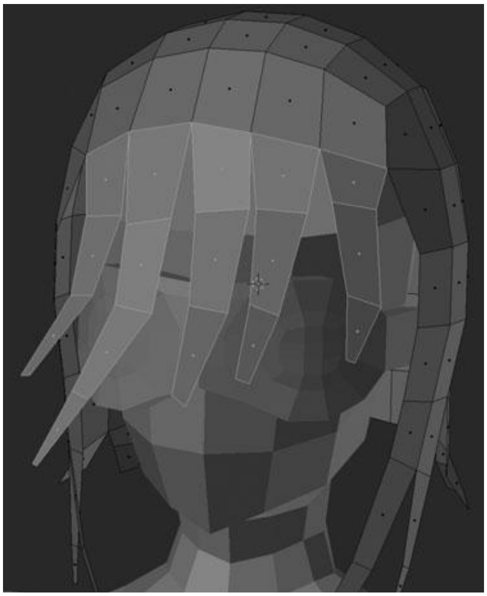

Figure 9.36
Extruding the bangs

The last set of extrusions you have to do is in the front, where you should extrude each edge several times to create the character's bangs, as shown in Figure 9.36.

This just about completes the main modeling of the hair. The last two steps are to add a Solidify Modifier with a thickness of something between 0.01 and 0.06, depending on your model (see Figure 9.37), and to scale the entire mesh in along the X axis to bring the shape closer in to the head. You can see the finished result in Figure 9.38.

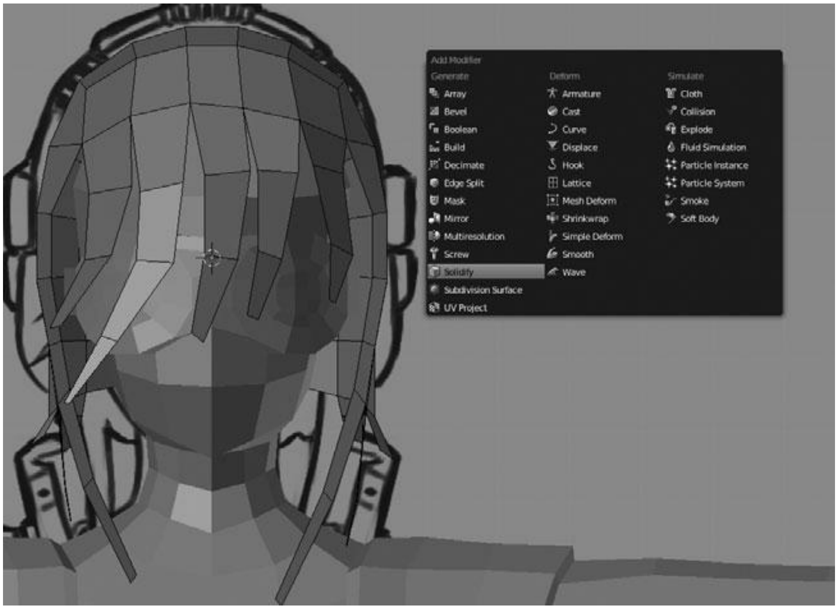

Figure 9.37
Adding a Solidify Modifier to the hair

Figure 9.38
Final base mesh for the hair

This base for the hair will give you an excellent starting point when you begin the sculpting process in Chapter 10. For now though, you will keep working on the accessories. Next up is the backpack.

Modeling the Backpack

The backpack is going to be modeled with the same box modeling technique that you have been taught throughout most of the earlier parts. To get started, you need to create a new cube. Position your 3D cursor at the origin by pressing Shift+C and then repositioning it from the side view at the center of the backpack. By first centering at the origin, you can ensure that the cursor is exactly centered along the X axis before adding a new object. This new object will be a cube. Add it from Object Mode by pressing Shift+A so that it is created as a new object. After adding the cube, scale it down relative to the modeling sheet and scale a second time along the Y axis to make it thinner, as shown in Figure 9.39.

Then you need to add two new edgeloops with Ctrl+R and reshape the mesh to give something similar to Figure 9.40. Following this, you add two new vertical loops in the center and scale them out slightly to get what you see in Figure 9.41. This shape will form the actual "pack" portion of the backpack. The next step is to create the back support underneath the pack.

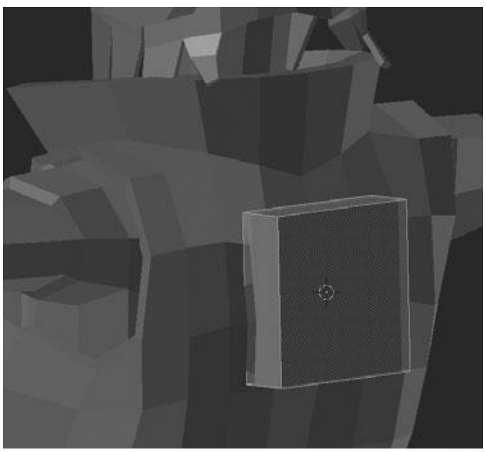

Figure 9.39
Starting point for the backpack

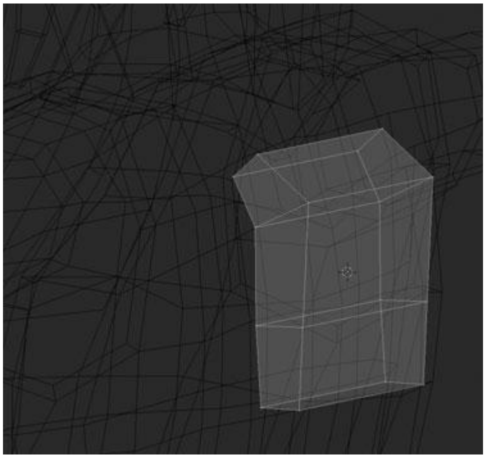

Figure 9.40
Shaping the backpack

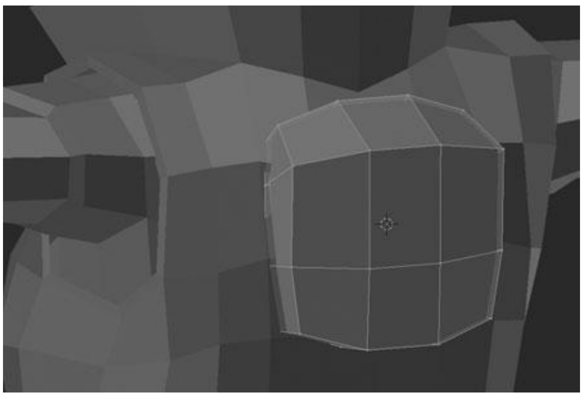

Figure 9.41
Smoothing out the backpack shape

While creating the back support, in order to speed up the process, use the pack mesh as a starting point. To get this started, you select the whole pack by pressing A and then duplicating it with Shift+D. After duplicating, and with the duplicate still selected, press W > Smooth to shrink the mesh down and average out the vertices. If needed, you can repeat this last smoothing step multiple times to give what you see in Figure 9.42. You can now use this to create the support, but before doing the next few steps, you need to select the pack and hide it by pressing H.

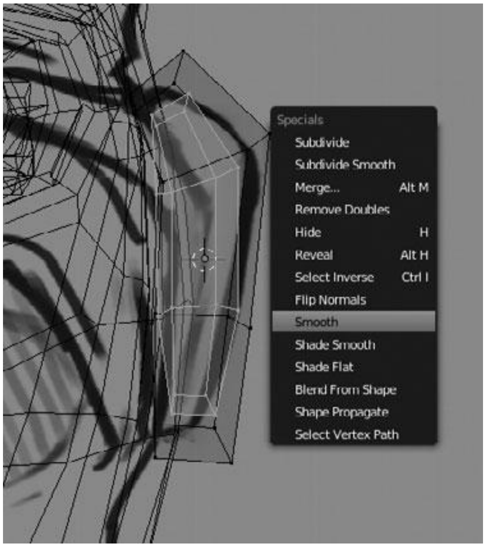

Figure 9.42
Creating the initial back support for the pack

Note

> You can easily select a whole mesh in Edit Mode by hovering your mouse cursor over one of the associated vertices and pressing Ctrl+L.

Now that you have isolated what is to become the back support, scale it up along the Z and X axes and delete the edgeloop that is second from the top. Precede this with a bit of shaping to get something similar to Figure 9.43. Move the whole support along the Y axis a bit to sit behind the pack mesh. Next, select the top-most side faces and extrude them out to form the area where the top straps attach, as shown in Figure 9.44.

Note

> Remember, if you ever have trouble following along with the text or the screenshots, simply refer to the modeling sheet to get your bearings. When in doubt, follow the shape of the modeling sheet, not the mesh.

You are now ready to add a Mirror Modifier. I waited to cover this until now because some of these transformations, primarily when scaling, are easier to do

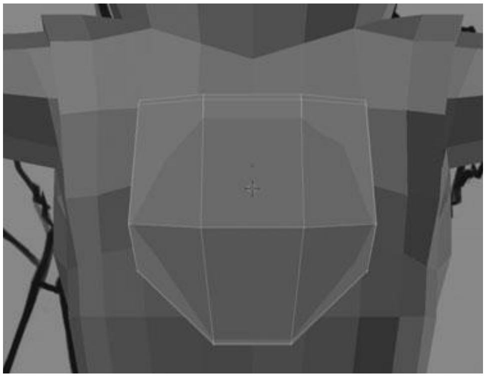

Figure 9.43
Shaping the back support

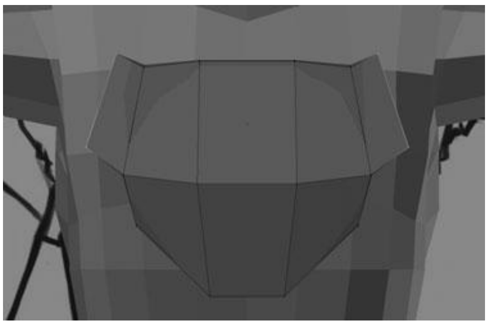

Figure 9.44
Extruding the attachment for the straps

with a non-mirrored mesh. Before adding the Mirror Modifier, though, you first need to add in a new central edgeloop and delete one half of the model, such as in Figure 9.45. This completes the basic shape of the back support, but you still need to add the rings for the straps to attach to.

To add the rings, you first need to reposition the 3D cursor in the center of one ring by clicking with your LMB from the back view (Ctrl+Numpad 1) and from the side view. After doing this, you add a Torus mesh with the settings seen in Figure 9.46. As soon as you have added the torus, rotate it to match the angle of the back support tab where it attaches and then duplicate the torus for the second ring. Rotate the second ring as needed to produce what you see in Figure 9.47. Now you can move on to the straps.

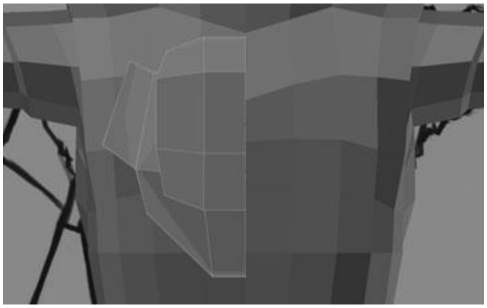

Figure 9.45
Deleting half of the backpack for a Mirror Modifier

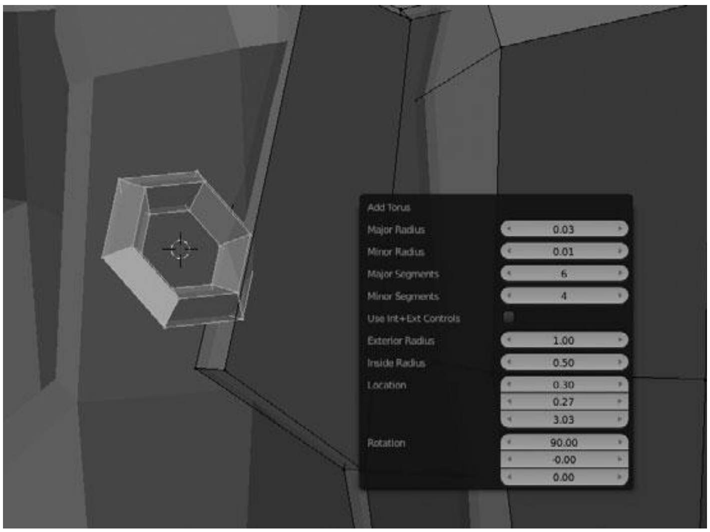

Figure 9.46
Adding a torus for the strap rings

The first strap you will work on is the strap over the shoulder. Since the strap will lie on top of the shoulder, it's easiest to actually use part of the shoulder mesh as a starting point. To do this, you need to first leave Edit Mode on the backpack by pressing Tab, selecting the coat mesh, and reentering Edit Mode. After entering Edit Mode, select the portion of the coat mesh on the shoulder that roughly resembles the shape of the strap, as you can see in Figure 9.48.

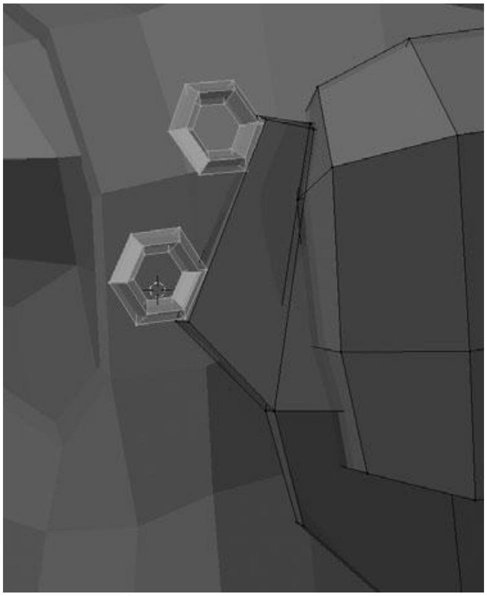

Figure 9.47
Positioning the second ring

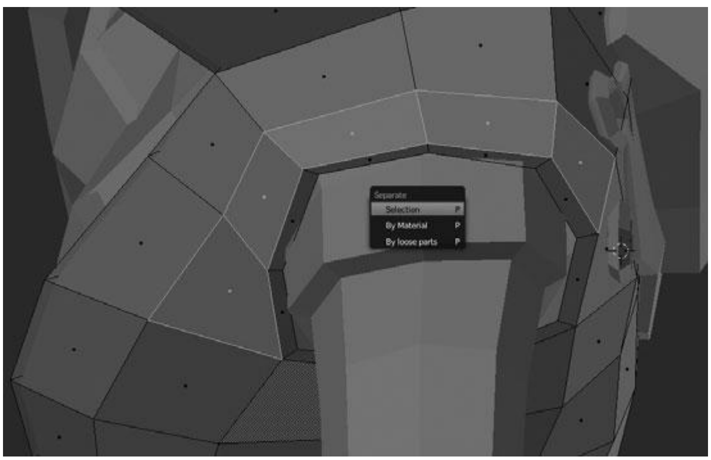

Figure 9.48
Duplicating and separating a selection from the coat for the strap

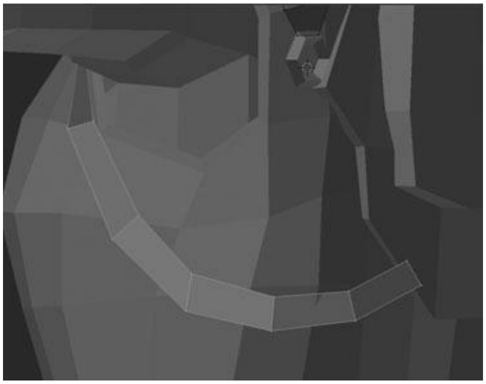

Figure 9.49
Extruding the strap under the arm

Duplicate this mesh, separate it to a new object with P > Separate Selection, and then leave Edit Mode and select the newly created mesh. After selecting the new mesh, enter Edit Mode again and begin forming the strap.

The first step in reshaping the strap is to select everything and press Alt+S to expand the mesh along the normals. Then you extrude the bottom, back edge and position the newly extruded edge on top of the lower of the two rings for the backpack strap. Next, move on to the front and extrude that bottom edge five times, each time transforming it as needed to give you Figure 9.49. The last step then to finish these straps is to add thickness by selecting everything with A, extruding with E, and then while still in Grab Mode from the extrusion pressing Alt+S to shrink the extrusion along the normals. You can see the final result in Figure 9.50.

At this point you are almost done, but there is still a couple more things to do. These are to add the ring on the bottom of the backpack and to add that lower strap. You'll add the ring as a new object from Object Mode after positioning the 3D cursor as shown in Figure 9.51. You can use similar settings as the previous rings but with more major segments. After adding and positioning the ring, reselect the backpack and enter Edit Mode to create the lower strap. This lower strap can be created much the same way as the shoulder strap but I will use the bottom edge of the backpack support as a starting point. I can simply select the edge, duplicate it, move it down to fit the inside of the ring, and then extrude it

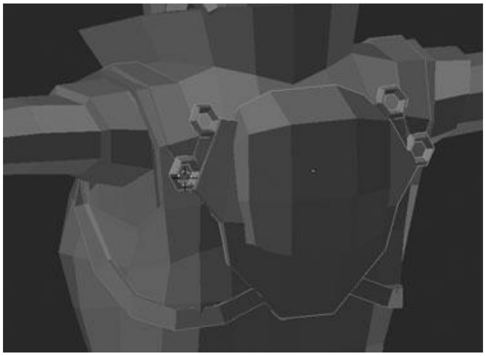

Figure 9.50
Final strap shape

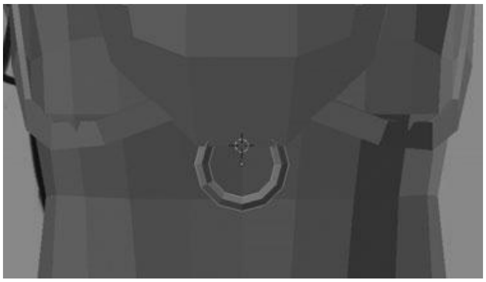

Figure 9.51
Adding the lower ring

several times in each direction to wrap around the inside and flow down the back towards the belt. Following the extrusion process, reshape the inside edge of the strap to follow the curvature of the ring and add thickness to the whole strap in the same way as the shoulder straps. Figure 9.52 shows the result. You are now ready to block in the belt.

Creating the Belt

You can start creating the belt by using the same technique as for the shoulder strap. That is to say, you can use part of the coat as a starting point. Begin by entering Edit Mode on the coat, selecting one of the loops around the waist, and then pressing P > Separate Selection. After doing this, leave Edit Mode on the coat only to select the newly formed mesh and reenter Edit Mode. Once you have done this, scale out the loop slightly and then extrude it to form something like Figure 9.53. Notice that since you used the coat as a starting point, the new

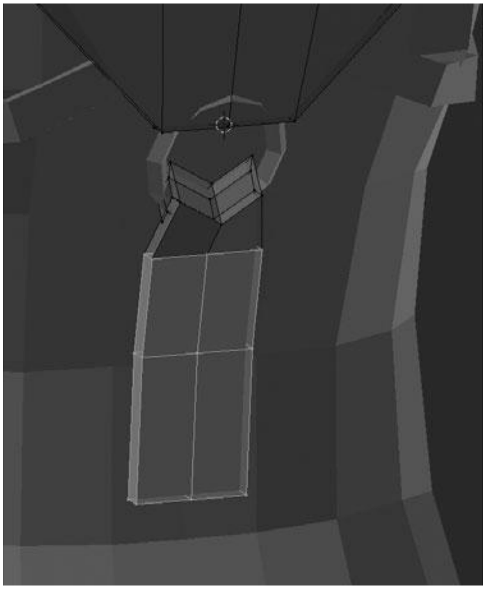

Figure 9.52
Adding and extruding the lower strap

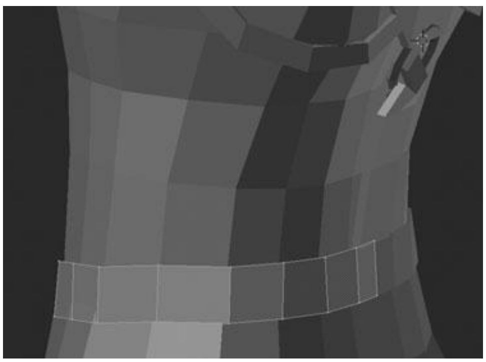

Figure 9.53
Adding the belt

mesh has inherited the modifiers, which in this case is the Mirror Modifier; this is exactly what you want.

Create the start of the belt buckle by selecting the four vertices that make up the inside, front face and pressing Y to split the selection. What this does is similar to the Separate tool (P) that you have been using a lot, but rather than

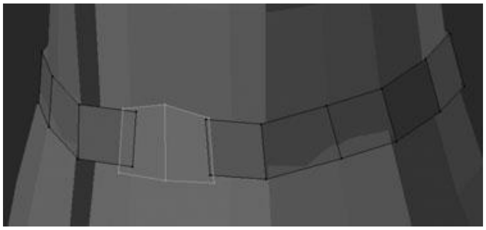

Figure 9.54
Splitting out the mesh for the belt buckle

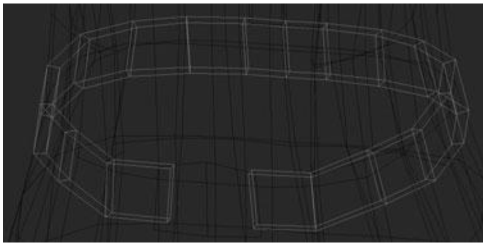

Figure 9.55
Final belt result

separating it to a new object the Split tool only separates the selection into a new mesh. After splitting the selection, you can scale it out slightly with S to form Figure 9.54.

That last step leaves you with the foundation of the belt but you still need to add thickness to it. You also need to separate the belt buckle to a new object. You can add thickness to the belt by adding a Solidify Modifier, as shown in Figure 9.55. The settings are shown in Figure 9.56.

You can now switch over to the belt buckle by Tabbing out of Edit Mode, selecting the buckle object, and pressing Tab again to enter Edit Mode. Extrude the buckle once to add thickness and then duplicate it and move it to the back of the character to use as a starting point for the strap connector in the back. See Figures 9.57 and 9.58. After duplicating the mesh for the back, you just need to extrude the side of the back piece once and flatten the top to fit the modeling sheet, as shown in Figure 9.59. This completes the belt; it is time to move on to the armbands.

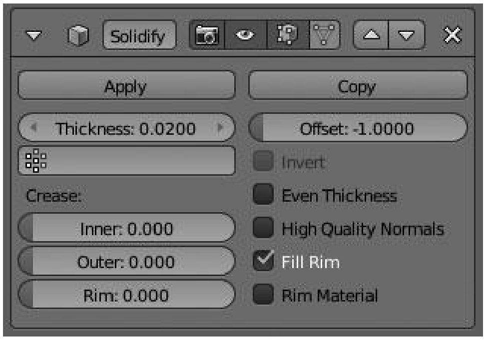

Figure 9.56
Solidify Modifier settings for belt

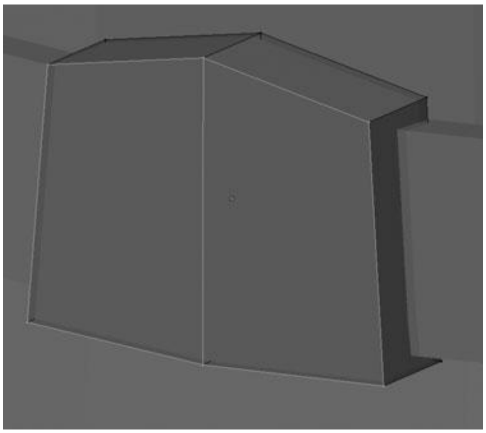

Figure 9.57
Extruding the belt buckle

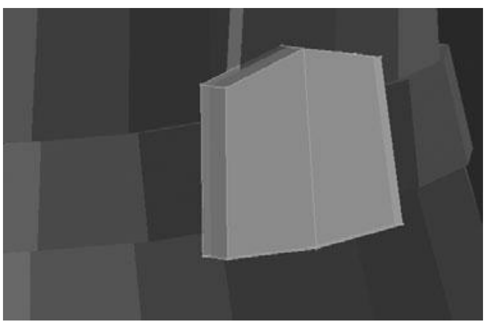

Figure 9.58
Duplicating the belt buckle for the back strap connector

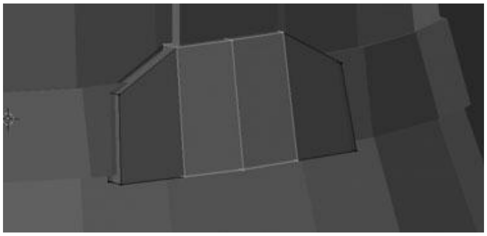

Figure 9.59
Modifying the back strap connector

Creating the Armbands

Once again, you will create the armbands using the same technique as the belt and the shoulder straps. However, this time you use the arm mesh as a starting point. Going into Edit Mode on the arm, select the two edgeloops near the elbow, as shown in Figure 9.60, and then duplicate and separate them. Now that you have them as their own mesh, enter Edit Mode on them and smooth the outer loop slightly such that it has a straight edge, as shown in Figure 9.61. Next, you add two new edgeloops right down the center and slide each of them out towards the side. You can slide the edgeloops after using the Loop Cut tool.

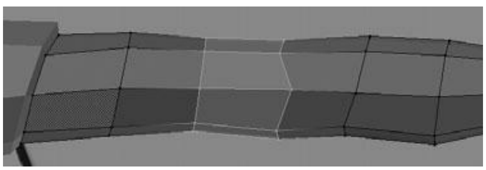

Figure 9.60
Starting point for the armbands

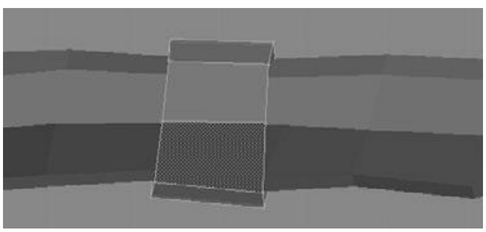

Figure 9.61
Duplicating, separating, and straightening the sides of the armbands

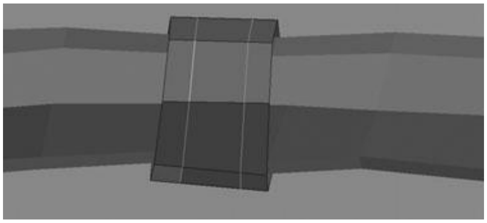

Figure 9.62
Sliding the two new edgeloops towards the outer edges

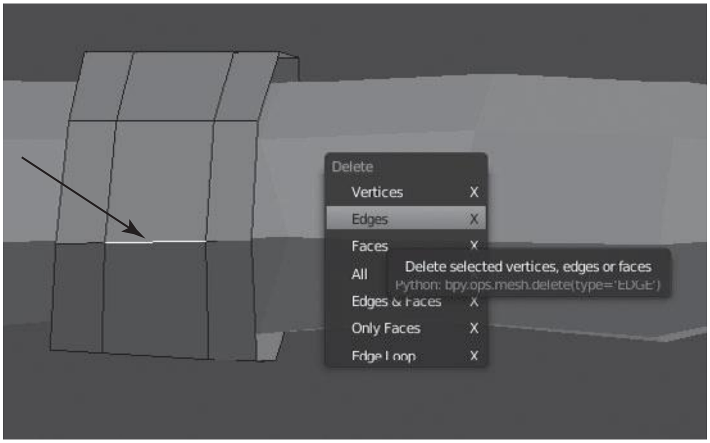

Figure 9.63
Deleting the center of the armbands

Select one edgeloop with Alt+RMB and press Ctrl+E > Edge Slide. Do this for both edgeloops to get Figure 9.62.

Following that last step, you need to switch to Edge Select Mode by pressing Ctrl+Tab > Edge and then select the middle, horizontal edge on both the front and the back. After selecting these, delete them by pressing X > Edges, as shown in Figure 9.63.

This will leave a hole in both sides to fit the design in the modeling sheet. You can leave the front just as is, but on the back you need to add the strap bit where perhaps the armband would button to itself, as shown in Figure 9.64.

You can do this by selecting the bottom, outer edge that forms the hole and pressing V to rip it away from the adjacent face, as shown in Figure 9.65.

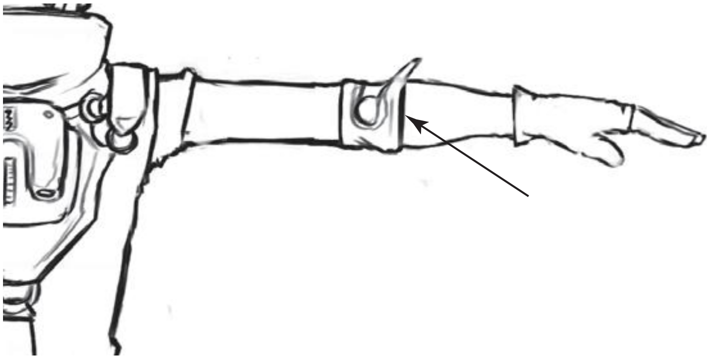

Figure 9.64
Armband straps on the modeling sheet

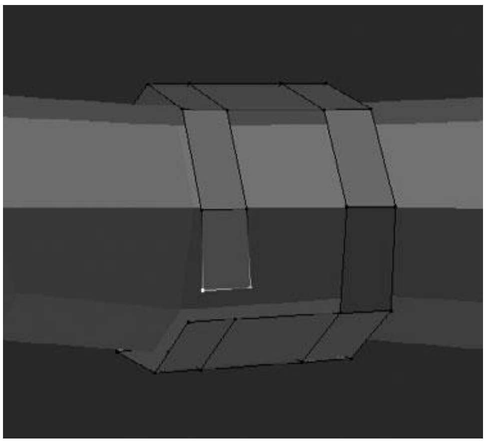

Figure 9.65
Ripping the edge for the strap

Once you have done this, you should extrude it and the edge it was originally connected to several times to form the basic straps, as you can see in Figure 9.66. It does not need to be exact, just close enough to give the basic impression of the straps. Remember, you will be sculpting on this later and so most of the details will be done at that point.

The last step on the armbands is to add thickness. In this case, since you will be sculpting on it, you can use Extrude and Alt+S to form the thickness. If you were

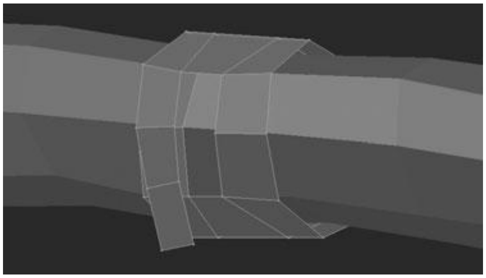

Figure 9.66
Extruding the armband strap

to use Solidify, you would need to apply the modifier before sculpting. Having done that, you can move on to the sword and scabbard.

Note

You may be wondering why I recommended using Solidify on the belt, if you only have to apply it later for sculpting? Well in the case of the belt, you don't actually sculpt; the work is done manually so Solidify works perfectly.

Modeling the Sword and Scabbard

Discounting the belt, the scabbard is perhaps the easiest accessory base mesh to model. The sword is not too far behind it. This section starts with the scabbard and then moves on to the sword.

To get going on the scabbard, first place you 3D cursor appropriately at the top of the scabbard and add a new Cube mesh from Object Mode. Upon adding the cube, enter Edit Mode and scale down the cube to fit the correct width based on the modeling sheet. You should also scale down the thickness along the Y axis as you best see fit since no side view of the scabbard was provided. With the initial cube now scaled correctly, you can select the bottom vertices and pull them down towards the end of the scabbard, just before it curves at the tip. Then you can extrude that same selection once and scale slightly along the X axis to form the tip of the scabbard, as shown in Figure 9.67.

Next select the entire tip, duplicate it, and then scale out slightly with Alt+S to form the metal end cap, as shown in Figure 9.68. The scabbard is almost done; you have just a few things to do. First off, add two vertical edgeloops to the end

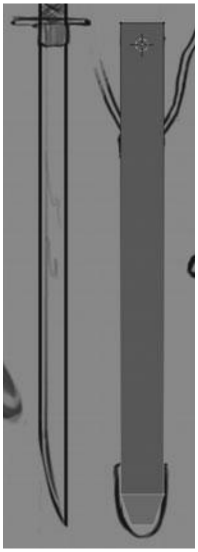

Figure 9.67
Basic scabbard shape

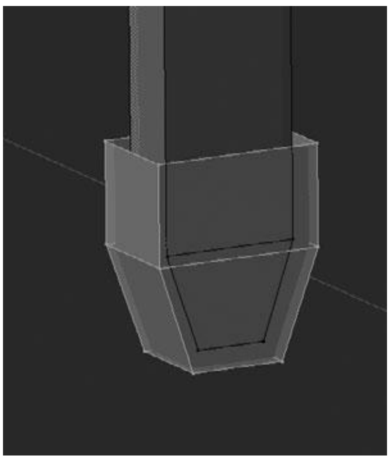

Figure 9.68
Duplicating the tip

cap and then delete the upper face on both sides to produce Figure 9.69. Secondly, delete the face at the top of the scabbard, where the sword will be placed so that you can add a Solidify Modifier for the thickness, as shown in

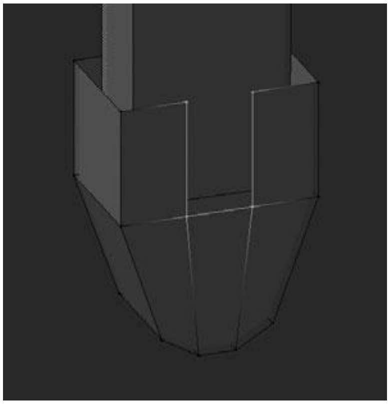

Figure 9.69
Adding edgeloops and removing edges to form the tip shape

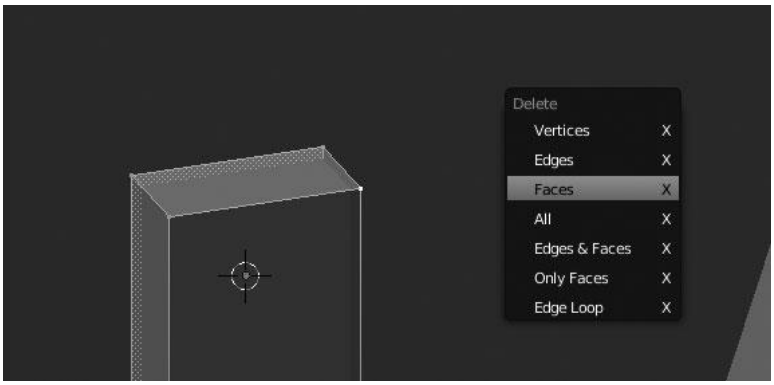

Figure 9.70
Deleting the top face

Figure 9.70. Lastly, add one more cube while still in Edit Mode, and then scale the cube down and delete the top and bottom faces (so as not to conflict with the Solidify Modifier) to give the strap attachment shown in Figure 9.71.

Now that the scabbard is done, you can move on to the sword. You will start the sword the same way by adding a new cube and then extruding it several times for the blade. However, this time, you should tweak each of the extrusions so as to fit the profile of the blade as you can see in Figure 9.72. Next, add a second cube from Edit Mode and scale it to fit the size of the grip, as shown in Figure 9.73.

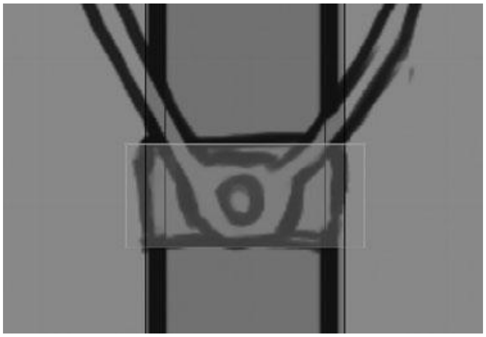

Figure 9.71
Adding the strap attachment

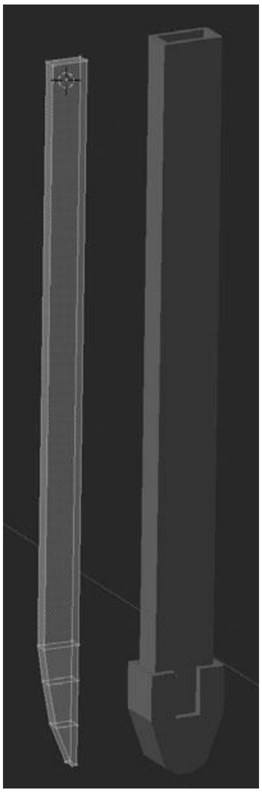

Figure 9.72
Extruding the blade shape from a cube

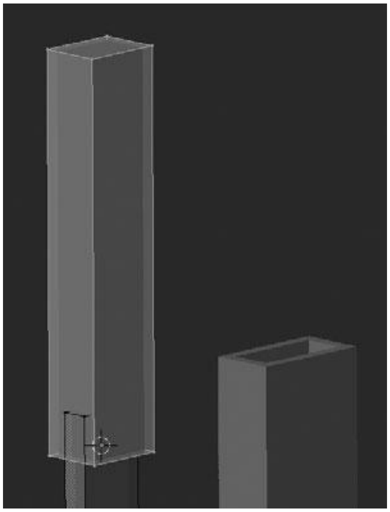

Figure 9.73
Adding the grip

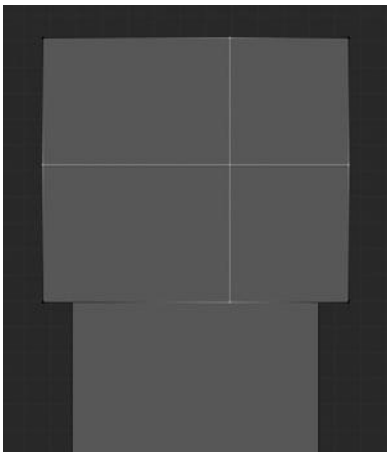

Figure 9.74
Adding loopcuts to a cube for the pommel

After the grip, add the pommel via another cube, but on this cube add a horizontal and a vertical loop using the Loop Cut tool, as seen in Figure 9.74. Following this, you can delete the lower-left two vertices and fill in the faces and

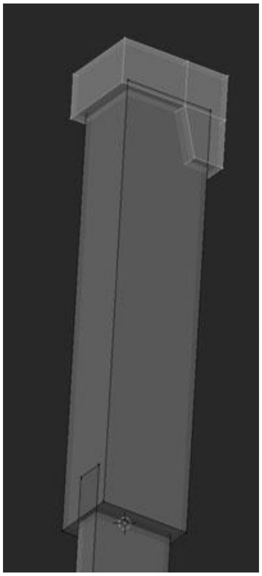

Figure 9.75
Shaping the pommel

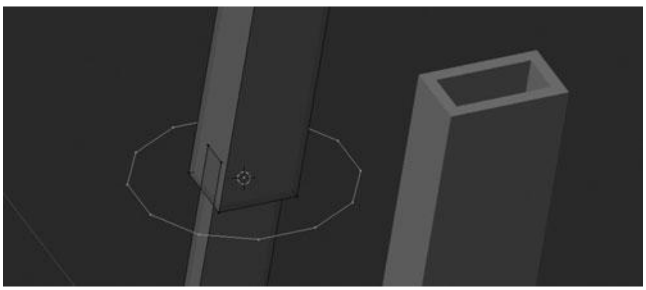

Figure 9.76
Adding a circle for the guard

then be left with Figure 9.75 (after some minor tweaking). You should now be ready to create the guard.

You can create the guard by adding a circle with twelve vertices, positioning it at the correct location relative to the modeling sheet, and then scaling it down along the Y axis in order to create an oval shape, as shown in Figure 9.76.

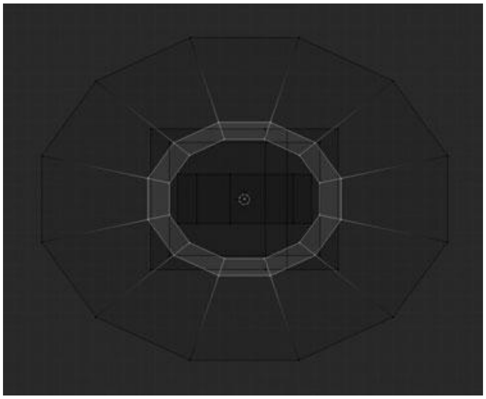

Figure 9.77
Extruding the guard

Next, extrude and scale that circle twice to produce what you see in Figure 9.77.

This provides you with the basic shape of the guard, but in order to fit on the hilt correctly, you need to straighten out the inside edges to form a rectangular shape. You can do this by selecting first an edgeloop on the right and an edgeloop on the left and then scaling to zero along the Y axis. After doing this on both sides, you are left with Figure 9.78. You then just need to take the inside vertices that are still arced and snap them along the Y axis to the edges you just straightened. You can do this by selecting them, and then pressing Ctrl+Shift+Tab > Vertex.

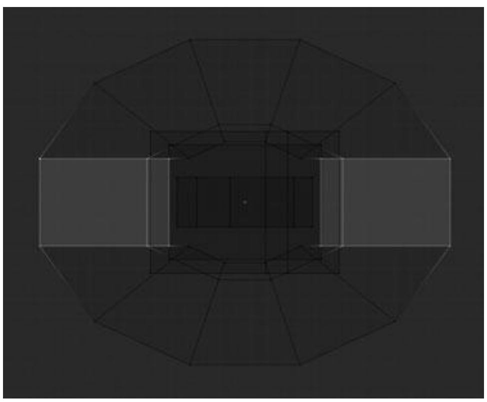

Figure 9.78
Straightening the loops through the guard

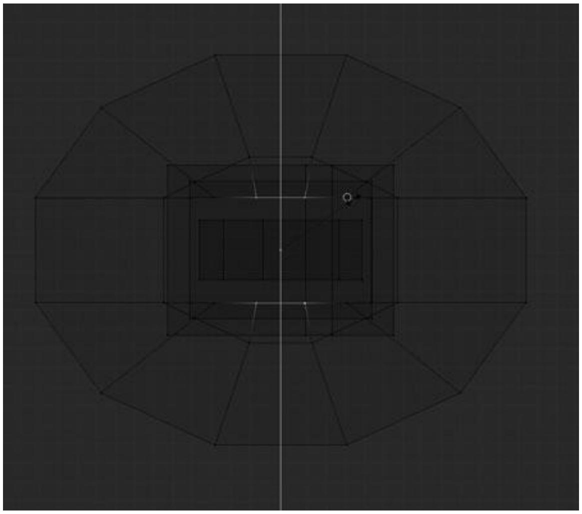

Figure 9.79
Snapping the inner vertices straight

Then, scale the vertices while constrained to the Y axis. During this scaling, hold Ctrl and hover your mouse cursor over one of the appropriate vertices to snap the transform to the vertex under your mouse. See Figure 9.79. You can then also snap the inside vertices of the middle edgeloop in as well, so they too form a straight line, as shown in Figure 9.80. The last step to complete the guard (and in

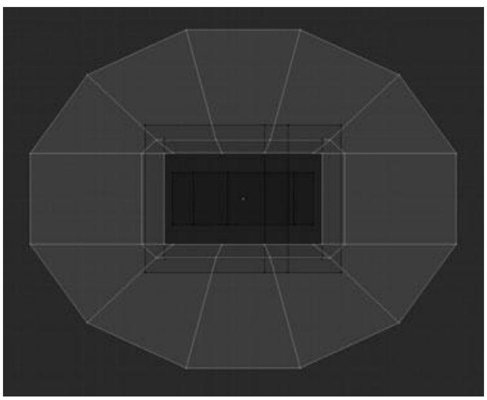

Figure 9.80
Snapping the middle vertices straight

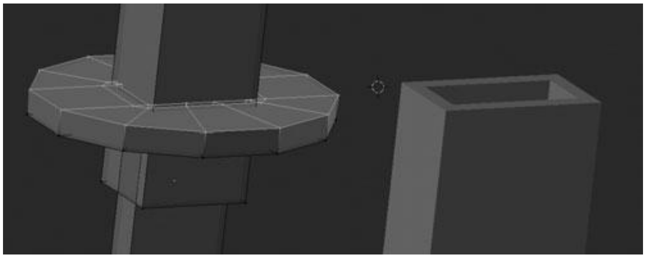

Figure 9.81
Extruding the guard

fact the whole sword) is to add thickness to the guard by selecting all of it and extruding up slightly; you should get Figure 9.81.

You are now ready to move on to blocking in the final accessory—the necklace.

Creating the Necklace

Just like multiple parts before it, you will use an existing mesh as the starting point for the necklace. In this case, you will create the necklace from an edgeloop in the neck of the character, as shown in Figure 9.82. After duplicating and separating the necklace out to a new mesh, extrude it once and move it appropriately to form a flat band shape that sits nicely on her neck, as shown in Figure 9.83. After extruding, add a Solidify Modifier for thickness.

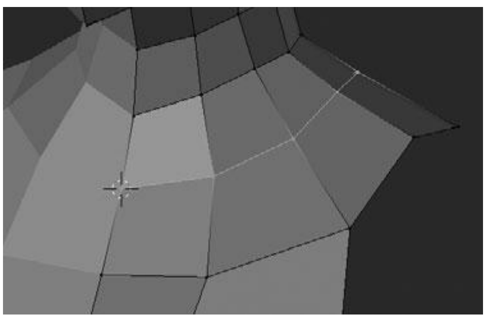

Figure 9.82
Starting point for the necklace

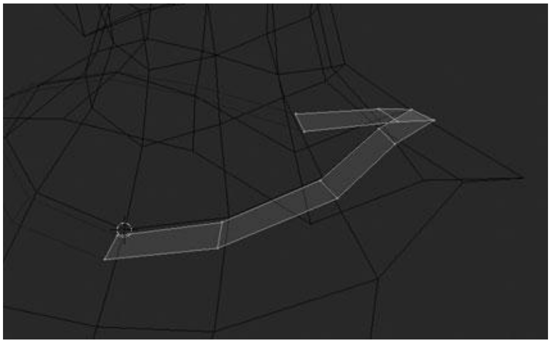

Figure 9.83
Extruding the necklace for width

Note

Sometimes you might find that the Solidify Modifier created a jumbled mesh. Most of the time this problem can be solved by selecting all faces and pressing Ctrl+N to recalculate the normals.

Now that you have created the band of the necklace, it is time to model the pendant. Start by placing the 3D cursor in the center of the pendant on the modeling sheet and then add a new cube. Once the cube is added, scale it down along the Y axis to make it thinner. Scale the top face of the cube along the X axis to form a basic triangular shape. This gives you the necklace, but there is one last thing you need to do. Currently the necklace, including the pendant, has a Mirror Modifier and a Solidify Modifier on it, but you do not want these to be included on the pendant. In order to fix this, you just need to separate the pendant and delete the two modifiers on it, as shown in Figure 9.84. This completes the necklace base mesh. The final model is illustrated in Figures 9.85 through 9.87.

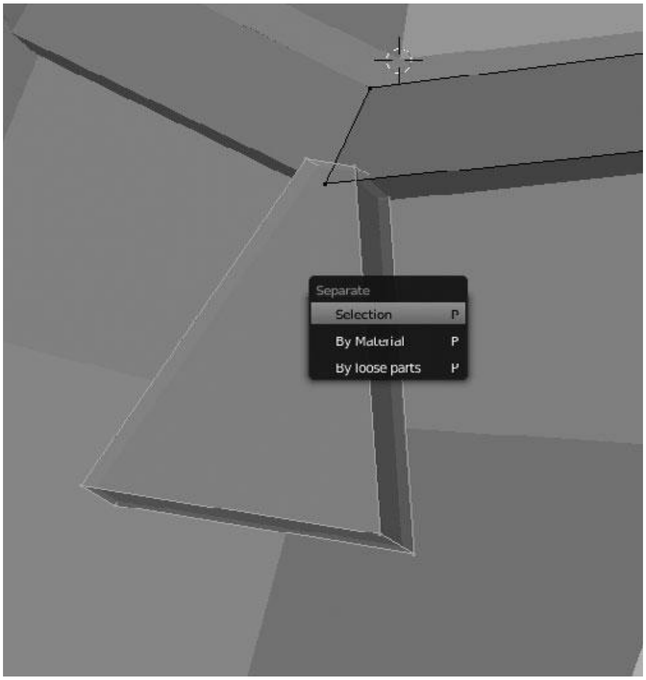

Figure 9.84
Pendant shape for the necklace

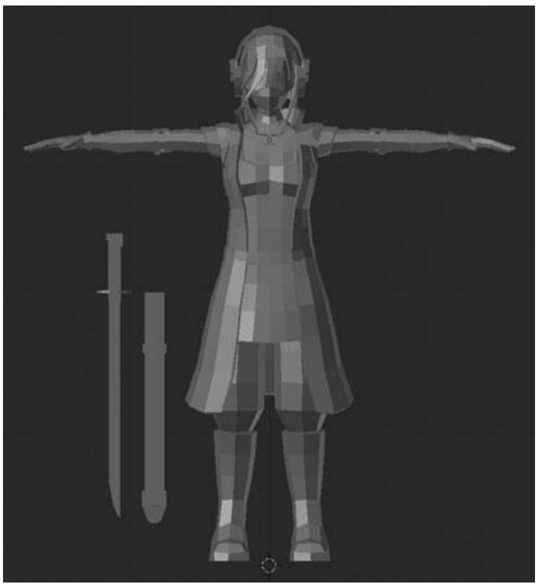

Figure 9.85
Front view of final base mesh

Figure 9.86
Side view of final base mesh

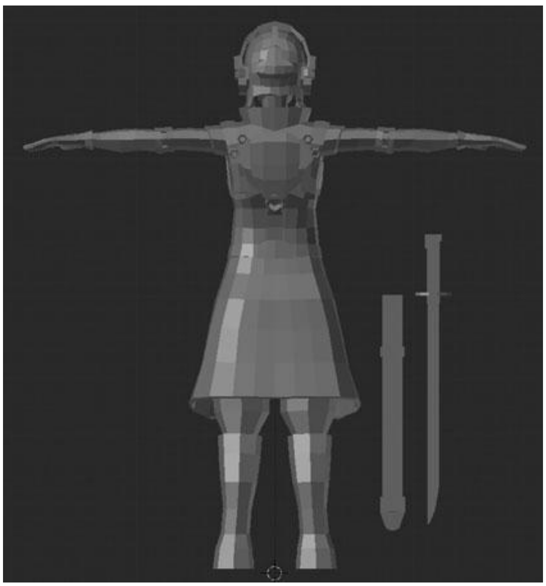

Figure 9.87
Back view of final base mesh

Summary

There you have it! At this point you have finished blocking in all of the accessories and the rest of the character. It was a lot of work to get to this point and I hope you have been able to follow along so far. In this chapter you should have become more comfortable with the same basic modeling tools that you used in Chapter 8 and hopefully seen a lot of ways in which you can model different kinds of objects. The next stage of the process is to detail everything either by manually modeling the details or by sculpting them. The techniques you'll learn to use will depend on the object you are working on and the kind of detail it needs.

Chapter 10

Sculpting and Modeling the Body and Clothing Details

The previous chapter spent a lot of time teaching you how to create a simplified version of all the components that make up the sample character. This process made use of many of the essential modeling tools—including transform, duplicate, and extrude—and also made good use of several modifiers. In the end, you were left with a model that greatly resembled the concept provided by David Revoy, but in a very simplified form. For most cases, you'll want much more detail than what you have so far. Therefore, in this chapter, you learn to create and apply more detail to the model.

This chapter is devoted to two concepts: sculpting and more intense modeling. You'll learn how to use the sculpt system that was demoed in Chapter 6 and you'll learn how to take the modeling practices taught in the previous chapter to the next level. You'll start by using the sculpting system to create the detail on the model's face, neck, chest, hair, arms, and clothing. Then you will go on to use a combination of sculpting and modeling to create the details on her boots.

Before you jump in and begin learning the sculpting and detailed modeling process, I want to give you a warning that relates to sculpting. Sculpting is one of those skills, much like drawing, that can be taught only to a certain level. I can show you the techniques and the basic ways to go about it, but becoming comfortable and skilled at the process is almost entirely up to you. This chapter does its best to provide tips and tricks along the way, but this topic, perhaps more than any other, is mostly on you. I encourage you to follow along. If you become frustrated at any point, go back to the beginning and start again or test the techniques on a simpler model. Much like drawing, sculpting is one of those skills that's best mastered through lots of practice.

Sculpting the Face, Neck, and Chest

To get started, you need to prep the model for sculpting. This is an easy and quick task, but quite important. However, before you get started, refer back to Chapter 6 if necessary for the basics of sculpting.

In order to prep the mesh, you must first select and isolate her head, neck, and chest mesh by selecting it and pressing Shift+H. Once this mesh is isolated, apply the Mirror Modifier so that you will be left with a single, whole mesh, as shown in Figure 10.1. This is important, as the Multiresolution Modifier, which you will be using for sculpting, must be placed at the top of the modifier stack.

The next step after applying the Mirror Modifier is to reposition the origin point of the mesh. In this case, the origin point is located at the origin of the scene (the intersection of the X, Y, and Z axes), but this is not ideal because when you rotate around the scene it is very easy to lose track of the mesh. To reposition the origin, enter Edit Mode, select the entire mesh (easily done by pressing A), and

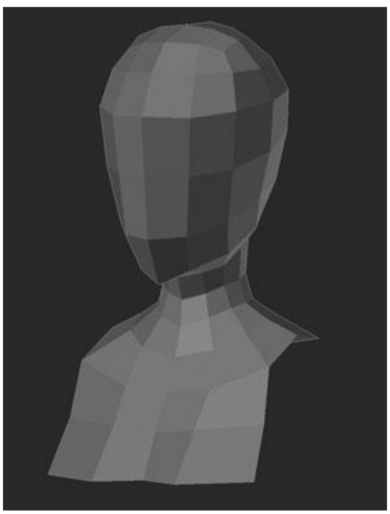

Figure 10.1
Base mesh for the face, neck, and chest

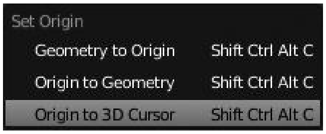

Figure 10.2
Re-centering the origin

Figure 10.3
Using the Search menu to find a tool

then press Shift+S > Cursor to Selection. This will position the 3D cursor in the center of the mesh, which you can then use to relocate the origin point. After centering the cursor, you must leave Edit Mode (or else you will receive an error) and then press Ctrl+Alt+Shift+C > Origin to 3D Cursor, as shown in Figure 10.2. Another way to do this, if you have trouble memorizing that complicated key combination, is simply press the Spacebar to bring up the Search menu and then search for "origin," as shown in Figure 10.3.

Note

The Rotate Around Selection option, from the Interface category of the User Preferences, is enabled so that your view will orientate around whatever object(s) you have selected rather than around the scene origin.

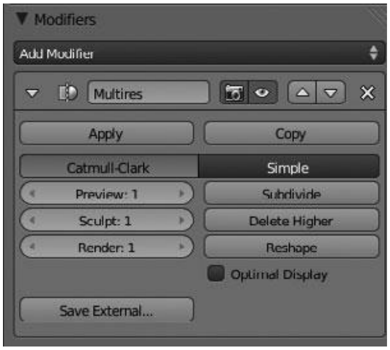

Figure 10.4
Raising the multires level

These previous two steps leave you with a mesh almost ready to begin sculpting on. However, before sculpting, there is one last thing that you must do and that is to add a Multiresolution Modifier. You can add the modifier by choosing it from the Add Modifier menu in the Modifier Properties window. After doing this, press the Subdivide option once to increase the level to 1 from 0, as shown in Figure 10.4. This will be a good starting point and you are now ready to begin sculpting.

Note

Note that the shading type is set to smooth; this is a personal preference. Whether you choose to do this or not is entirely up to you, although it will need to be done for the final render once the model is complete.

The first step in sculpting is, of course, to switch into Sculpt Mode, as shown in Figure 10.5. You can now begin sculpting on the model. The first thing you should do is to enable X symmetry, as shown in Figure 10.6. You can then begin the actual sculpting process by adding some definition for the nose. To do this, use the Grab brush, switch to side view, and then pull out the very center vertex a small amount using a relatively small brush size, as shown in Figure 10.7. If necessary, you can also tweak the nose slightly by rotating the view around to get a better angle and then tweaking the mesh with the same Grab brush, as shown in Figure 10.8. You may notice, if you look closely, that I have also added the slightest definition for the eye sockets. The eye sockets are mostly for reference

Figure 10.5
Sculpt Mode

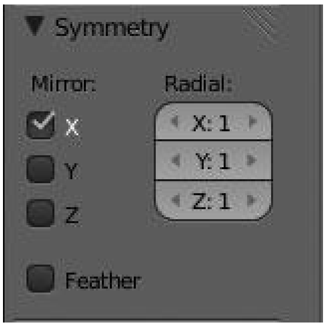

Figure 10.6
X symmetry

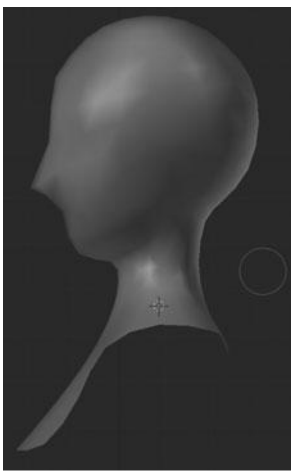

Figure 10.7
Tweaking the nose with the Grab brush, shown from the side view

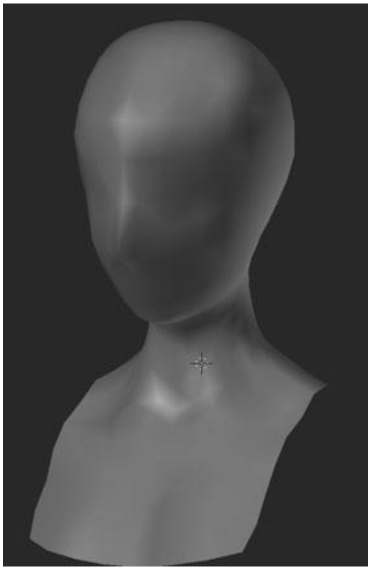

Figure 10.8
Tweaking the nose with the Grab brush, shown from the front view

use only, since you will not actually be sculpting any detail for them since they are hidden behind the goggles. For this model, you'll be sculpting details on everything below the nose.

Note

> At this stage in the process, it is best to keep things as simple as possible. A general rule of thumb is not to raise the subdivision level until you have to. If you raise it too quickly, you will tend to find yourself with an unworkable mesh.

At this point, having given a basic shape to the nose, you can raise the subdivision level once by pressing Subdivide. You are raising the level now so as to have a high enough resolution to sculpt the basic shape of the mouth.

Before getting to the mouth, though, first switch over to the SculptDraw brush and push in the bridge of the nose slightly and the eye sockets a bit more to better define the forms, as shown in Figure 10.9. Next, change over to the Grab brush again in order to adjust the nose a bit more. Pull out the cheeks and pull down the surface around the clavicle and the muscles in the neck, as shown in Figure 10.10.

Figure 10.9
Defining the nose and eye socket shape

Figure 10.10
Shaping the neck muscles and clavicle

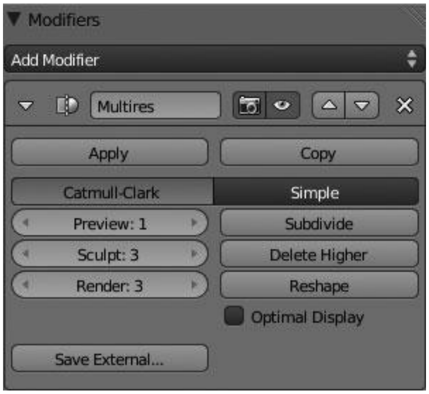

Figure 10.11
Raising the multires to level 3

Note

> Remember, the sculpting process is all about getting familiar with the tools. Sculpting in Blender is more similar to traditional arts than any other process in Blender. There are many ways to achieve the same result. In cases where I suggest you use the Grab brush, you may find it easier to use the SculptDraw brush. It all comes down to what you are most comfortable with and what works for you.

Now you can raise the subdivision level once more to level 3 by pressing Subdivide. This should give me enough geometry to work effectively on the lips, as shown in Figure 10.11.

To get started on the lips, switch to the Clay brush, because it is very good at building up forms. Using this brush, you can begin drawing in the shape of the upper lip a bit. Remember, you can add form by drawing with your LMB or subtract form by drawing with your LMB while holding down Ctrl. At this level, you should only be trying to hint at the forms; going for the detail immediately will just get you into trouble. It is best to build things up gradually. Notice in Figure 10.12 that I have tweaked the other parts of her face slightly as well, also using the Clay brush. At each step along the way, I like to constantly tweak the surface wherever I feel it needs it.

After putting in the basic shape of the upper lip, you'll work with the chin slightly before moving on to the bottom lip. The chin will help you decide how things should be placed.

Figure 10.12
Tweaking the face shape with the Clay brush

Note

Remember to use the modeling sheet to the best of your ability! When in doubt, follow the modeling sheets.

The chin, and most of the model, can be tweaked using the Clay brush. In the end, it is just a matter of creating the form that you need, not which brush you use. The adjustments to the chin can be seen in Figure 10.13.

Now you can use the Clay brush further to tweak the eye socket shape, to adjust the cheeks, and to form the lower lip. See Figure 10.14. You might notice that she looks a bit terrifying at the moment, but this is okay! Characters often do at this stage. Luckily the sculpt tools allow you to fix things like this with relative ease.

After still more strokes with the Clay brush, you are left with what you see in Figure 10.15. I added the muscle flows from the nose to the mouth and added slightly more form to her upper lip. You can also see more work done to the muscles as the base of the neck. Before continuing, let's see how the character is looking with all of the other components visible. You can do this by switching back to Object Mode and then pressing Alt+H. See Figure 10.16.

Figure 10.13
Adjusting the chin shape

Figure 10.14
Forming the lower lip

Figure 10.15
Adding muscle flows around the nose and mouth

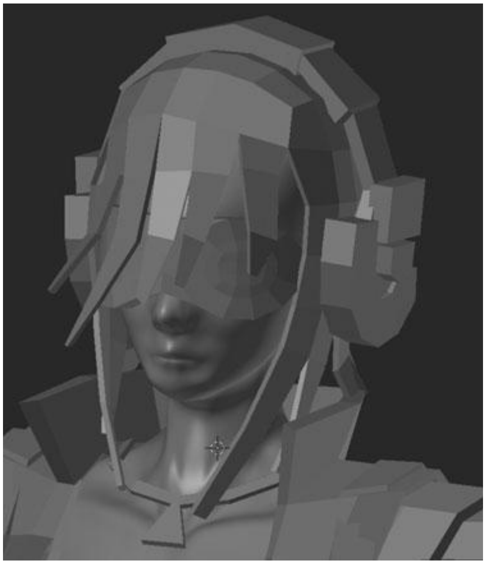

Figure 10.16
Face sculpt with other components visible

Things are looking pretty good, but it might be better to add more definition to her lips. Seeing that most of her face is hidden by the goggles and the headset, you will have to rely mostly on the lips to convey the expressions you want.

Switching back to Sculpt Mode, you can add more detail to her lips. A great tool for this is the Crease brush, as shown in Figure 10.17. If you remember from Chapter 6, this brush allows you to draw creases into the surface easily. After switching to this brush, you can add a crease between the lips by drawing a nice graceful smile, as shown in Figure 10.18. If you do not hold Ctrl, you will sculpt on the ridges, which can be useful at times but not in this case.

Draw a bit more with the Crease brush along the bottom of the lower lip, top of the upper lip, around the nose, and down the sides of the mouth to get something like Figure 10.19. You can also switch back to the Clay brush at anytime if you need to add volume anywhere. At this point, you are done with the head and the neck, as shown in Figure 10.20. You now need to sculpt in her chest.

Following the modeling sheet, you need to add a slight bulge to her breasts above her shirt line. This can be done quite easily by using the Clay brush

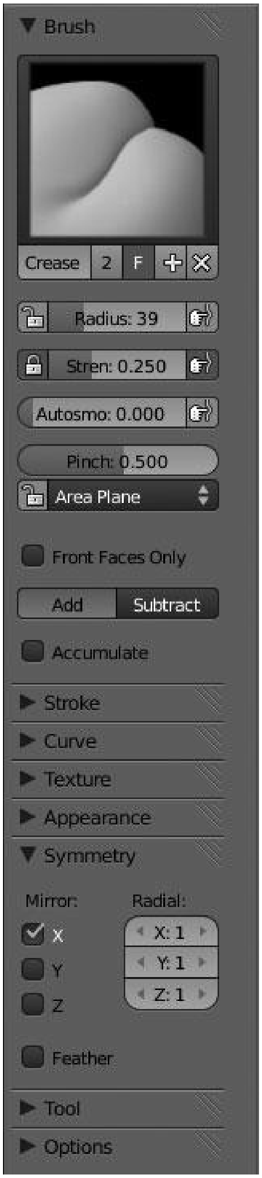

Figure 10.17
Crease brush

with a very large size. It is just a matter of drawing several very small strokes over the breast to create a nice, rounded form. You can see the result in Figure 10.21.

Figure 10.18
Creasing between the lips with the Crease brush

Figure 10.19
Creasing around the nose and mouth

Figure 10.20
Finished face sculpt

Figure 10.21
Shaping the breasts with the Clay brush

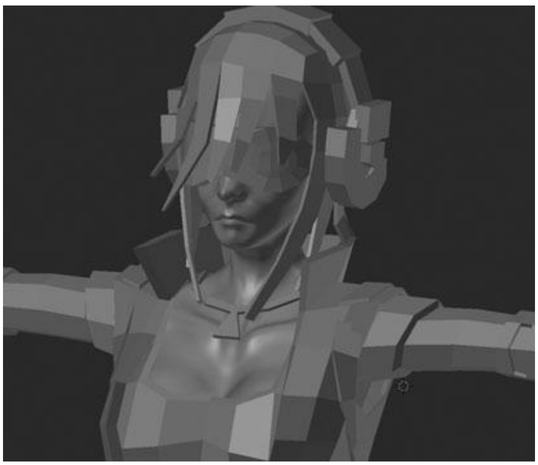

Figure 10.22
Final result after sculpting the face, neck, and chest

Note

Remember, you can adjust the size or strength of your brush at anytime from the Viewport by pressing F and Shift+F, respectively.

You can now call this portion complete. You're ready to move on to sculpting the hair. You can see the final result, with all other components visible, in Figure 10.22.

Sculpting the Hair

Now that you have finished sculpting the character's face, neck, and chest, it's time to move to the hair. You will be doing this in a similar manner as in the previous section, but you'll also be using what's called the Crease tool (not to be confused with the Crease brush, which you'll also be using). You'll also use a brush texture to better create the feeling of hair strands.

In order to sculpt the hair, you first want to make a couple of adjustments to the mesh you created in Chapter 9. These adjustments include making slight changes to the positioning of the bangs and creasing the inner perimeter edges to help prevent the hair from looking like lumpy tubes.

The Crease tool is used in conjunction with the Subsurf Modifier or the Multiresolution Modifier. It allows you to set the amount of smoothing that is to be applied to the edges after subdividing with one of the two modifiers just mentioned.

To make this clear, let me show you an example. Figure 10.23 demonstrates a simple mesh with no creasing, the same mesh with a 0.5 crease, and the same mesh with a 1.0 crease. As you can see, the mesh with no creasing is very round and smooth in the center, whereas the mesh with the 0.5 is only about half as rounded, and the mesh with the 1.0 crease is completely sharp. What this allows you to do is define the sharpness of any specific edge while still using a Subsurf or Multiresolution Modifier to smooth the rest of the mesh.

You can crease an edge by selecting it (best done in Edge Select Mode) and pressing Shift+E or by using the Mean Crease slider under the Transform

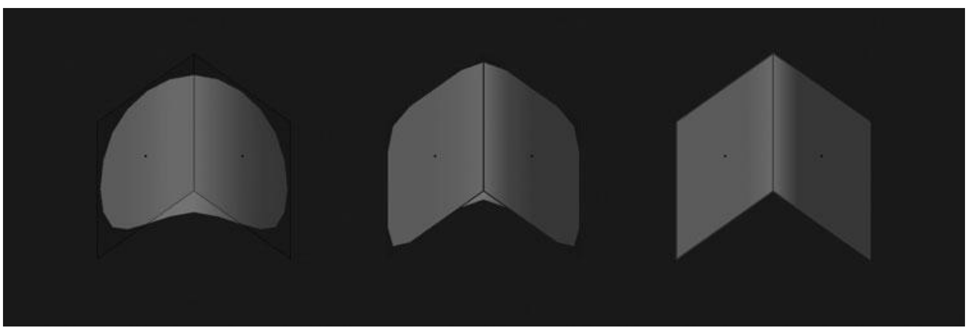

Figure 10.23
Example mesh with no creasing, 0.50 creasing, and 1.0 creasing weights (left to right)

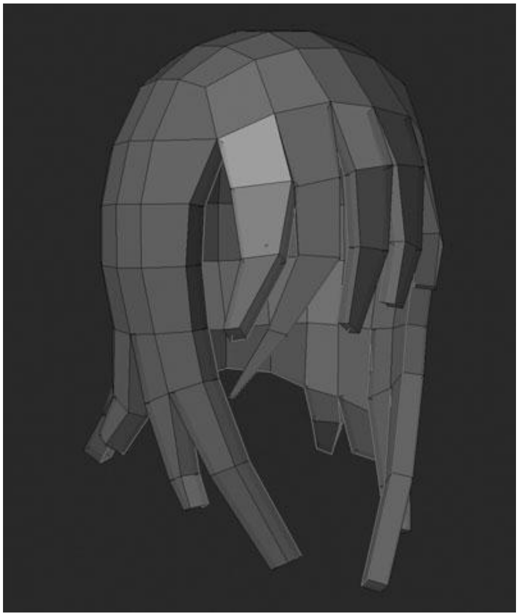

Figure 10.24
Creasing the inner, perimeter edges on the hair

category of the Viewport Properties. This example uses the Crease tool to give you a better starting point for the hair.

To crease the hair, enter Edit Mode, select all of the inner, perimeter edges in Edge Select Mode (Ctrl+Tab), and then set their creasing to 0.8. See Figure 10.24. The effect of this creasing can be seen after adding a Multiresolution Modifier from Object Mode and setting the subdivision level to 2. See Figure 10.25. The result is not overly obvious but if you look closely at the inside edge, you will see that it is angled sharper than the other edges.

The next step, before getting to the sculpting, is to reshape the bangs a bit to create a more pleasing result. You can do this simply by selecting the left, center, and right bangs and moving, rotating, and scaling them slightly so as to fit the reference better and create a more flowing pattern. You can see the before and after shots in Figures 10.26 and 10.27, Figures 10.28 and 10.29, and Figures 10.30 and 10.31. After this point, you should be ready to begin sculpting.

The sculpting process for hair such as this is to first rough in the main hair clumps to give an indication of the forms. Next, slowly smooth out the clumps

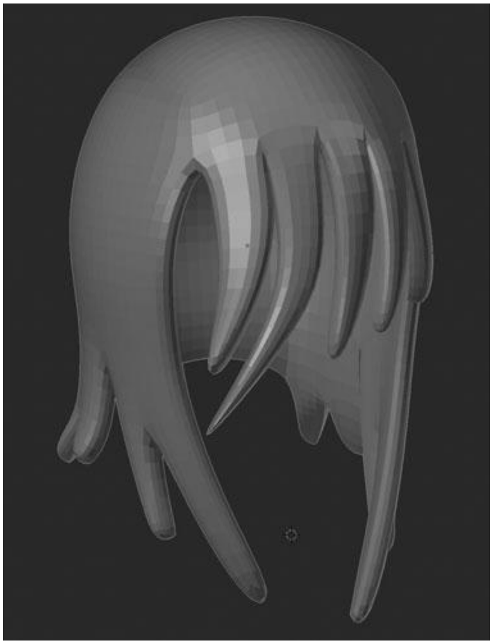

Figure 10.25
Hair with multires set to 2

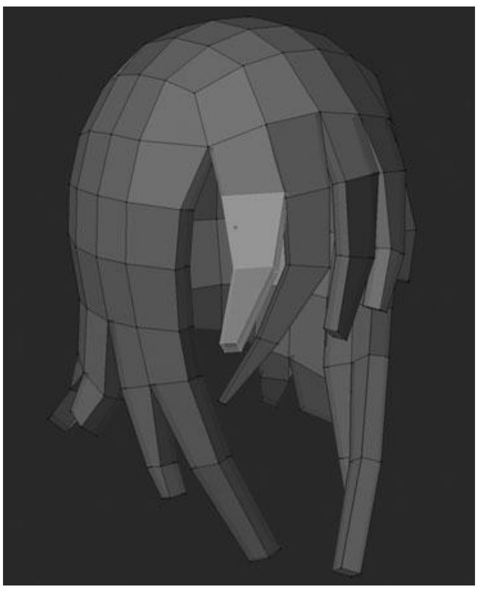

Figure 10.26
Bangs before tweaking

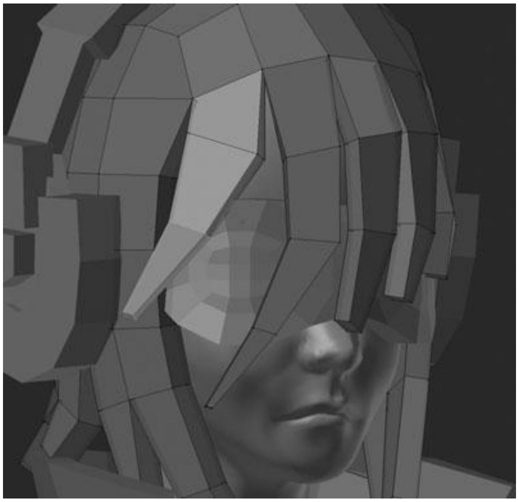

Figure 10.27
Bangs after tweaking

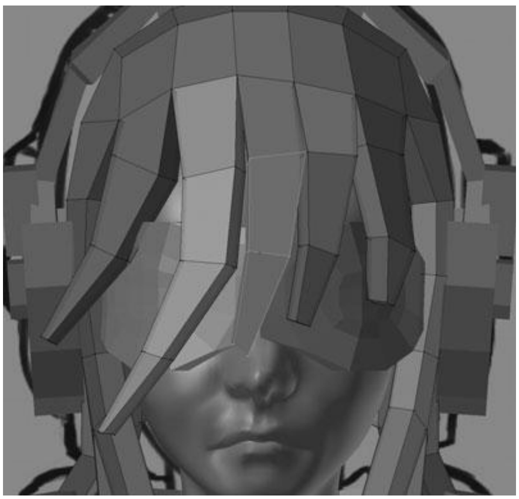

Figure 10.28
Bangs before tweaking

and make the edges crisper where needed. The last step is to add texture to the hair to give the indication of individual strands.

You'll start by using a Clay brush with the curve shown in Figure 10.32. Using this brush, you can add volume to the main hair clumps based on the

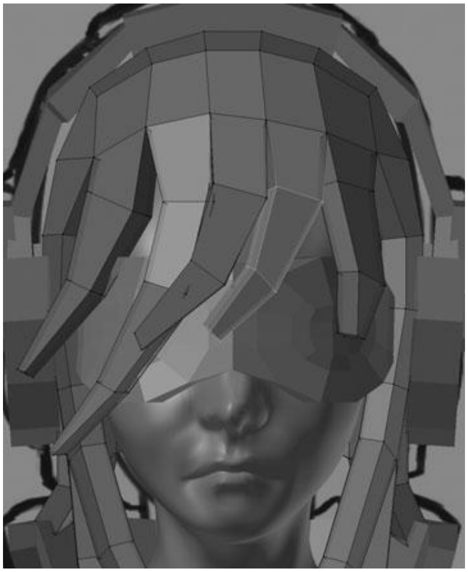

Figure 10.29
Bangs after tweaking

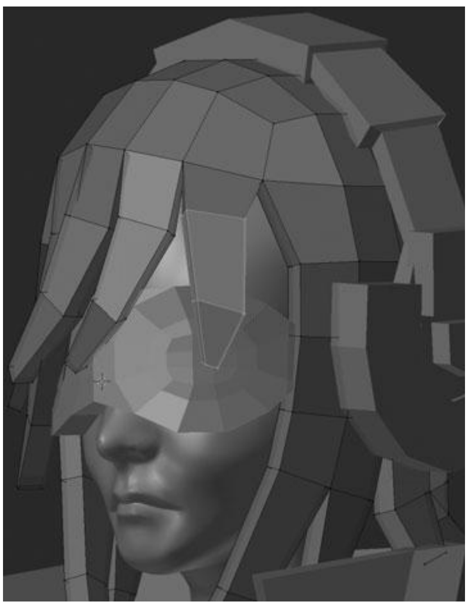

Figure 10.30
Bangs before tweaking

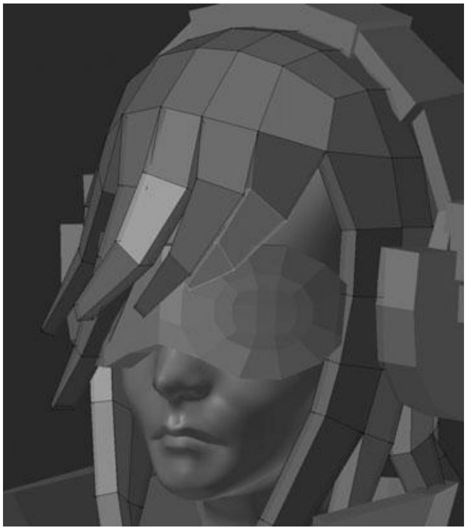

Figure 10.31
Bangs after tweaking

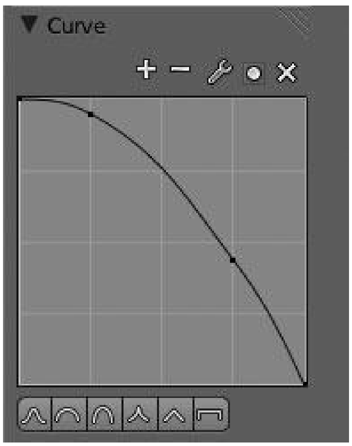

Figure 10.32
Curve for the Clay brush

modeling sheet and the base mesh to get something similar to Figures 10.33 and 10.34. After doing this, change the brush to the Pinch/Magnify brush and use the default setting to stroke over each of the previously sculpted clumps while holding Ctrl to spread out the faces along the ridge of the clumps.

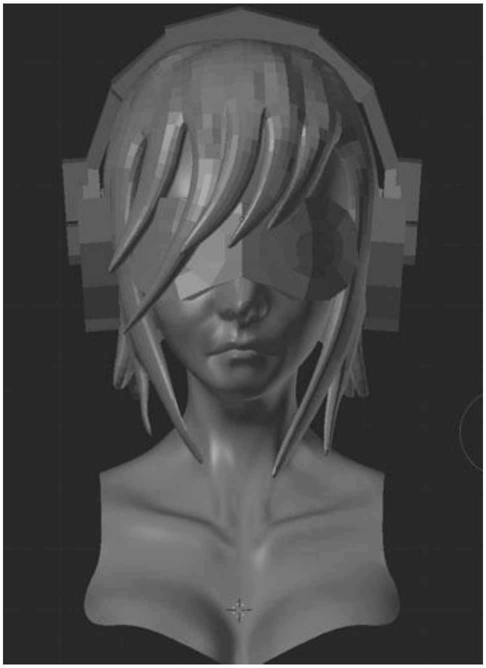

Figure 10.33
Initial hair clump shapes

Figure 10.34
Hair clump shapes after further, subtle tweaking

Figure 10.35
Spreading out the surface of the clumps

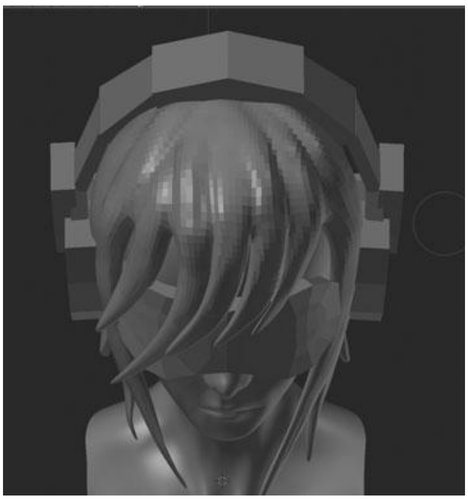

Figure 10.36
Spreading out the surface of the clumps, view from the top

See Figures 10.35 and 10.36. What this effectively does is flatten the surface and sharpen the creases between the clumps.

After using the Pinch/Magnify brush to flatten the clumps, increase the subdivision level to 3 and change back to the Clay brush. This time, however, set the curve preset to maximum, flatlining the curve. This makes the brush act like what is commonly referred to as a "Clay Strips" or "Clay Tubes" brush. It is very good for building volume. In this case, you'll use it to add slightly more volume to the individual clumps, as shown in Figure 10.37.

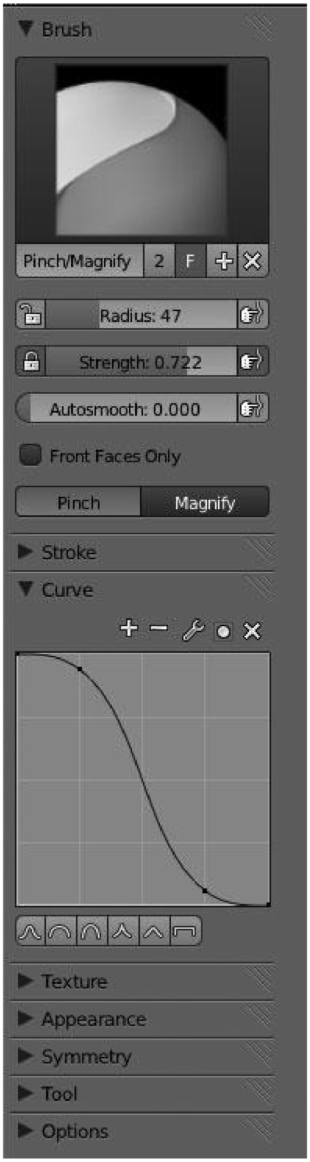

Figure 10.37
Adding volume to the hair clumps

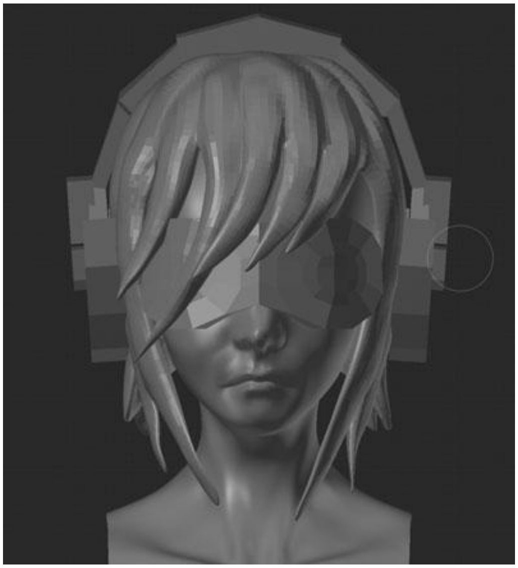

Figure 10.38
Using the Pinch/Magnify brush to sharpen the lines between clumps

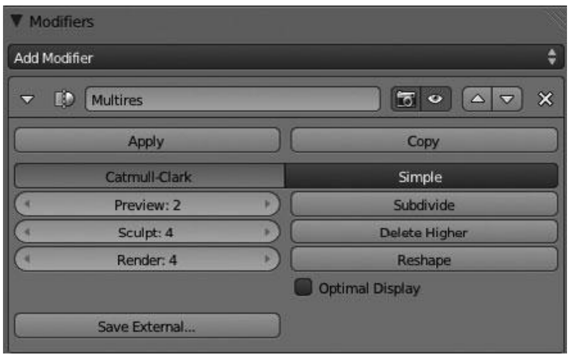

Figure 10.39
Increasing multires level to 4

Immediately after adding the additional volume with the Clay brush, switch back to the Pinch/Magnify brush and draw across all the areas where the clumps meet. This will sharpen the line between them, as shown in Figure 10.38.

This is now a good time to set the shading of the mesh to smooth (most easily done by Tabbing into Edit Mode, selecting everything, and then pressing W > Shade Smooth) and to increase the subdivision level to 4. See Figure 10.39.

At this point, you will probably notice that the hair looks very lumpy and, frankly, nothing like hair. Thankfully, this is about to change.

To fix the lumpiness, first switch over to the Polish brush using the settings shown in Figure 10.40. Draw over each of the clumps from various angles to smooth out the surface. While doing this, be careful to keep the brush size approximately the same size as the width of the clump on which you are actively working. If you cross over the edge, it will blur out the line between the clumps. You can see the result in Figure 10.41.

Currently it still looks a bit odd so you can try two things. First use the Crease brush to strengthen the lines between the clumps. See Figures 10.42 and 10.43. Then you can begin adding texture to the strands.

In order to add texture to the strands, you need to go ahead and add a brush texture. If you do not remember how to do this, refer back to Chapter 6. The texture used here is very simple; it's nothing more than three evenly spaced dots that are aligned horizontally, as shown in Figure 10.44.

Note

You can find this texture, among other resources, on the DVD under the Resources directory.

After setting the texture, you need to adjust the texture angle from User to Rake. This way, the texture will follow the curvature of your brush strokes. You might also want to enable pressure sensitivity (I do so since I am using a Wacom tablet) for the radius and strength, but these are not specifically necessary. Increase the subdivision level once more to level 5. This should give you plenty of geometry for the strands.

To sculpt the strands, it is merely a matter of drawing many strokes along the clumps until you get something you like. It is important to keep things smooth and flowing to best replicate the style of hair displayed in the concept art. You might find it helpful to enable Smooth Stroke under the brush's stroke settings. Figure 10.45 shows the result after drawing a few strokes on the first two clumps.

If you're happy with your results, you can therefore repeat the process across all the hair to create something like what's shown in Figures 10.46 through 10.48.

This completes the sculpting for the hair; you'll now move on to the arms.

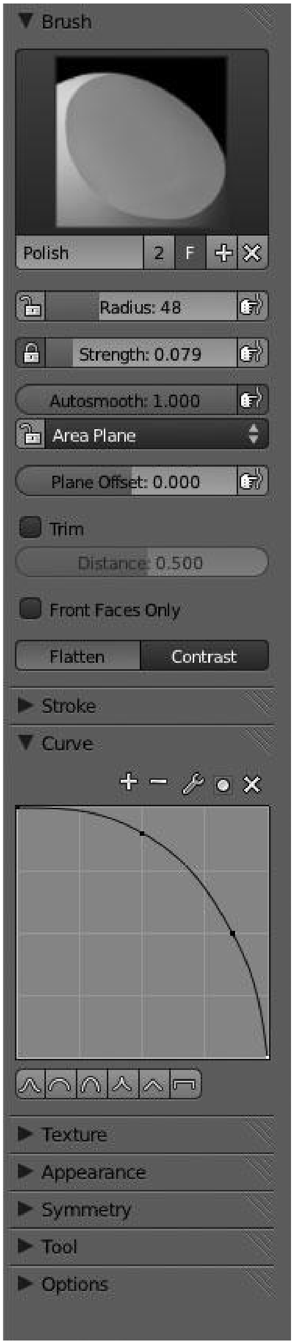

Figure 10.40
Polish brush settings

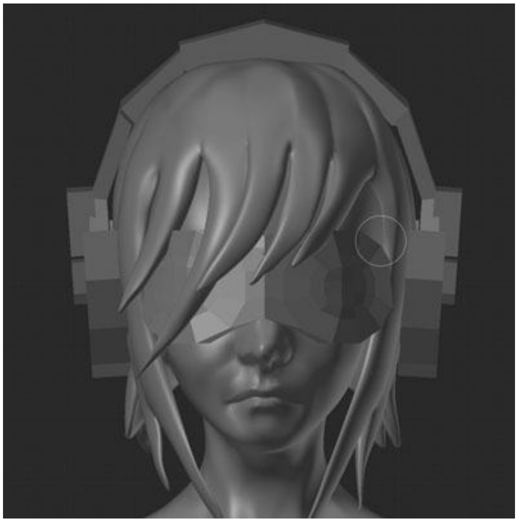

Figure 10.41
Hair result after polishing

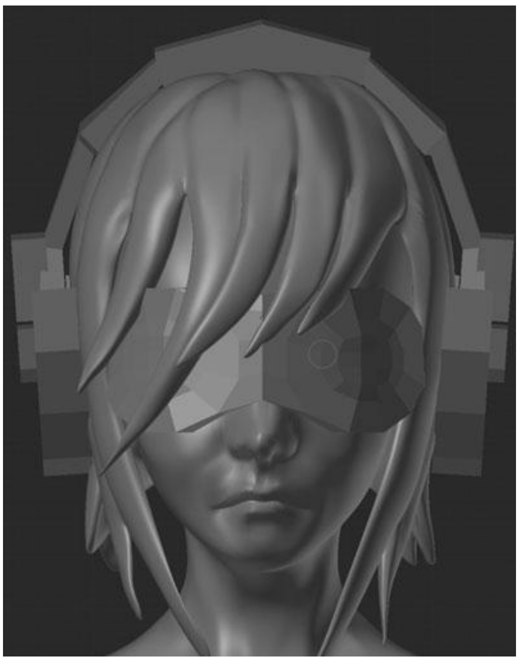

Figure 10.42
Creasing the lines between hair clumps, view from the front

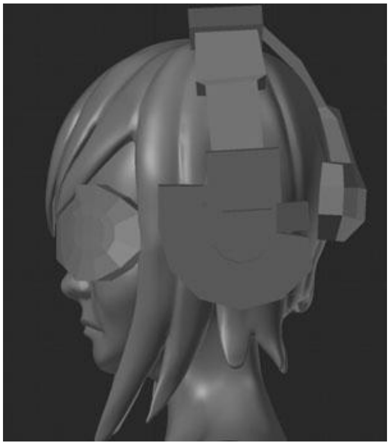

Figure 10.43
Creasing the lines between hair clumps, view from the side

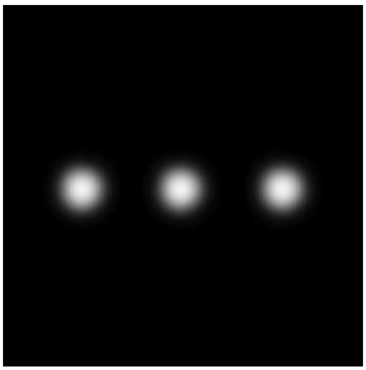

Figure 10.44
Hair brush texture

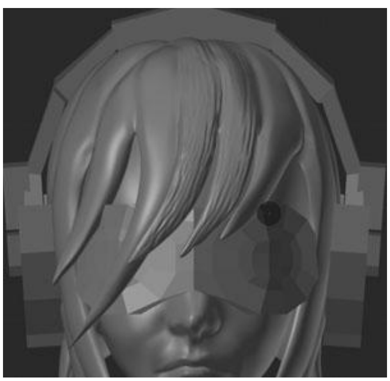

Figure 10.45
Adding texture to the hair

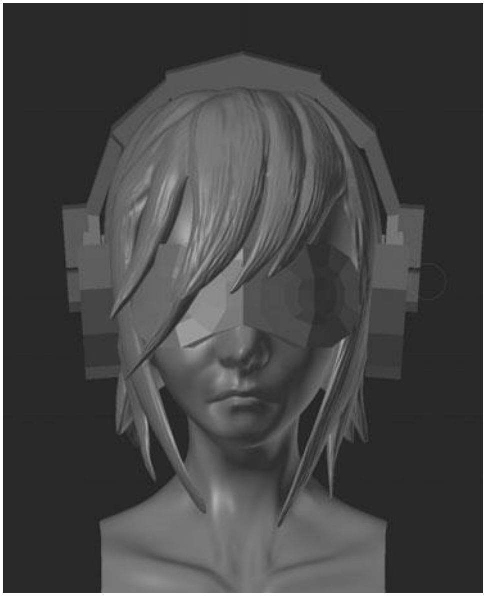

Figure 10.46
Final hair texture, view from the front

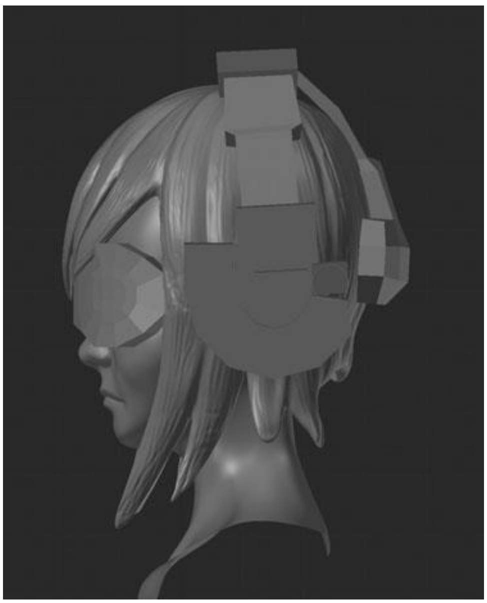

Figure 10.47
Final hair texture, view from the side

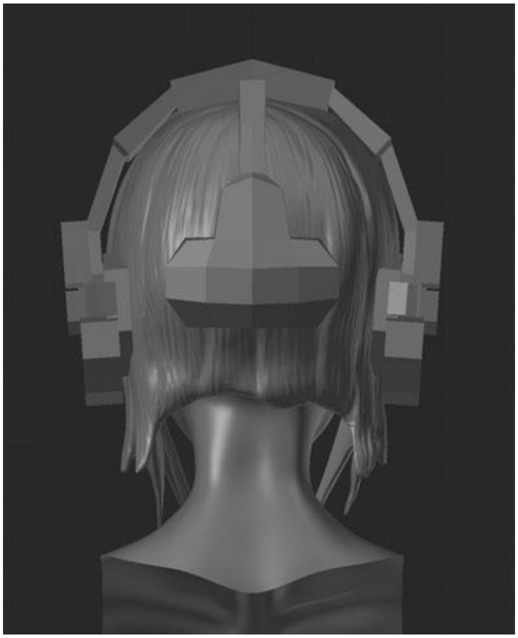

Figure 10.48
Final hair texture, view from the back

Sculpting the Arms

Now that you have finished sculpting the detailed hair, you can move on to the arms. Sculpting arms is a relatively easy process as there's very little detail; much of the detail that would normally be there is hidden by the coat, armbands, and gloves.

Start by applying the Mirror Modifier that is currently on the arm; set the shading to smooth. Next, add a Multiresolution Modifier and increase the level to 2. This will provide you with enough geometry to shape the arms correctly. Immediately after adding the Multiresolution Modifier, enter Edit Mode and select the inside edgeloops on both arms. Scale them in along the X axis, as shown in Figure 10.49. This will ensure no gaps are created where the arm meets the shirtsleeve.

To sculpt the arms, use the Clay brush with X symmetry enabled. First draw across the primary muscle forms in the shoulder, upper arm, and forearm, as shown in Figure 10.50. Then repeat this process, adding and subtracting volume where needed, to get the final shape shown in Figure 10.51.

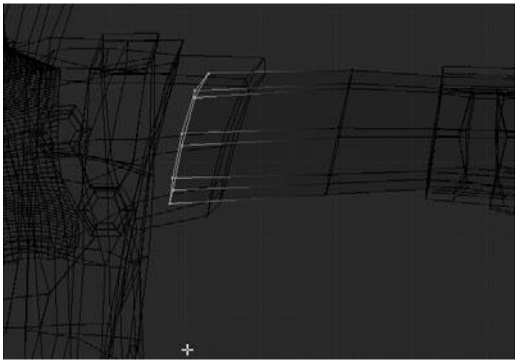

Figure 10.49
Tweaking the start of the arm to avoid gaps

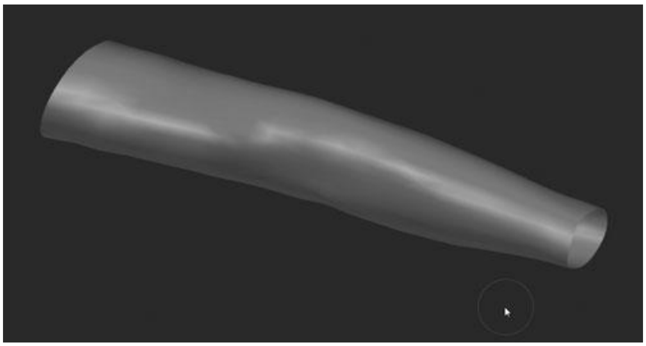

Figure 10.50
Sculpting on the arm

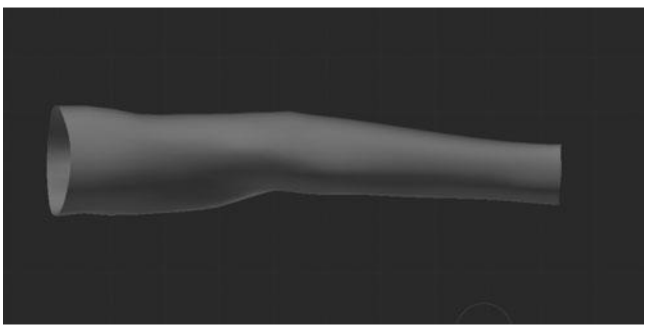

Figure 10.51
Final sculpted shape of the arm

This is as far as you need to go, in order to keep the detail level balanced with the other parts of the character. You can now move on to sculpting the clothing.

Sculpting the Clothing

In order to organize the focus of this section better, it's divided into three parts—the shirt and pants, the coat, and then the gloves and armbands. Let's start off with the shirt and pants.

Creating the Shirt and Pants

You'll first learn to create the shirt. To get started, you can do the initial steps like you did with many of the other pieces—by applying the Mirror Modifier and then adding a new Multiresolution Modifier. Set the multires level to 2 to begin with and switch to the Clay brush after activating Sculpt Mode. You can use the default settings for the Clay brush except you should change the curve preset to maximum, as shown in Figure 10.52, and enable X symmetry.

The first sculpting step is to reshape the breasts slightly to better fit the profile of the modeling sheet. Using the Clay brush, you can draw across the breasts to raise the surface. Also draw around the shoulders and sleeves a bit to get a more

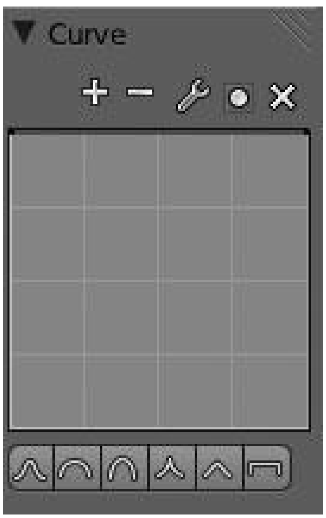

Figure 10.52
Curve setting for the Clay brush

Figure 10.53
Shaping the breasts

natural shape. After a bit of tweaking and additional help from the Grab brush to shape the breasts, you should have something similar to Figure 10.53.

At this point, you have added only a bit of volume to the breasts and shaped the shoulder area a bit. So far the changes have been minimal. You can now raise the multires level to level 3 and begin sculpting the detail. The first detail you'll add is the pleats in the lower part of her shirt and the impression from the belt. After just a few strokes following the pleats, you should have something similar to Figure 10.54. Create the pleats all the way around the side and the back.

Figure 10.54
Sculpting the pleats in the shirt

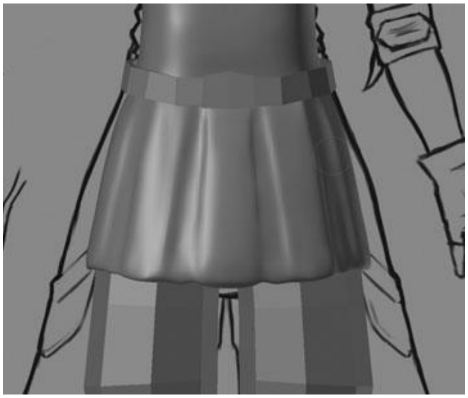

Figure 10.55
Sharpening the pleats

You can now switch over to the Crease brush and sharpen the edges of the pleats by following the lines with subtractive strokes, as shown in Figure 10.55. Once again, make these changes all the way around to the back.

The next step is to begin adding wrinkles. You can add wrinkles rather easily by using a modified Crease brush; change the curve over to a rounded profile. Now, using a combination of additive and subtractive strokes, draw repeatedly across the shirt in a fairly loose pattern. You're attempting to replicate the natural shape of cloth to get Figure 10.56.

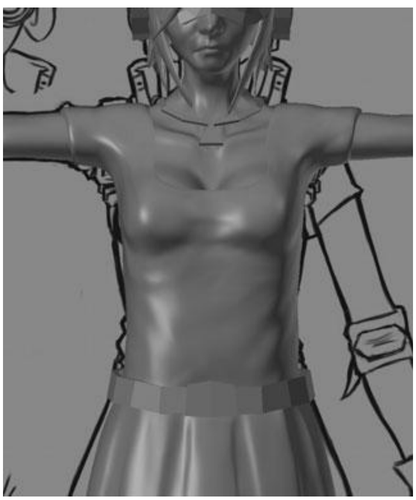

Figure 10.56
Sculpting wrinkles in the shirt

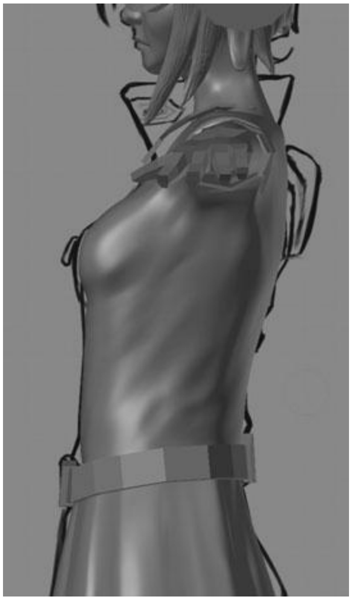

Figure 10.57
Side view of shirt

That last step may seem complicated by it is really quite simple; it might just take a few attempts to get something that looks natural. You can see the side and back views from that last step in Figures 10.57 and 10.58.

The final step to complete the shirt is to use the Polish brush with a low strength and to draw along some of the main wrinkle patterns to smooth and flatten some of the contours. This will help the shirt to not look too lumpy, as shown in Figures 10.59 though 10.61.

You are now done with the shirt and can move on to the pants. You'll use similar techniques to create the pants as you did to make the shirt; the main difference being that the wrinkles will be much more defined.

Note

Remember, if at any point in the sculpting process you find yourself with a lumpy model that you can't seem to get right, you can just hold down the Shift key while sculpting to activate the Smooth brush. It works great to iron out those nasty lumps that pop up when you're first learning to sculpt.

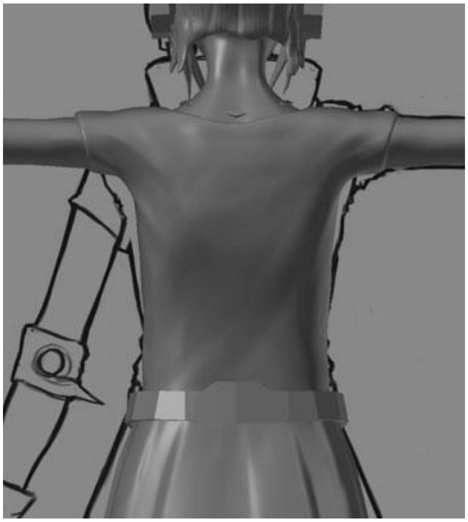

Figure 10.58
Back view of shirt

Figure 10.59
Shirt after polishing, viewed from the front

Figure 10.60
Shirt after polishing, viewed from the side

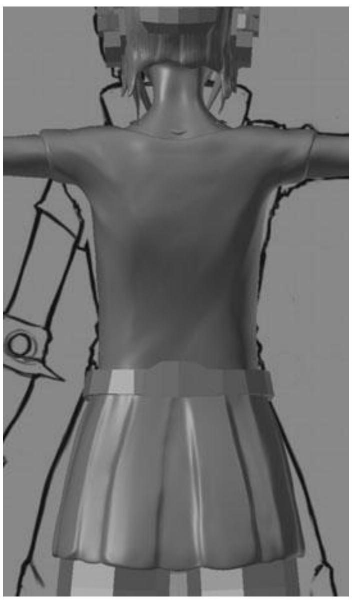

Figure 10.61
Shirt after polishing, viewed from the back

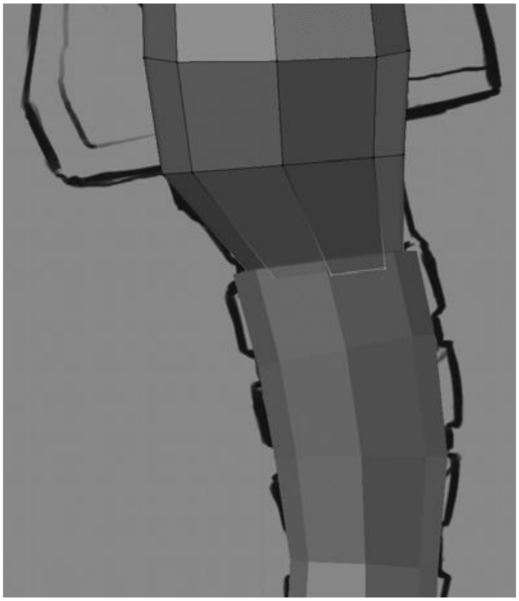

Figure 10.62
Preventing seams between the pants and the boots

First you need to pull down the bottom-most loop to fit inside the boots, preventing any seems from showing. See Figure 10.62. After that, once again apply the Mirror Modifier and add a Multiresolution Modifier. Set the multires to level 3 and the shading to Smooth. You can now switch to Sculpt Mode on the pants and choose the same rounded Crease brush that you used with the shirt. Using the Crease brush, draw in the main folds of the cloth by using additive and subtractive strokes. You can see a comparison of the original pant leg and the first wrinkles in Figure 10.63.

Once you are happy with the first side, do the second side. See Figure 10.64. Note that I am suggesting you not use symmetry here; the detail on the pants is fairly pronounced so using symmetry would be obvious and artificial.

Now increase the multires level to 4 and switch over to the Clay brush, once again using the maxed out curve. With the Clay brush, sculpt over and around all the main wrinkle shapes created previously to help add or remove volume. One area in particular that you might want to pay attention to is the bulge over the boots. You can see the result, from the front, side, and back, in Figures 10.65 through 10.67.

The pants are now done so you can move on to the coat.

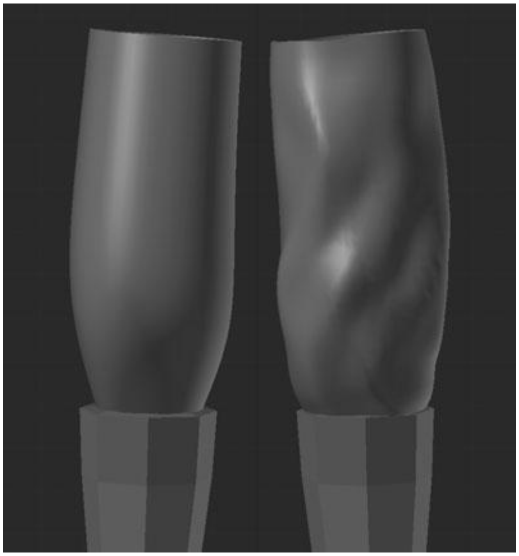

Figure 10.63
Adding wrinkles to the pants

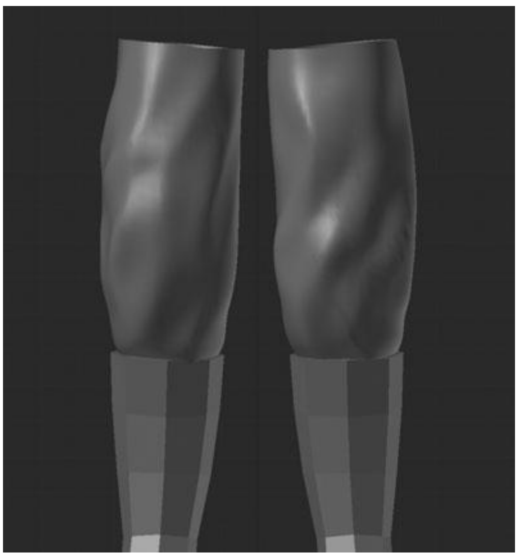

Figure 10.64
Adding wrinkles to both pant legs

Figure 10.65
Front view of pants

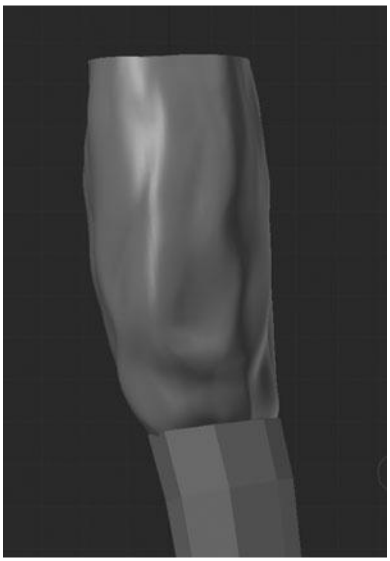

Figure 10.66
Side view of pants

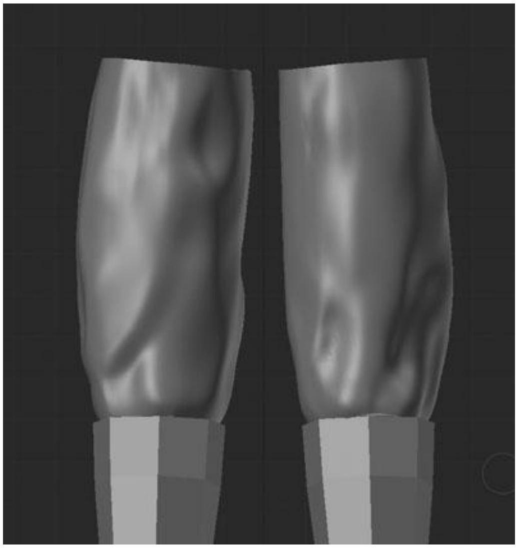

Figure 10.67
Back view of pants

Creating the Coat

To get started on the coat, you can use the same starting technique as you did with the hair—start by creasing the perimeter edges in order to create a cleaner result when you add the Multiresolution Modifier. The perimeter edges can be seen in Figure 10.68. Set the crease value to 0.6, which should give you a sharper, but still slightly rounded, corner. After adding the Multiresolution Modifier and increasing the level to 3, you should have something similar to Figure 10.69.

After adding the Multiresolution Modifier, you can begin sculpting the wrinkles. This process is similar to that of the shirt, but this time you'll create the wrinkles in such a way as to show them being pulled by the straps on the backpack and the belt. Most of the wrinkles can be sculpted using the Clay brush with a maxed-out curve just like you've done on the previous parts. The initial wrinkles can be seen in Figures 10.70 and 10.71.

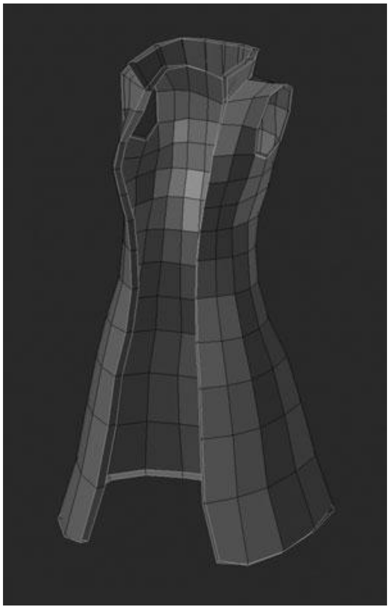

Figure 10.68
Selecting the perimeter edges for creasing

Figure 10.69
Adding multires to the coat

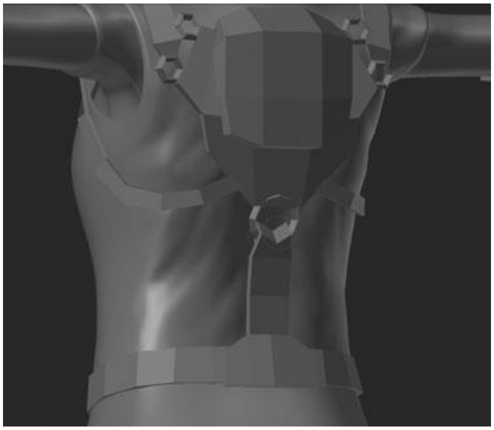

Figure 10.70
Initial wrinkles on the back of the coat

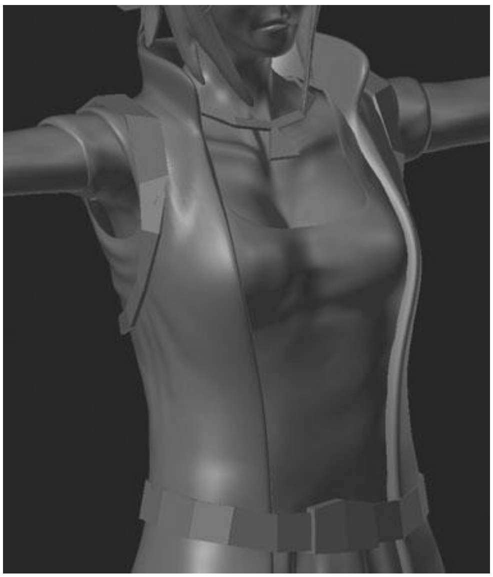

Figure 10.71
Initial wrinkles on the front of the coat

Once you're happy with the wrinkles, increase the multires level to 4 and do another pass with a smaller brush to again create the feeling of pinched fabric. Try drawing a lot of swift strokes over the entire surface to create a slightly rough texture. This second pass is shown in Figure 10.72.

Figure 10.72
Adding some texture to the coat

At this point, if necessary, you can use the Pinch or Crease brush to accent some of the wrinkles. You can also use those same brushes to draw the trimline along the entire perimeter. It works well to first do a pass with the Crease brush and then go back on a second pass with the Pinch brush, as shown in Figure 10.73.

Now that you have finished the wrinkles and the trim, the last step is to do a little work to reshape the coat by using the Grab brush. The area you want to reshape is the portion between the breasts and the shoulder. Currently it is floating above the shirt; you want to move it in closer so that the coat looks to be hanging off her body more. See Figure 10.74.

You can now move on to the last bit of clothing—the gloves and armbands.

Creating the Armbands and Gloves

Let's start on the armbands then move to the gloves.

The first step on the armbands, as with many of the other parts, is to apply the Mirror Modifier and in this case the Solidify Modifier as well. After doing this,

Figure 10.73
Adding trim to the coat

Figure 10.74
Reshaping the coat

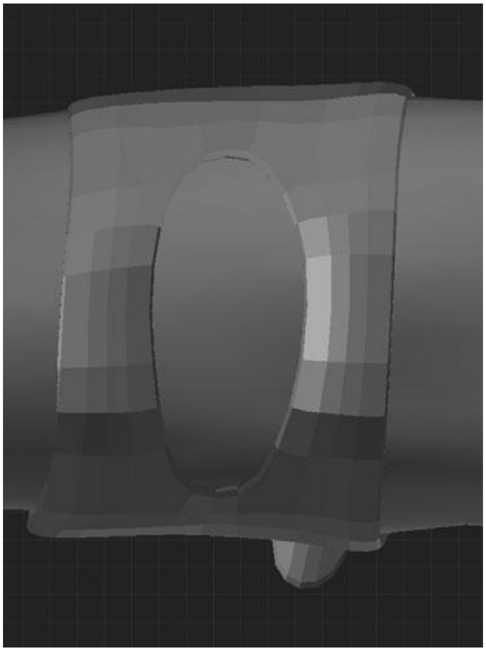

Figure 10.75
Shaping the armbands

you can add a Multiresolution Modifier and increase the level to 2. Then enter Sculpt Mode and choose the Grab brush with X symmetry enabled. Once this is done, push and pull the mesh to fit the shape of the arm that you sculpted earlier. See Figure 10.75. You will notice that now the mesh fits the arm nicely, whereas before it was intersecting with the arm.

Moving on, jump into Edit Mode and select everything with A. Then, set the shading to Smooth with W > Shading Smooth. Finally, increase the multires level to 3 in preparation for adding details.

The first detail that you'll learn to add is the button that holds the armband closed. You can do this using the Blob brush. The settings you'll use on the brush can be seen in Figure 10.76. Notice that the Stroke method is now Anchored, Edge to Edge is now enabled, and the curve type is set to a rounded curve. The Pinch value is now increased to 0.900.

With the brush settings right, you can now just click and drag where you want the button until you have one at the appropriate place. See Figure 10.77.

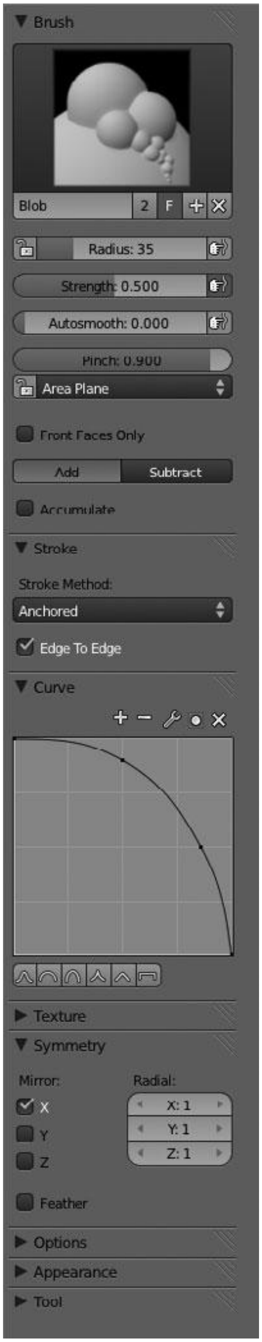

Figure 10.76
Blob brush settings

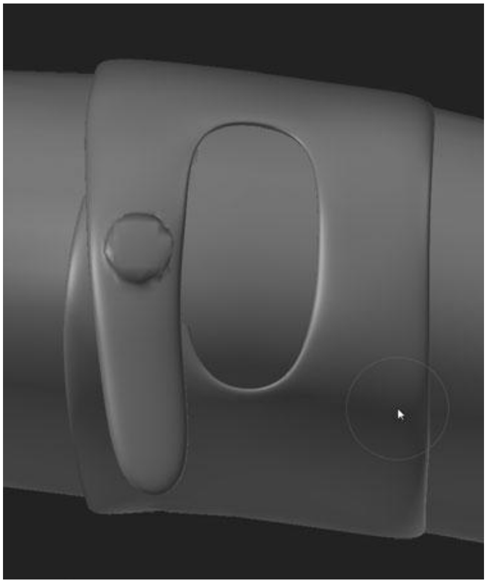

Figure 10.77
Adding a button with the Blob brush

Next, using a combination of the Clay and Crease brushes and the same techniques and settings that you used on the shirt and the coat, sculpt in some wrinkles to produce something like Figure 10.78.

This completes the armband. Let's move on to the glove.

Just like with the armbands, the first step with the gloves is to apply the preexisting modifiers and then crease the perimeter edges before adding a Multiresolution Modifier. In this case, add a crease of 0.500 to the edges of the glove, as shown in Figure 10.79.

After doing this, add the Multiresolution Modifier with a level of 2 and enter Sculpt Mode. The first brush you're going to use this time is the Inflate/Deflate brush. This is because the fingertips, after adding the multires, have become quite small and pointy. Small and pointy is not what you want at all; it does not give the impression of gloves. By using the Inflate brush, you can expand all of the faces that make up the tips of the fingers along their respective normals, increasing the volume of the whole fingertip. The result can be seen in Figure 10.80.

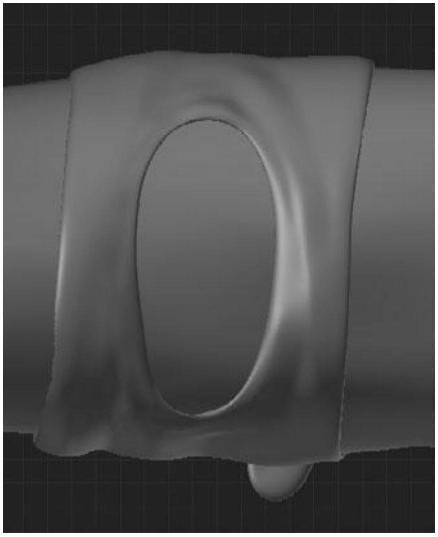

Figure 10.78
Sculpting wrinkles on the armbands

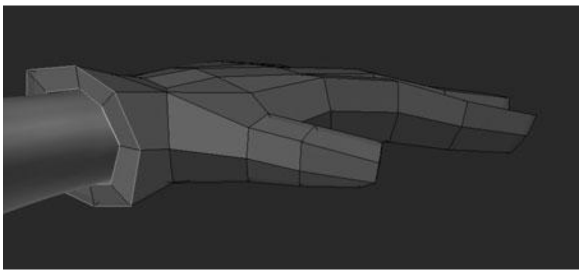

Figure 10.79
Creasing perimeter of the gloves

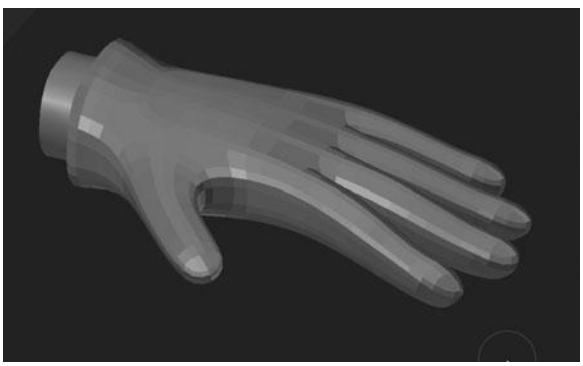

Figure 10.80
Inflating the fingertips

That last step leaves you at a good point to increase the multires level to 3, set the shading to Smooth, and switch over to the Crease brush for some wrinkle work. The wrinkles you want to create are those formed between the fingers, around the wrist, and on the palm. You can see the top and bottom of the glove after adding the wrinkles in Figures 10.81 and 10.82.

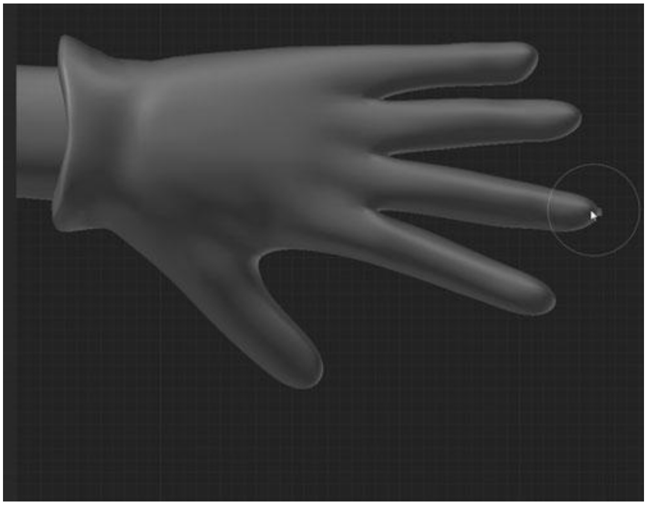

Figure 10.81
Adding wrinkles to the back of the gloves

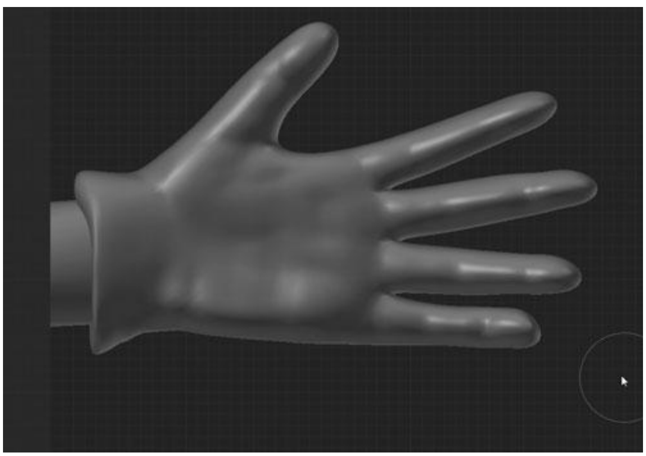

Figure 10.82
Adding wrinkles to the palm of the gloves

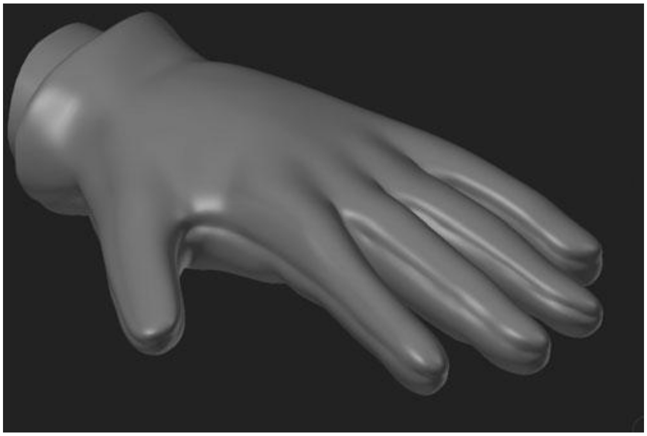

Figure 10.83
Sculpting the seam on the gloves

The final two steps to finish the glove are to increase the multires level to 4 and then use the Crease brush to draw a seam all the way around the glove. See Figure 10.83.

The glove is now complete and you can move onto the boots.

Modeling and Sculpting the Boots

Up until now all of the detail you have added has been created with the sculpting tools. However, with the boots, you'll do things a little bit differently. Starting out, you'll make use of a few of the modeling tools that you learned about while creating the initial base mesh. Then, you'll go on to sculpt some additional detail into the boots.

Enter Edit Mode and then add several additional loops along the top length so as to create enough faces to extrude the banding that you can see in the modeling sheet. See Figure 10.84. Add a new edgeloop right at the top and then four more at every other face to get something like Figure 10.85.

Using these new edgeloops and their adjacent loops, you can select the rings of faces. Extrude them out by pressing E and then immediately pressing the RMB, followed by Alt+S, to expand along the normals. You should have something similar to Figure 10.86.

Figure 10.84
Bands on boots on modeling sheet

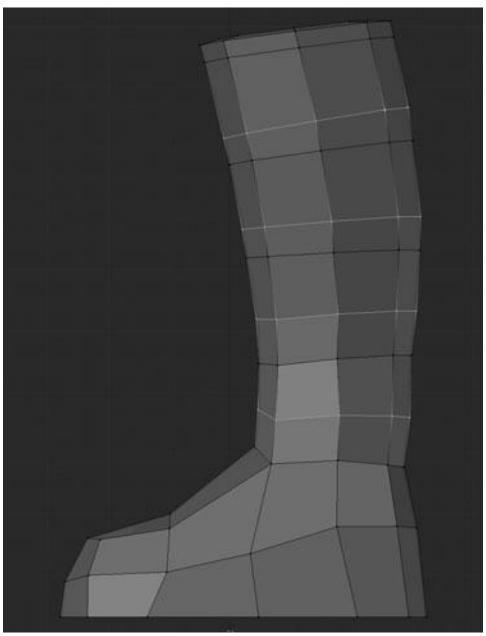

Figure 10.85
Additional edgeloops to create bands

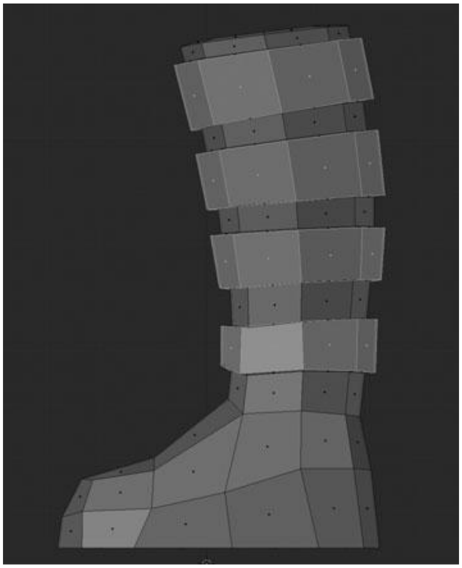

Figure 10.86
Extruding bands on boots

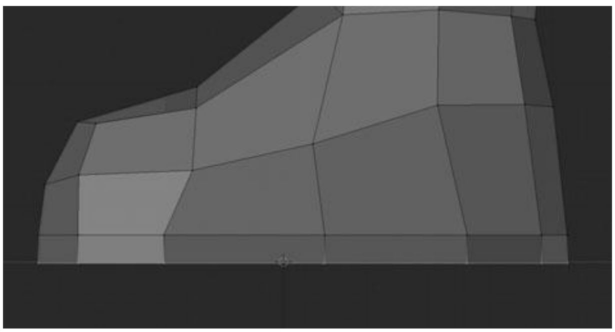

Figure 10.87
Extruding the sole of the boot

Next up, you want to add some additional geometry to the bottom of the boot for the sole, or else it will be quite difficult to sculpt. You do this by selecting all the vertices that make up the sole and extruding them down an appropriate amount for the sole, as shown in Figure 10.87.

Follow this up by adding two more additional loops, sliding them up toward the upper loop, and then scaling the middle loop slightly to create the seam between the leather of the boots and the sole. See Figure 10.88.

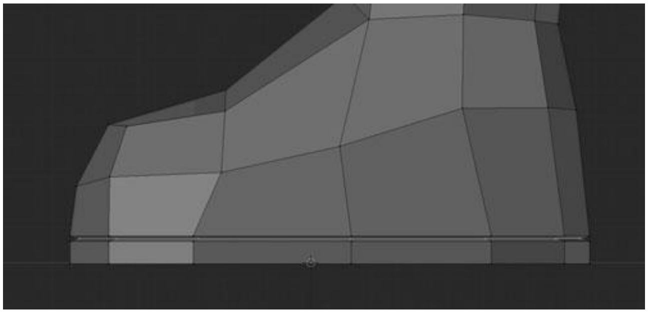

Figure 10.88
Adding a seam to the sole

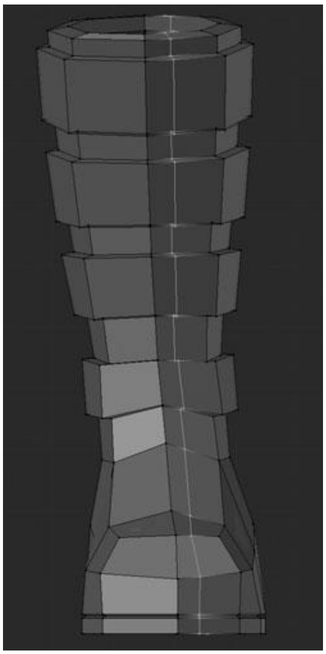

Figure 10.89
Adding another vertical loop to the boots

At this point, you are almost ready to begin sculpting; you have a few more steps. The first of those is to add another loop along the entire length of the boot, vertically. Slide this loop slightly over towards the center and then slide the original center loop over as well to even out the spacing, as shown in Figures 10.89 and 10.90.

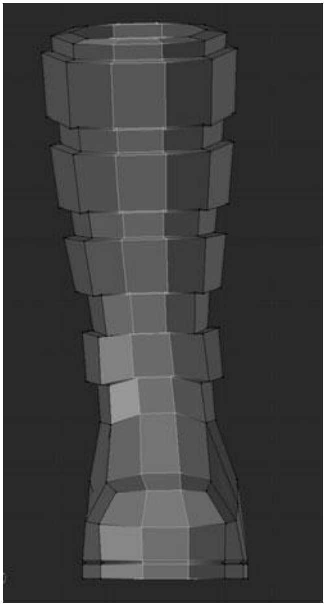

Figure 10.90
Evening out the loops

After moving these loops over, you can scale both loops along the Y axis a bit to round out the shape of the boots. See Figure 10.91.

The last two steps are to add one more loop in between the sole of the boot and the leather foot, as shown in Figure 10.92, and to crease all the perimeter edges like you have done before, as shown in Figure 10.93. Try creasing them to 0.800.

That finishes the modeling process of the boots, allowing you to move on to the sculpting process. The sculpting, of course, will begin by applying the Mirror Modifier and then adding a Multiresolution Modifier. Set the multires level to 3 and start with the Clay brush.

Using the Clay brush, first add some volume between the bands to give the impression of compression on the boot, as shown in Figure 10.94. Also add some small amounts of volume to the toe and the heel.

Next, increase the multires level to 4 and switch over to the Crease brush. Using the Crease brush, draw the seams in the leather to roughly match the modeling sheet, as shown in Figure 10.95.

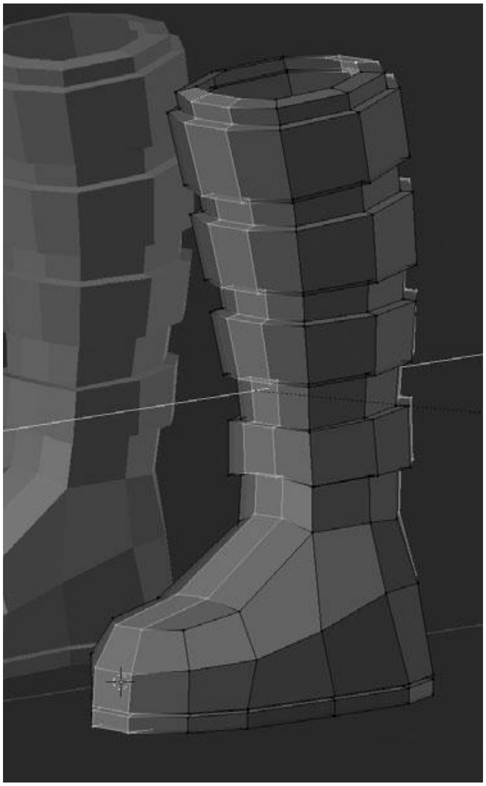

Figure 10.91
Rounding out the boots

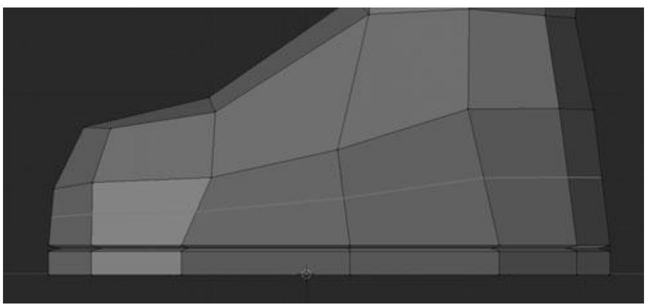

Figure 10.92
Adding another loop to the foot of the boot

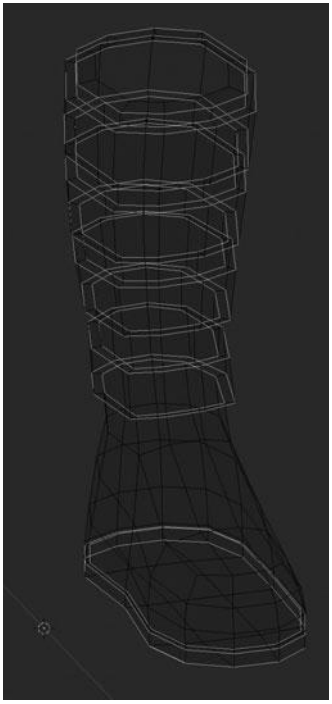

Figure 10.93
Creasing the perimeter edges on the boots

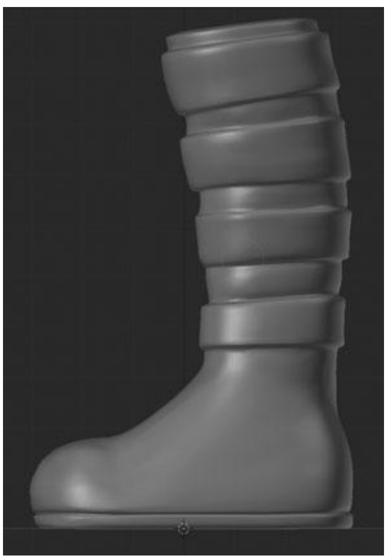

Figure 10.94
Adding volume between the bands

Figure 10.95
Adding seams to the boot leather

Figure 10.96
Pinching the seams

Following the initial passes with the Crease brush, switch over to the Pinch/Magnify brush and do a second pass over them all, as well as any other areas you feel are necessary, in order to tighten up the seams. See Figure 10.96.

The boots should now be finished.

Summary

Take a moment to review how the current model should look, with everything you have done so far. You can see a front, side, and back view in Figures 10.97 through 10.99. In the next chapter, you'll learn to model the headset and other accessories.

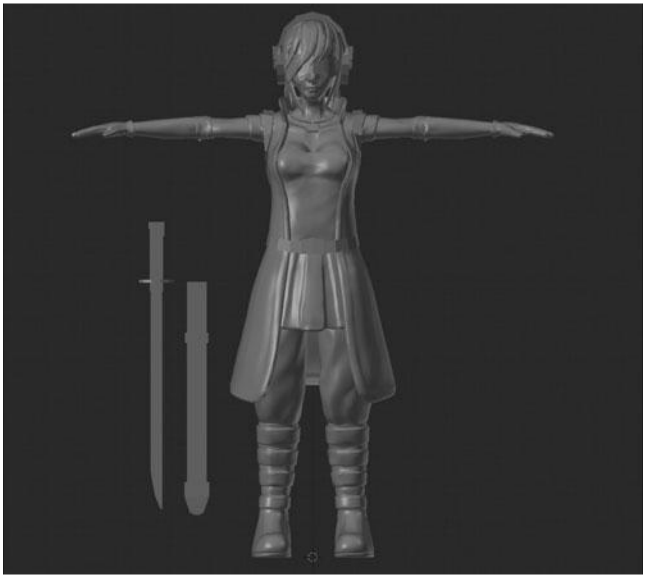

Figure 10.97
Front view of complete model in its current state

Figure 10.98
Side view of complete model in its current state

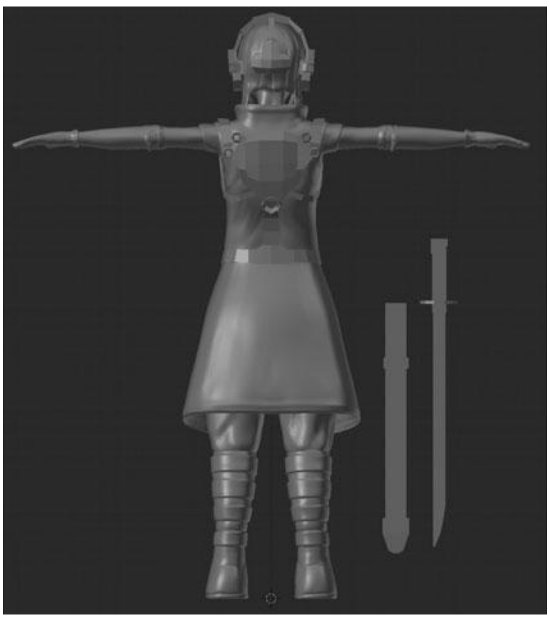

Figure 10.99
Back view of complete model in its current state

Chapter 11

Modeling the Accessory Details

At this point, I have spent a considerable amount of time teaching you how to use the sculpting system to detail the body and clothing of the character; you also did a small amount of modeling for the boots. From here, you'll learn how to model the details for all of the accessories, including the headset, backpack, goggles, sword, and so on.

This chapter makes exclusive use of the various modeling tools, most of which you've already seen in previous sections. Some of the tools you'll be using extensively include the Loop Cut tool, the Extrude tool, the Transform tools, and the Crease tool.

Let's start by working on the headset.

Modeling the Headset

The headset requires you to do a lot more detailed modeling. You learned a bit of this detailing in Chapter 10 when you worked on the boots, but most of the detail was still handled by sculpting. In this case, with the headset, all the detail will be modeled manually and you will not be using sculpting at all. Nor will you be using sculpting for any of the remaining sections. The reason for this is that the previous parts, such as the head and the clothing, were very organic forms, whereas the remaining objects are generally referred to as "hard-surface" objects. That is to say they have much harder edges and planes versus the smooth, organic forms of the previous objects. Blender's sculpting tools are not very well

Figure 11.1
First part of the headband on the modeling sheet

adapted to hard-surface forms and so you must use the traditional modeling tools for these.

To get you going on the headset, I will cover it piece by piece, separating pieces into new objects when necessary to make them easier to work with. The first piece you'll tackle is part of the headband shown in Figure 11.1.

With this piece selected, separate it to a new object by pressing P. Once it's separated, leave Edit Mode on the main headset only to select the new piece and enter Edit Mode on it. After doing this, select the inside edgeloop and extrude it once towards the center until it locks with the central axis (assuming Clipping is enabled on the Mirror Modifier). See Figure 11.2.

Next, add a Subsurf Modifier to the mesh. Add two perimeter edgeloops, slid over to each side to produce Figure 11.3.

After adding those edgeloops, add one more loop between the open end and the middle loop, so that you can then select the two loops that make up the open end and scale them down along the Y axis for something like Figure 11.4.

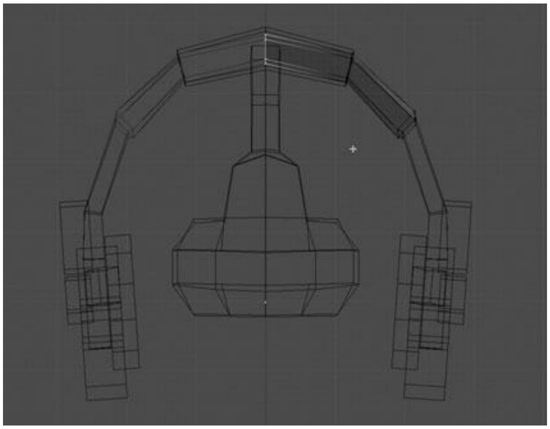

Figure 11.2
Extruding the headband in towards the centerline

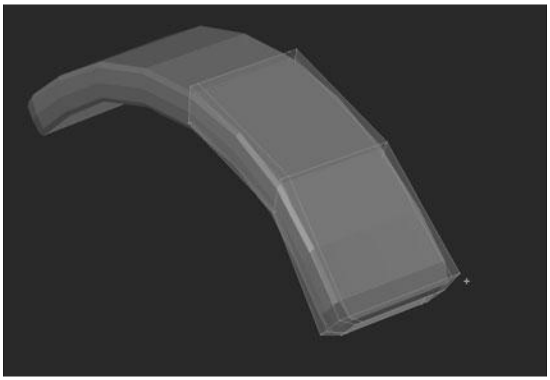

Figure 11.3
Adding perimeter edgeloops

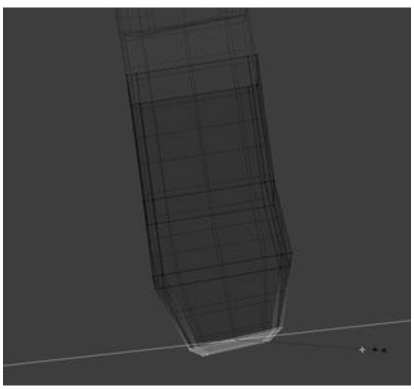

Figure 11.4
Scaling down the end of the headband section

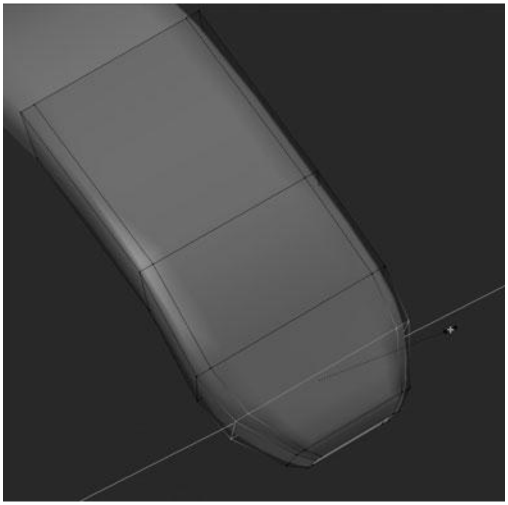

Figure 11.5
Rounding out the profile of the headband section

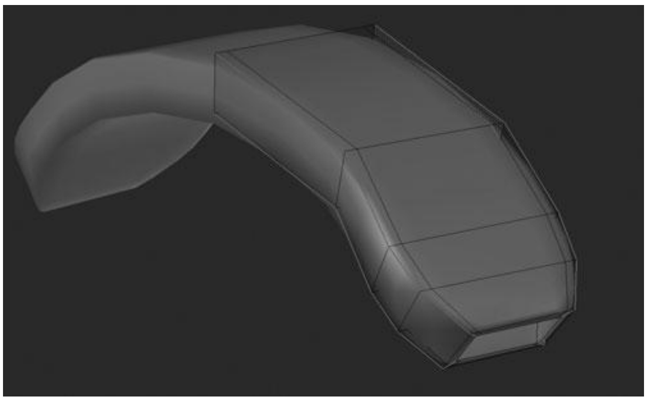

Figure 11.6
Creasing the corners

You can then add yet another edgeloop between the open end and the loop you added in the previous step. Then, scale along the Y axis slightly to produce Figure 11.5.

Now select the open-end edgeloop and extrude and scale it in slightly to give the impression of thickness. Next, switch into Edge Select Mode with Ctrl+Tab so you can easily select all the corner loops by pressing Alt+Shift+RMB on them and then adding a 0.500 value crease to them. See Figure 11.6.

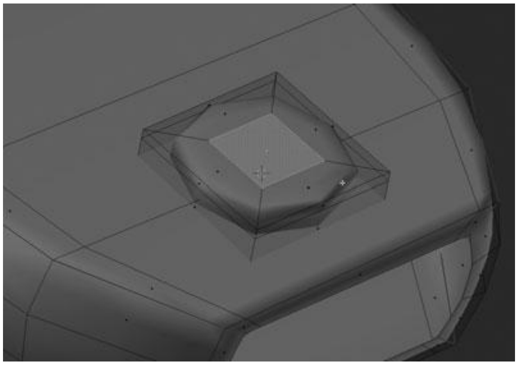

Figure 11.7
Adding the headband knob

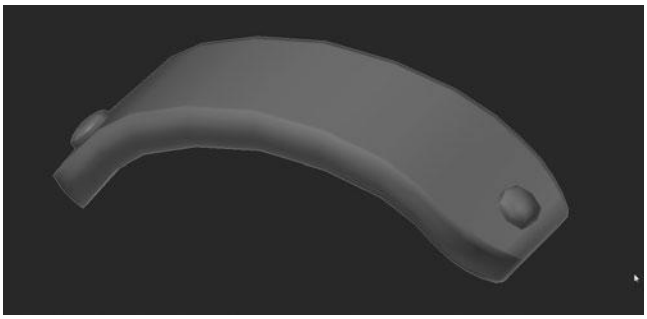

Figure 11.8
Final mesh for the first headband section

The last two steps to finish this part of the headband are to add two loops along the full length of the piece, scale them out along the normal (Alt+S), and then add a new cube, scaled way down to form a knob of sorts at the end of the piece. After adding and scaling the cube, you add another loop towards the top edge and extrude and scale in the top face as well, to help get a cleaner shape, as shown in Figure 11.7.

You can see the final piece in Figure 11.8. You can now move on to the top headband piece.

For the top piece, you'll first separate it from the main headset mesh, as shown in Figure 11.9, and then add a Subsurf Modifier.

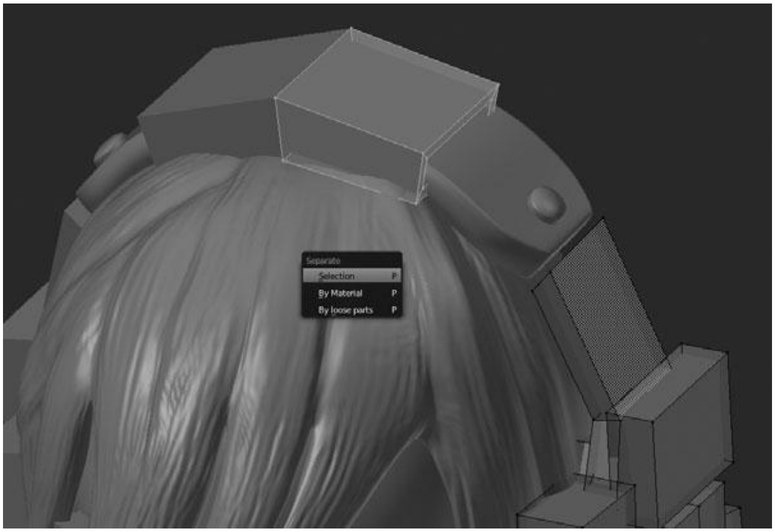

Figure 11.9
Separating the top section of the headband

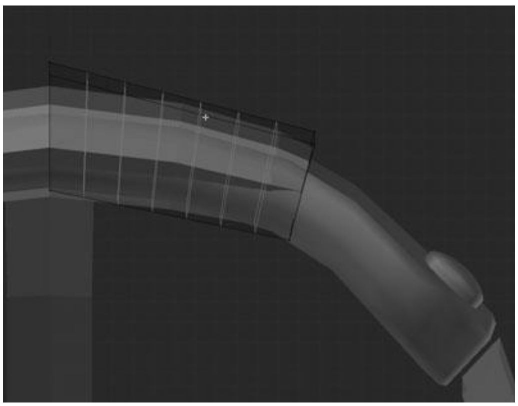

Figure 11.10
Adding six vertical loops for the ridges

After adding the Subsurf Modifier, add six vertical edgeloops that will let you create the ridges along the top, as shown in Figure 11.10.

Now you must add eight more perimeter loops—two along the top, two along the bottom, and two along each of the sides. See Figure 11.11.

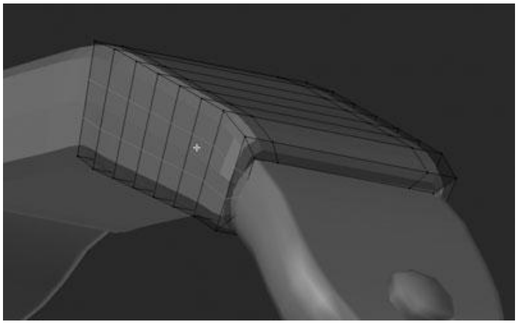

Figure 11.11
Adding more loops to the top, bottom, front, and back

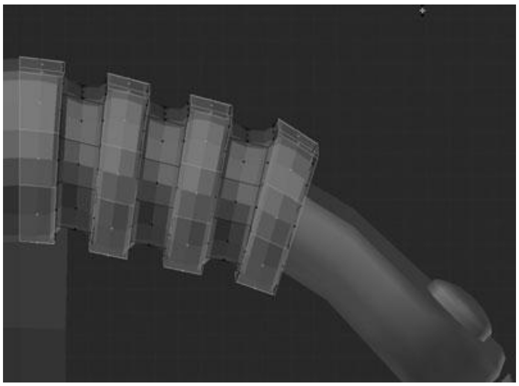

Figure 11.12
Extruding every other ring of faces to form the ridges

Once again, you scale the two side loops out along the Y axis to form a more rounded shape. After doing this, select every other face ring, from Face Select Mode, and then extrude and scale along the normals to produce something similar to Figure 11.12.

This creates a very rounded effect, which is not what you need. To make these ridges nice and crisp, select the face rings that make up the side of the ridges, while still in Face Select Mode, and then extrude and scale along the normals again to get what you see in Figure 11.13.

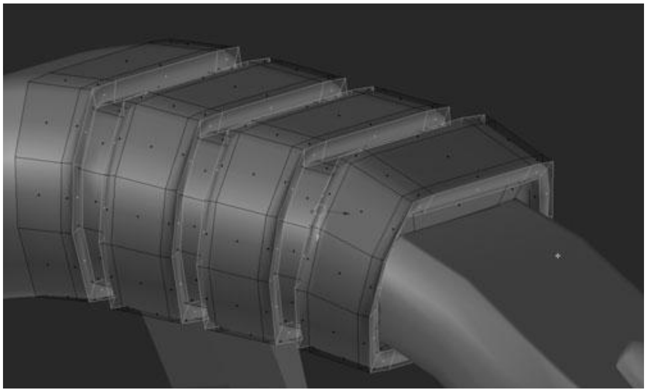

Figure 11.13
Extruding the sides of the ridges and scaling along the normals

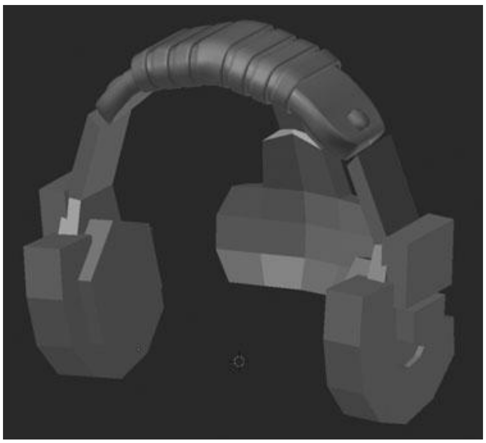

Figure 11.14
Final result for the top of the headband

You can call this piece complete and move on. The final result is shown in Figure 11.14.

Note

Throughout this process, you might find it necessary to tweak the meshes in any number of ways to fit them together appropriately. I have left some of these steps out for the sake of time, but they are simply a matter of pushing and pulling vertices until the pieces fit together nicely.

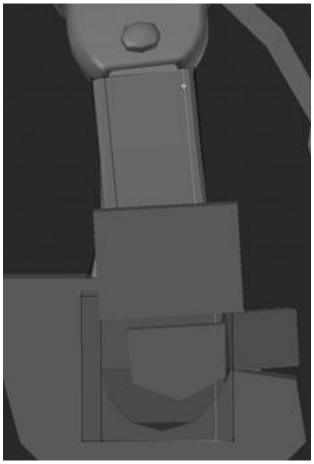

Figure 11.15
Adding perimeter loops to the side rail

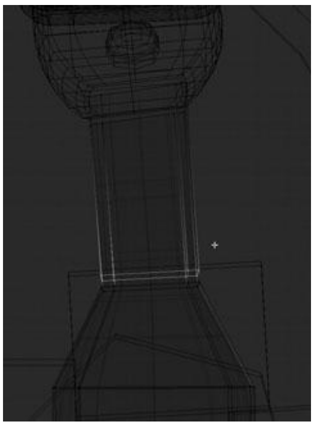

Figure 11.16
Scaling the side rail to fit within the headband

The next piece you'll work on is the side rail that connects the earphones to the headband. Once again the first steps are to separate the mesh and then add a Subsurf Modifier. After doing this, add two perimeter edgeloops vertically along the side faces to sharpen the edges. See Figure 11.15.

Next, select the top two loops and scale them along the Y axis so as to fit with the headband. See Figure 11.16. Add an edgeloop and slide it right up to the bottom of those two top loops to create a sharper angle before the bar meets the earphone.

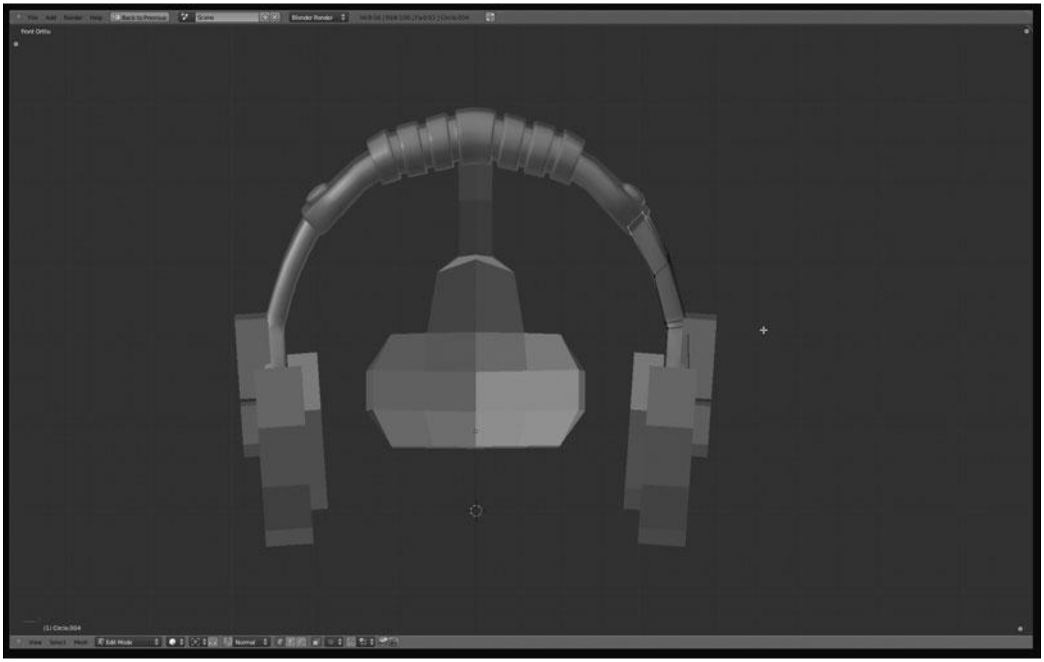

Figure 11.17
Adding another loop to the side rail and rounding out the front profile

You can now add another edgeloop between the top two loops and move it out along the X axis a bit to create a nice, round profile, as shown in Figure 11.17.

The next step is to add the groove along the side that will act as the guide for adjusting the earphone placement. This groove can be created by adding two edgeloops along the side faces and then extruding those newly created faces in along their normals to create something like Figure 11.18. (Notice that I have also deleted the top face that is created when extruding the faces and I have added two edgeloops right next to the edge of the groove to get a crisper edge.) This completes the side rail, so you can move on to the main earphone shape.

As with the other parts, the first steps are to separate and add a Subsurf Modifier. After doing this, immediately add two edgeloops along the front to sharpen the corners and then add a horizontal edgeloop at the front, top, and back top portions See Figures 11.19 and 11.20. Also add a loop along the side that you'll use to create a bevel along the front edge. See Figure 11.21.

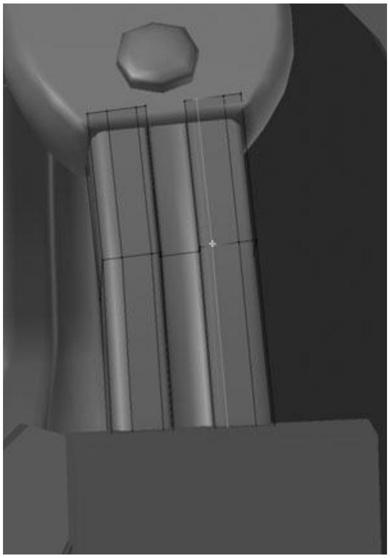

Figure 11.18
Creating the side rail groove

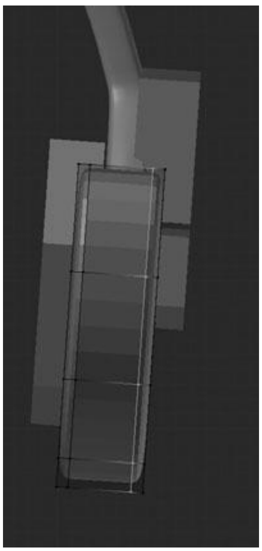

Figure 11.19
Adding edgeloops to the front of the earphone

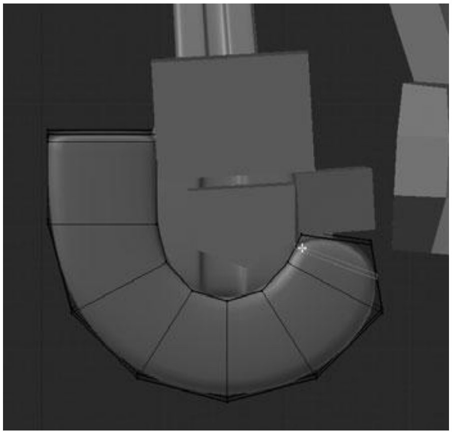

Figure 11.20
Adding loops to the top of the earphone

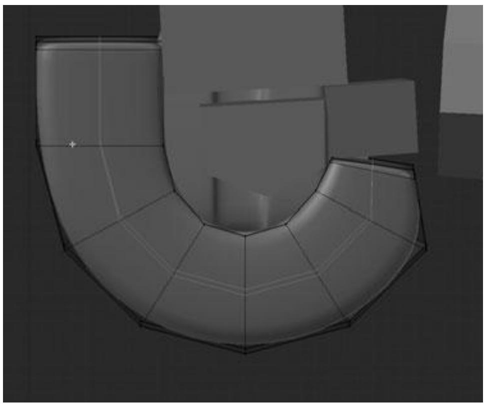

Figure 11.21
Adding a loop that will be used for beveling the front edge of the earphone

After adding all these loops, select the front corner edgeloop and use the Edge Slide tool (Ctrl+E > Edge Slide) to slide the edge in towards the adjacent loop along the front surface. This creates a very nice bevel that you can then sharpen by adding another loop next to the inner edge. See Figure 11.22.

Now that the bevel is done, you can sharpen the inside curve with yet another edgeloop, as shown in Figure 11.23. This also completes the outer earphone, leaving you to work on the earphone padding.

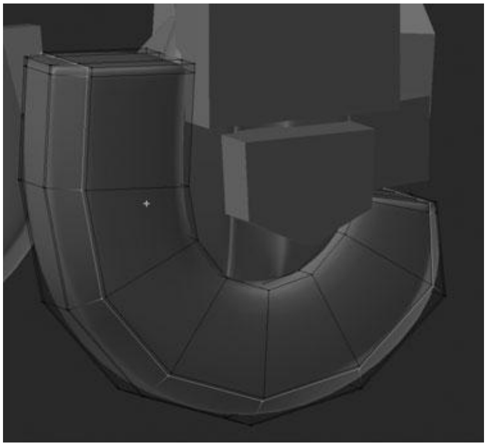

Figure 11.22
Beveling the front edge

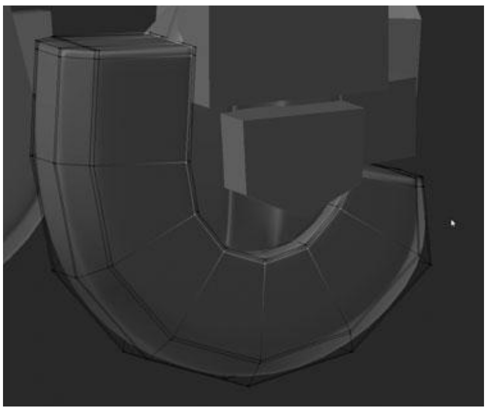

Figure 11.23
Sharpening the inside curve of the earphone

The earphone padding is very simple; it is literally just a matter of adding a Subsurf Modifier, then extruding and scaling the inner faces once, followed by extruding the newly created face loop out to add thickness. You can see the quick process in Figures 11.24 and 11.25. You can now move on to the two smaller, outer earphone pieces.

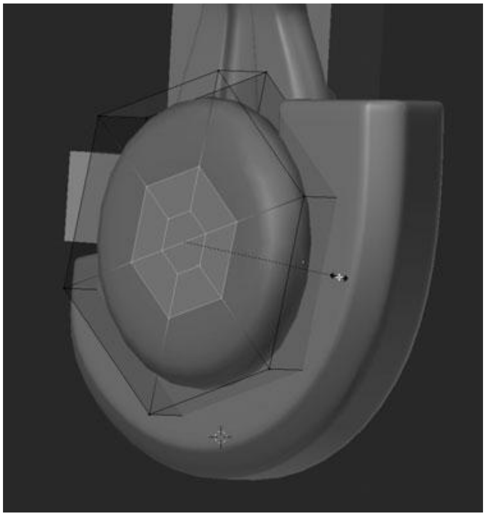

Figure 11.24
Extruding and scaling the inside surface of the earphone padding

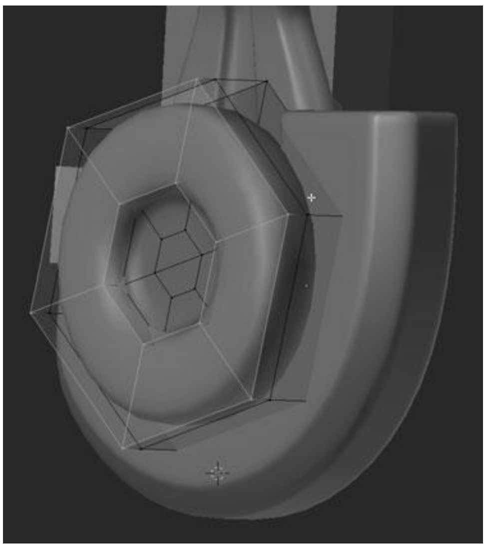

Figure 11.25
Extruding the outer rim of the earphone padding

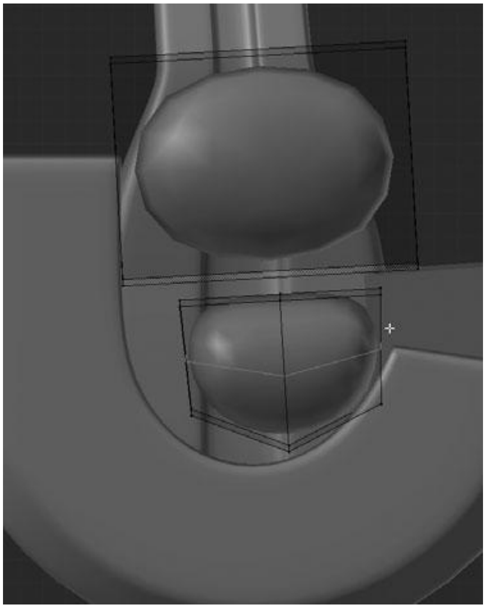

Figure 11.26
Outer earphone pieces after adding Subsurf

The first few steps of modeling the outer earphone pieces, after adding a Subsurf Modifier, is to add several edgeloops to both pieces and tweak the shape. The edgeloops you'll use will make the shape square, rather than round like it currently is, as shown in Figure 11.26.

Starting on the bottom piece, add two edgeloops from top to bottom, and two edgeloops on the sides. Each time, slide them over towards the edge to get a crisp corner, as shown in Figure 11.27.

Next you'll work to reshape the bottom piece by scaling out the top sections along the Y axis so that it forms an elongated half-circle, as shown in Figure 11.28. You can also add another edgeloop through the center to help with the shape.

This is all you need to do for the bottom piece and so now you can start by adding the same initial loops on the top piece. Add them along each edge to square the corners up, as shown in Figure 11.29.

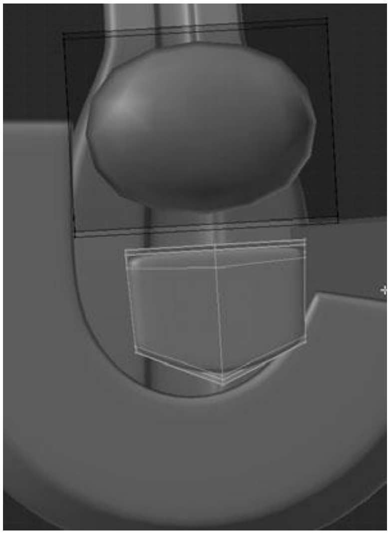

Figure 11.27
Adding edgeloops to the bottom piece

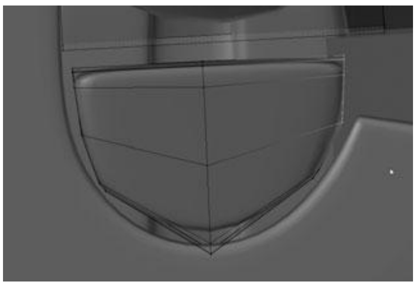

Figure 11.28
Shaping the bottom piece

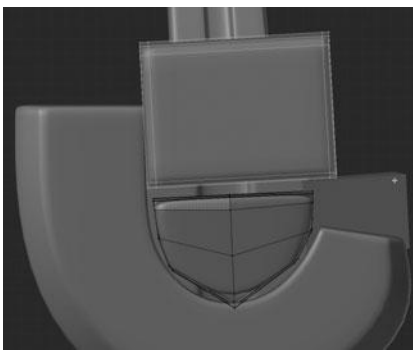

Figure 11.29
Squaring up the corners of the top piece

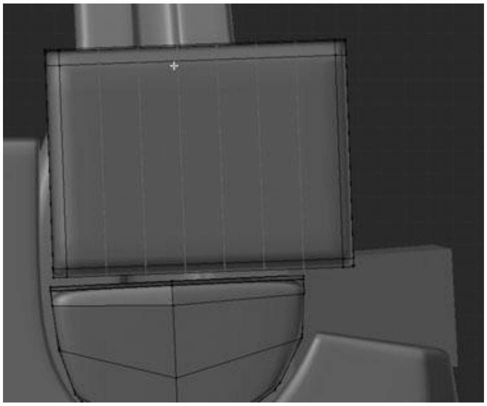

Figure 11.30
Adding six loops to the top piece in order to create the details

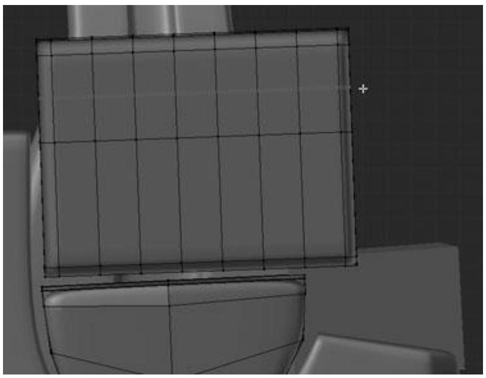

Figure 11.31
Adding two more loops for the insets

After adding the initial loops to the top piece, add a set of six more vertical loops to the top that will give you some of the edges necessary to create the four insets seen in the modeling sheet. See Figure 11.30.

Following those six loops, add two more, shifted towards the top edge to line up with the top and bottom of the insets. See Figure 11.31.

Now, using the selection in Face Mode shown in Figure 11.32, extrude the faces in slightly to form the actual inset. See Figure 11.33. This leaves you with the inset but now you need to sharpen the edges to give it a finished look.

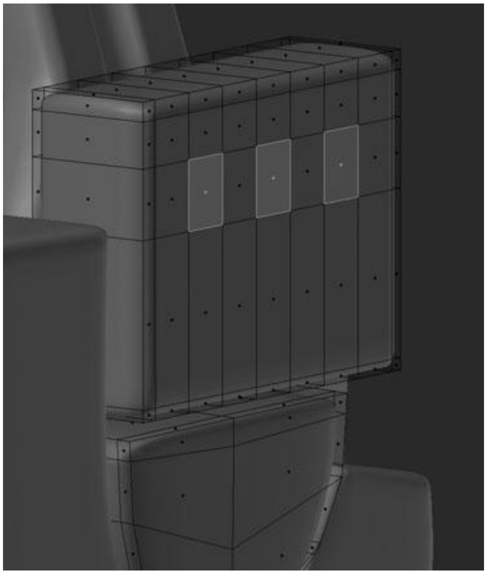

Figure 11.32
Selection of the faces used to extrude the insets

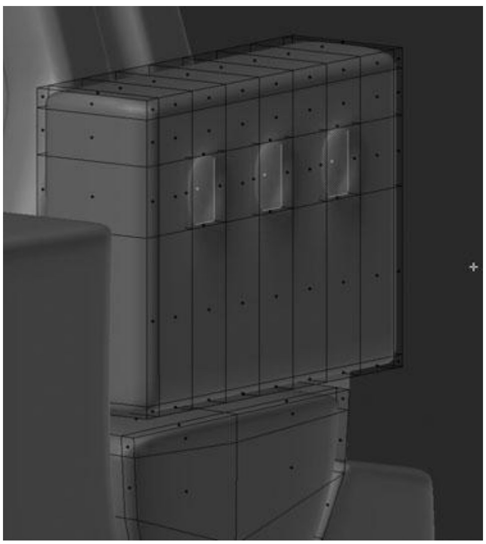

Figure 11.33
Extruding the insets

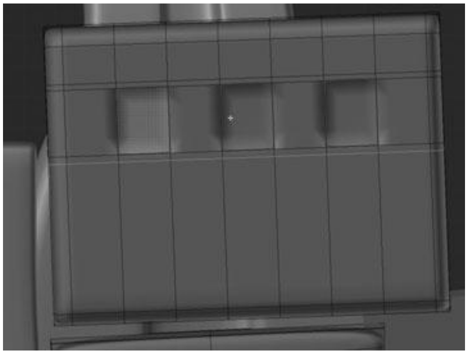

Figure 11.34
Creasing and sharpening the insets with edgeloops

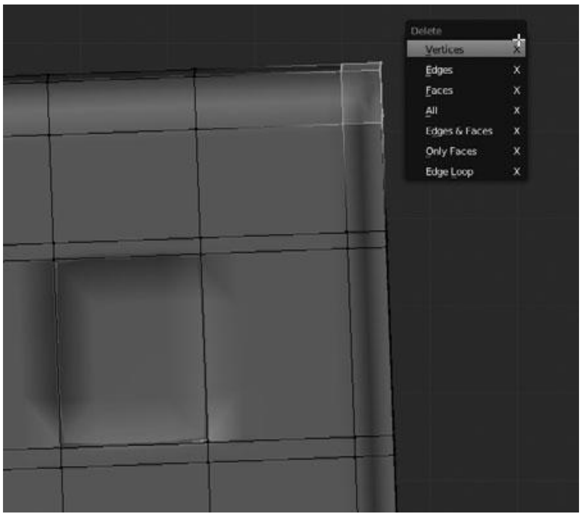

Figure 11.35
Deleting the vertices in the top-right corner

You can sharpen the edges by selecting all the edges that make up the inset and setting a crease value of 0.900. Then, in order to combat the smoothing artifacts you can see next to the insets, add an edgeloop above and below the insets. See Figure 11.34.

At this point, there are just two more tasks. The first is to delete the vertices that make up the top-right corner when viewed from the side. See Figure 11.35.

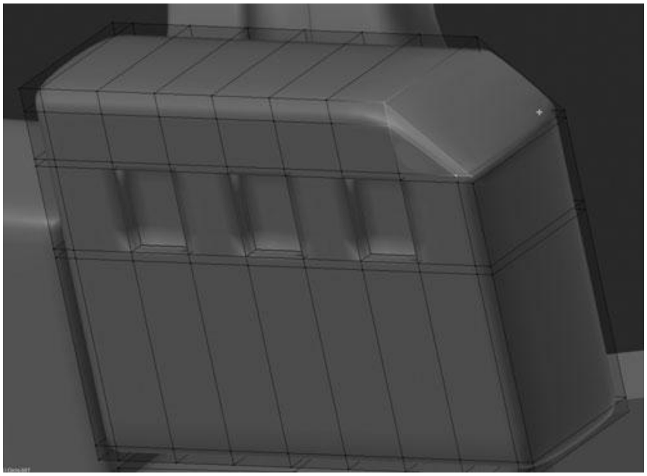

Figure 11.36
Filling the side and end faces

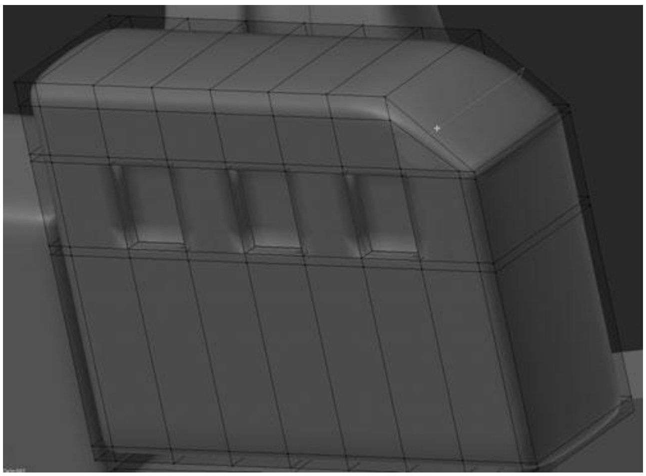

Figure 11.37
Adding an edgeloop to the new surface

After deleting these vertices, you can fill the end and side faces as you can see in Figure 11.36. Then, add another edgeloop along the surface, as shown in Figure 11.37.

You can then select that new edgeloop and move it out slightly along the Y and Z axes so as to make a rounded corner on the mesh. After rounding it out, you can finish filling in the gap seen in Figure 11.38.

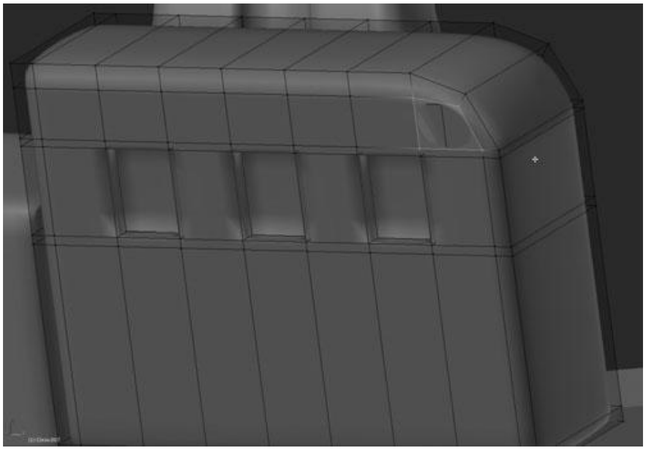

Figure 11.38
Filling in the remaining gap

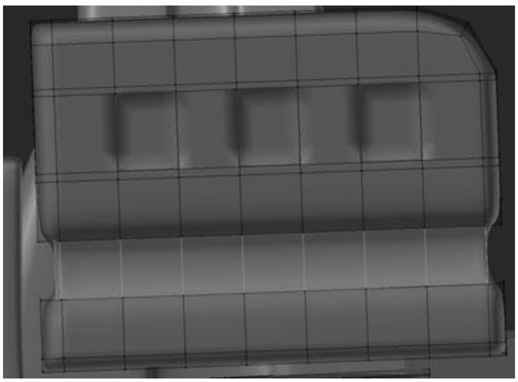

Figure 11.39
Adding and extruding two loops to form an inset

The second task is started by adding two more edgeloops towards the bottom of the top piece. Extrude those new loops once and then scale them along their normals to get Figure 11.39.

Once you have scaled those loops down, you can add two more loops, one at the top of the newly created inset and one at the bottom. See Figure 11.40.

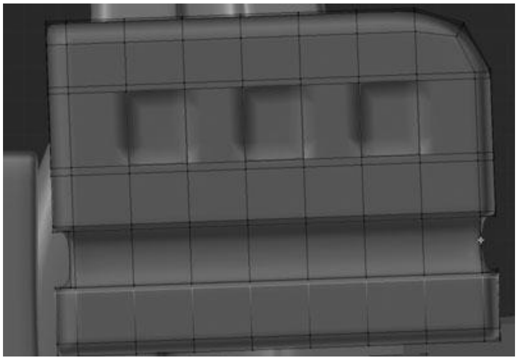

Figure 11.40
Adding perimeter loops to the new inset

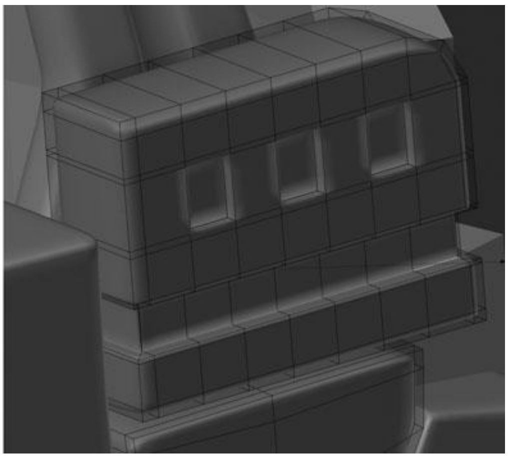

Figure 11.41
Creasing the inside loops of the inset

Then to finish the piece, select the two inner loops that make up the inset and crease them with a value of 0.800. See Figure 11.41.

You are now almost done with the headset. You just have the back support and the tubing connecting the back support to the earphone left to do.

As with the other pieces, start on the back support by adding a Subsurf Modifier and setting the shading to Smooth. After doing this, enter Edit Mode and start

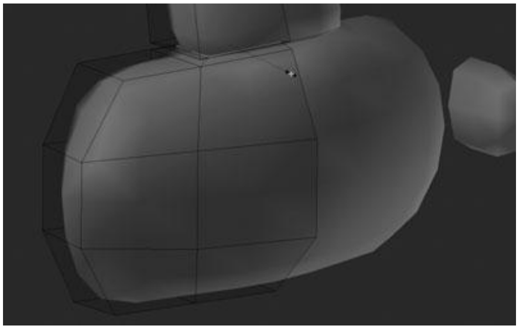

Figure 11.42
Adding edgeloops to the top of the back support

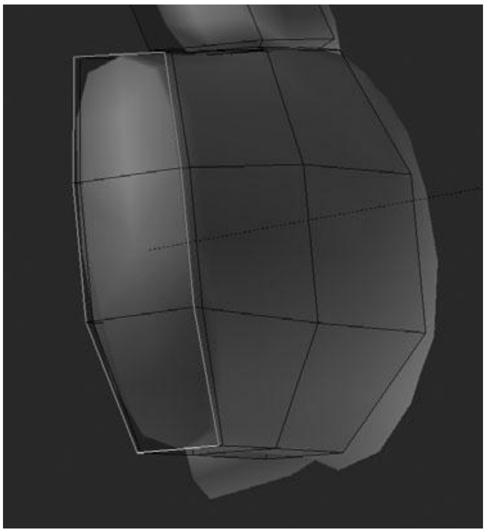

Figure 11.43
Adding an edgeloop to the side of the support and creasing the corners

by adding a couple of new edgeloops at the base of the rail running up from the support padding. See Figure 11.42. By scaling the middle of these two loops, you can quickly and easily create a simple seam between the rail and the padding.

Next, add another edgeloop to the side of the padding to crisp up the corners, followed by creasing the outer edges to make them even sharper, as shown in Figure 11.43.

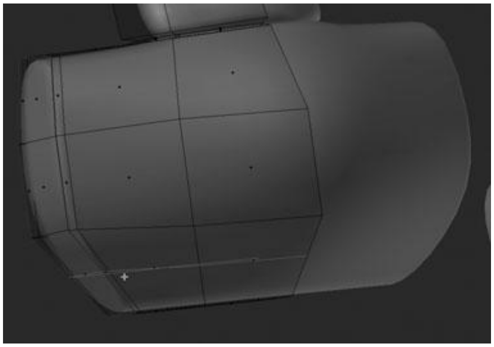

Figure 11.44
Adding an edgeloop toward the bottom of the support to prepare for the tubing

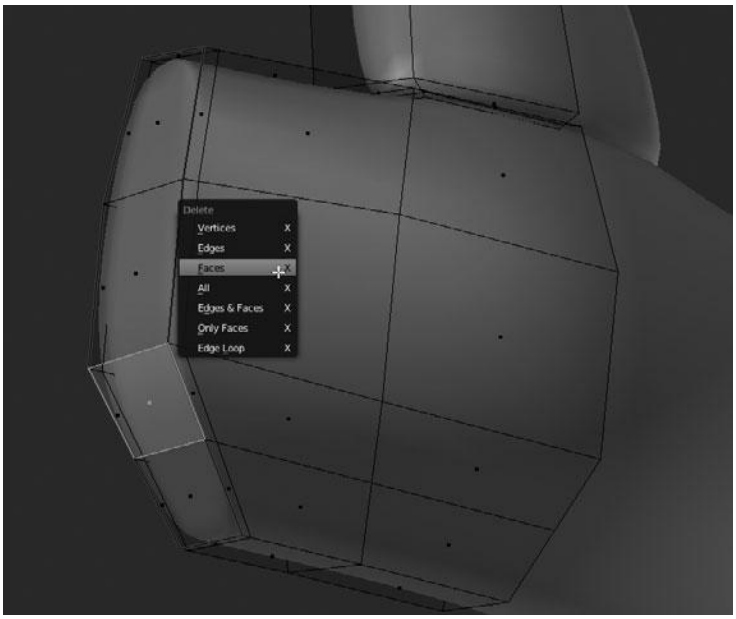

Figure 11.45
Deleting the faces to extruding the tubing

You can now add yet another edgeloop, this time horizontally along the bottom so as to give you a face to which you can connect the tubing. See Figure 11.44.

In order to then make this tubing, start by deleting the two faces you can see selected in Figure 11.45.

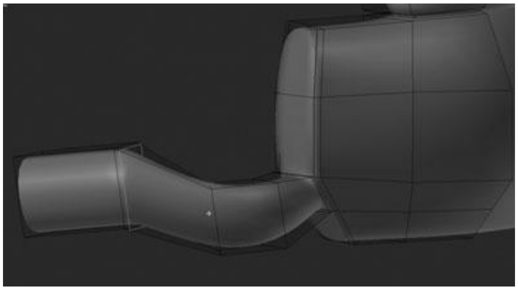

Figure 11.46
Extruding and connecting the tubing

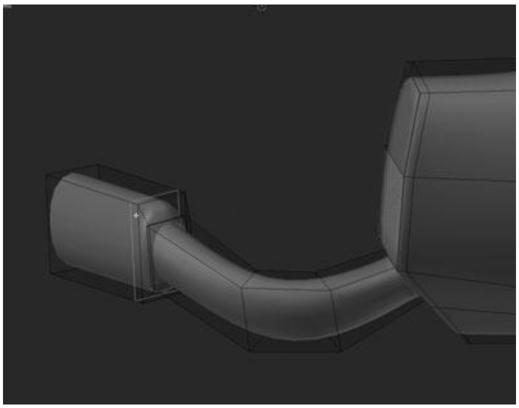

Figure 11.47
Ripping the tubing away from the connector

After deleting these faces, it is just a matter of extruding one of the two open edgeloops several times in a tubular shape and then connecting the faces like in Figure 11.46. (Notice that I have also added two edgeloops, one at each end to create a cleaner shape.)

Now what you need to do is to detach the tube from the connector where it hooks into the earphone. To do this, first select a loop on the end and press V to rip it away from the rest of the mesh. Doing this will allow you to scale it up or down, depending on which way the mesh ripped, in order to make a clear seam between the two pieces. After doing this, you need to add appropriate edgeloops in order to sharpen the connector, rather than keeping it rounded. See Figure 11.47.

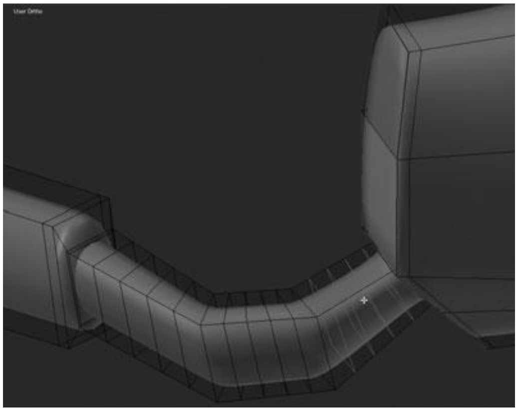

Figure 11.48
Adding loops to each segment of tubing

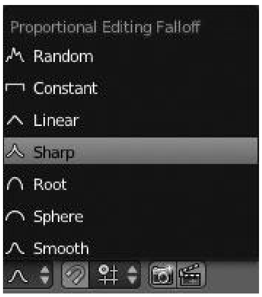

Figure 11.49
Changing the falloff type for the PET

It is now time to add the ridges to the tubing, which you can do by adding four edgeloops to each segment of the tubing. See Figure 11.48.

At this point, notice that the tubing has taken on a very angular shape, due to the new loops just added. This can be fixed by using the Proportional Editing Tool, or PET, as it is referred to. Pressing O activates the PET. After activating the PET, change the falloff type from the menu in the Viewport header to Sharp. See Figure 11.49.

Once activated, use the tool by switching into Top view and selecting the two loops where the tubing bends, as shown in Figure 11.50. Then, using the Grab tool, move them in slightly along the Y and X axes to round out the whole tubing.

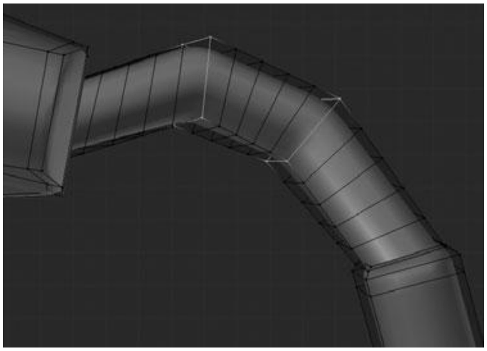

Figure 11.50
Selection to be transformed on the tubing

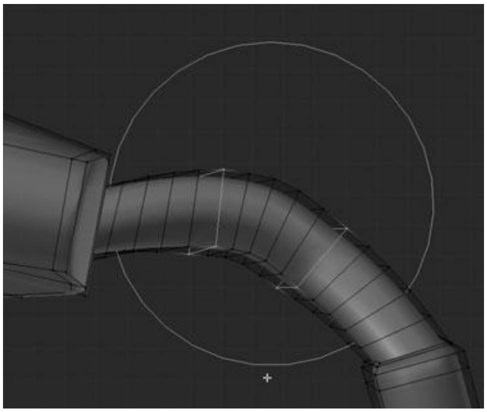

Figure 11.51
Transforming the tubing with the Proportional Editing Tool

See Figure 11.51. The surrounding vertices will follow the transform based on the circle of influence that is indicated by the circle drawn around your cursor. After using the PET, don't forget to turn it off with O before moving on to the next steps.

Note

While using the PET tool, you will notice that all surrounding vertices within the circle guide are affected based on the falloff method you choose. This circle guide, or the sphere of influence, can be sized up or down by using MouseWheel UP/Down or by using the Page Up and Page Down keys.

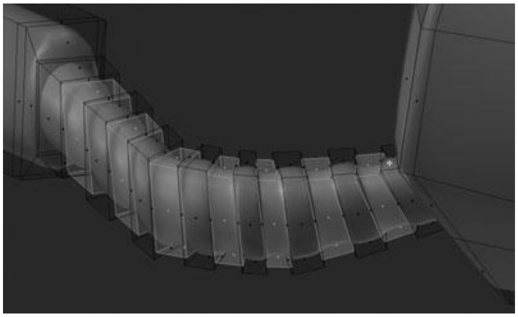

Figure 11.52
Extruding and scaling the ridges along their normals

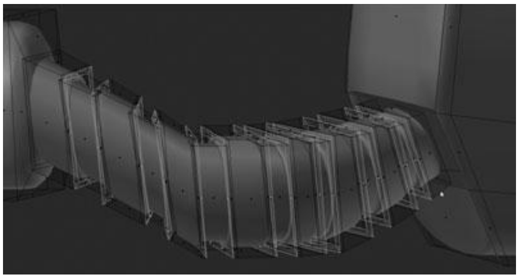

Figure 11.53
Extruding the sidewalls of the ridges and scaling along their normals

After rounding out the bends in the tubing, it is time to add the ridges. You can do this the same way you created the ridges in the top piece of the headband earlier in this chapter. The first step is to select every other ring of faces. Then extrude and scale down along the normals (E > Enter > Alt+S). See Figure 11.52.

The second step is to repeat that same process, but this time select each of the newly created face rings along the sidewalls of the insets. Then, extrude them and scale out along the normals rather than in. See Figure 11.53.

Now you need to repeat that entire process again on the connector between the back rail and back support, except that you need only to create a single inset. See Figure 11.54.

To finish the rest of the top rail and connector, add a couple of loops to sharpen the top of the connector, rip the base loop of the connector away from the

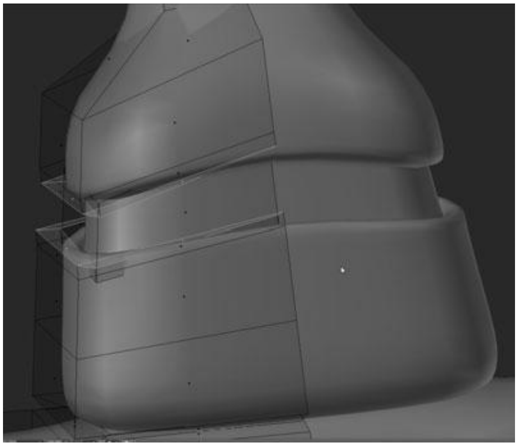

Figure 11.54
Adding an inset to the connector between the back rail and back support

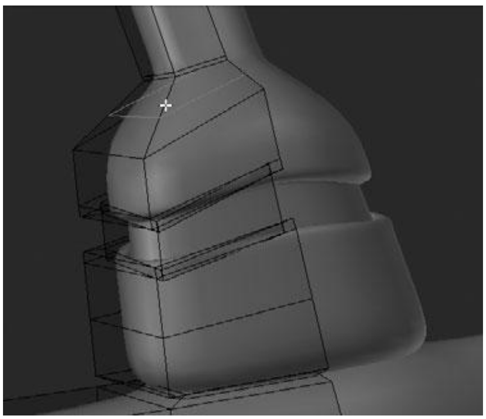

Figure 11.55
Adding loops to the top of the connector

support, and then add another loop along the entire length of the rail that will give you the geometry to create yet another inset. See Figures 11.55 and 11.56.

Next you can add yet another loop to the base of the rail and select the inside, outer faces and extrude them in slightly. See Figures 11.57 and 11.58.

After doing this, you can also crease the inner and outer edges along the inset to sharpen it up a bit more. See Figure 11.59.

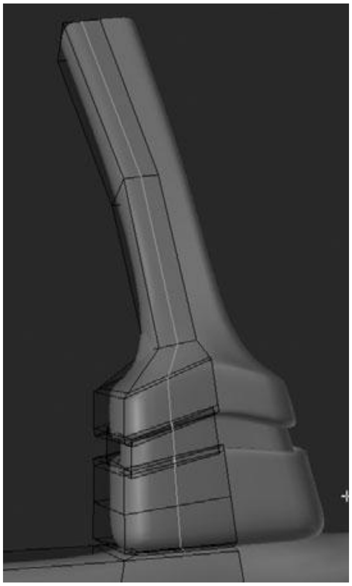

Figure 11.56
Adding a loop along the rail

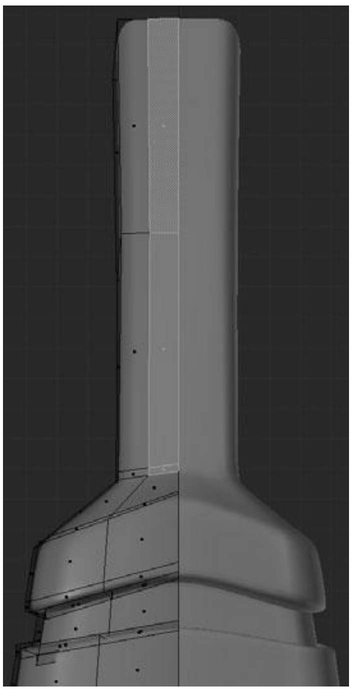

Figure 11.57
Selecting the inside faces of the rail to extrude

Figure 11.58
Extruding the inside faces of the rail to create an inset

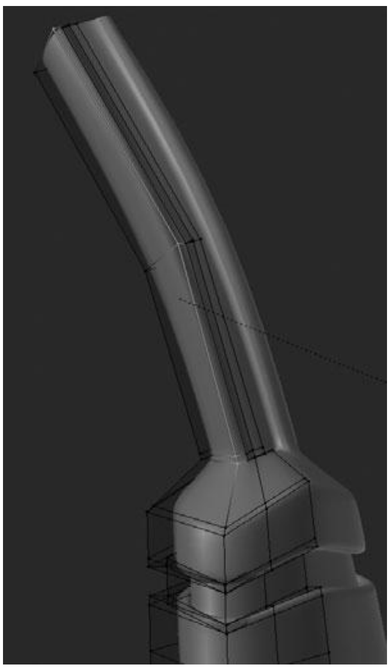

Figure 11.59
Creasing the inside and outside edges of the rail

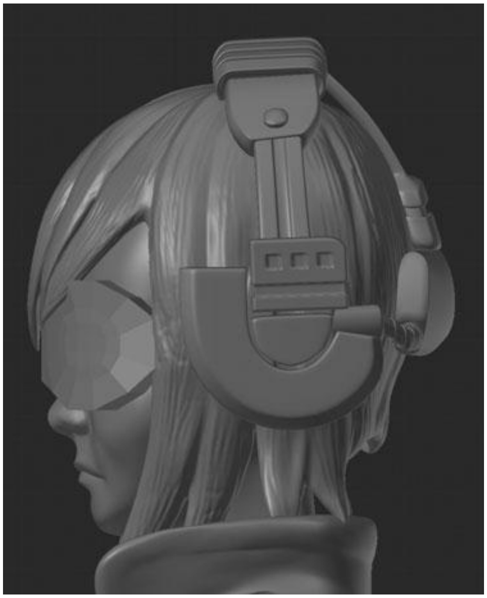

Figure 11.60
Side view of the finished headset

The headset is now complete; you can see the finish result in Figures 11.60 and 11.61. It is now time to move on to the backpack.

Modeling the Backpack

In order to model the detail on the backpack, you'll use all the same techniques you did on the headset along with a few new ones. You'll start out by working on the shoulder straps.

To create and finish the main part of the shoulder straps is just a matter of adding a Subsurf Modifier, creasing the corners, and then adding two edgeloops down the center to create what's shown in Figure 11.62. These are the same steps you followed over and over on the headset, which is why it's covered only briefly here.

Now that you've polished up the main strap shape, zoom in on the rings to make the strap wrap around the lower ring and add a band around the strap for the upper ring.

Figure 11.61
Back view of the finished headset

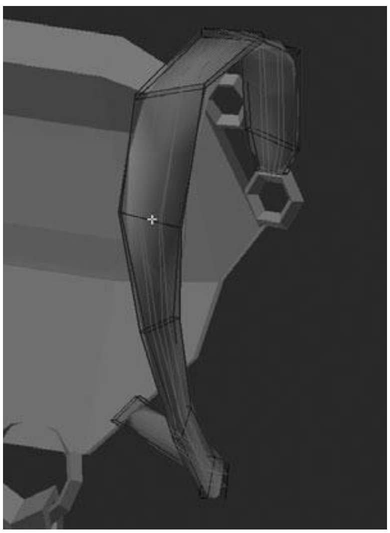

Figure 11.62
Adding loops to the backpack's strap

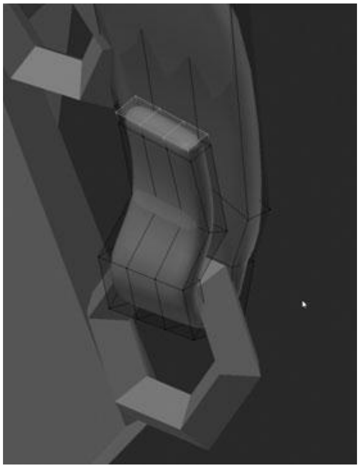

Figure 11.63
Extruding the strap around the ring

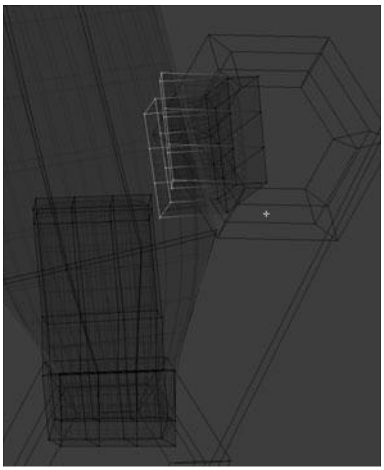

Figure 11.64
Duplicating a part of the main strap to create the loop on the second ring

To coil the strap around the lower ring, it is just a matter of selecting the end faces and extruding them several times, rotating and repositioning with each extrusion to get something similar to Figure 11.63.

The upper ring is done slightly different. For this ring, use the lower half of the coil from the strap as a starting point—the piece that wraps around the lower ring—by duplicating it, rotating it, and moving it in to fit the upper ring. See Figure 11.64.

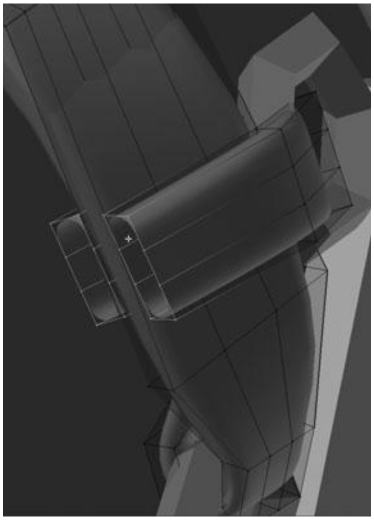

Figure 11.65
Extruding the loops for the second ring

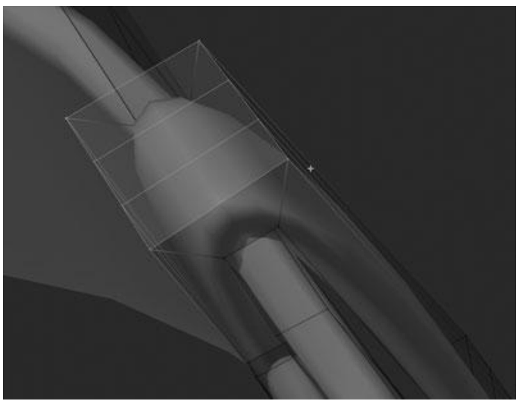

Figure 11.66
Filling in the faces for the second ring

After doing this, extrude both ends of the duplicated piece over to the other side of the strap and then fill in a face at a time to make the strap one continuous piece. See Figures 11.65 and 11.66.

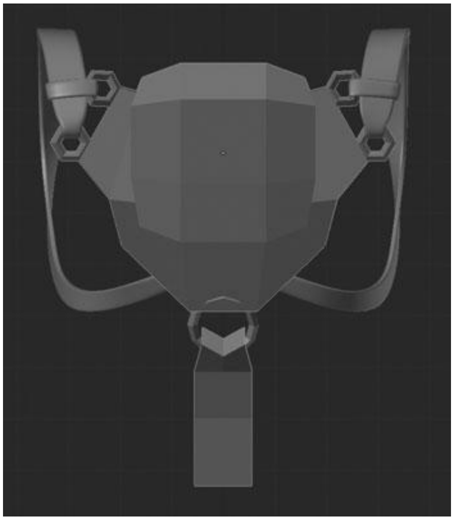

Figure 11.67
Final straps for the backpack

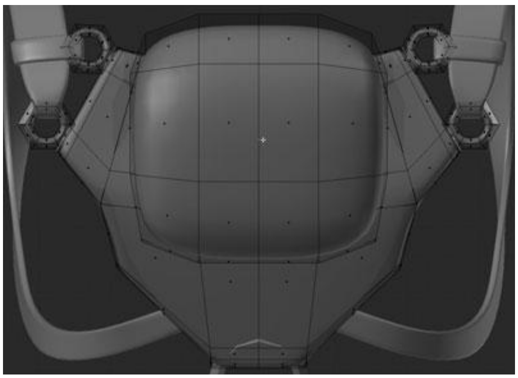

Figure 11.68
Backpack after adding Subsurf and perimeter loops

This finishes off the shoulder straps, leaving you ready to work on the main shape of the backpack. You can see the result for the straps in Figure 11.67.

The first few steps of the main backpack shape are the same as the previous parts: you add a Subsurf and then add edgeloops to sharpen the edges. Thus, I have omitted the step-by-step for this bit. You can see the results in Figure 11.68.

Notice that you should add the edgeloops primarily around the perimeter. The next step is to extrude the edge faces that are immediately adjacent to the rings. You need to extrude them the same way you did the strap around the ring, so that they wrap around the ring. See Figures 11.69 and 11.70.

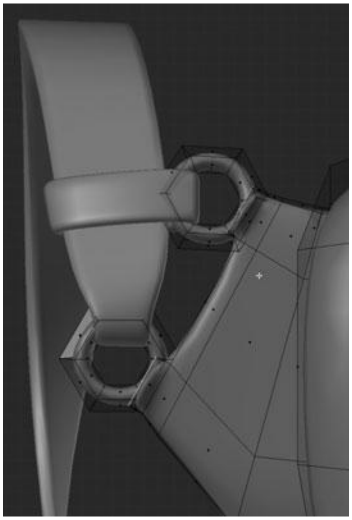

Figure 11.69
Extruding the straps around the rings

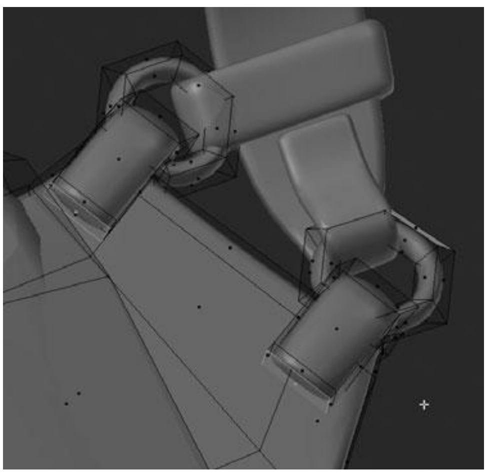

Figure 11.70
Finishing the extrusion of the straps around the rings

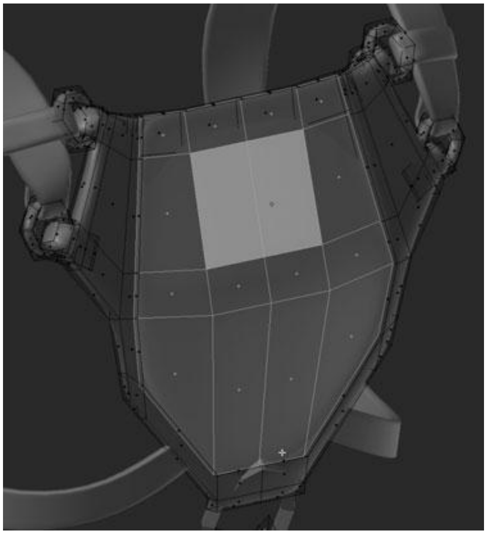

Figure 11.71
Extruding the large inset for the backpack to create the trim

Add a few more loops to the back support and then select the main surface of it and extrude in slightly, leaving a trim around the outer edge. See Figure 11.71.

Note

I have temporarily hidden the main part of the pack with H so as to be able to see the back support better.

Lastly on the back support, add another loop down the center to square off the bottom near the large ring. Then crease the inside edge of the trim. See Figure 11.72.

You can now move your focus to the actual pack portion of the backpack. The first part you'll work on is the flap, as shown in Figure 11.73. To get started, select the front faces from the halfway up point on through to the back, as shown in Figure 11.74. Then duplicate this section, scale it down along the X axis, and then scale out along the normals to produce Figure 11.75.

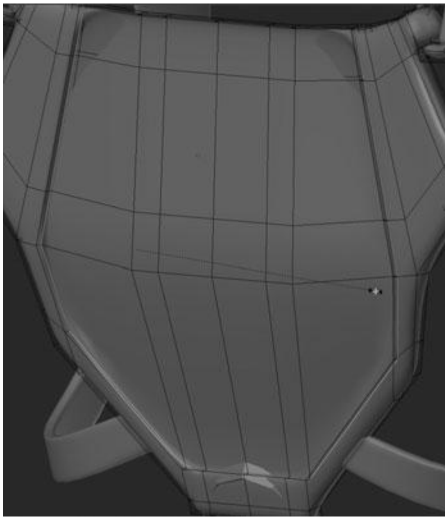

Figure 11.72
Creasing the inner edge of the trim

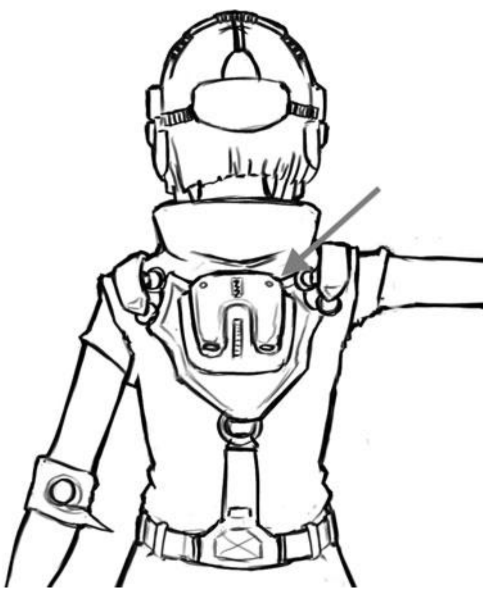

Figure 11.73
Backpack flap on modeling sheet

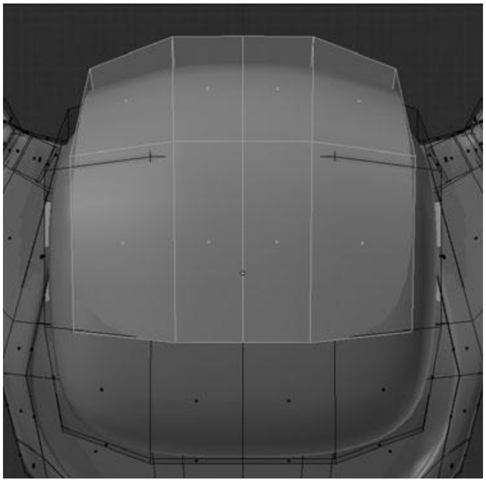

Figure 11.74
Selection for creating the flap

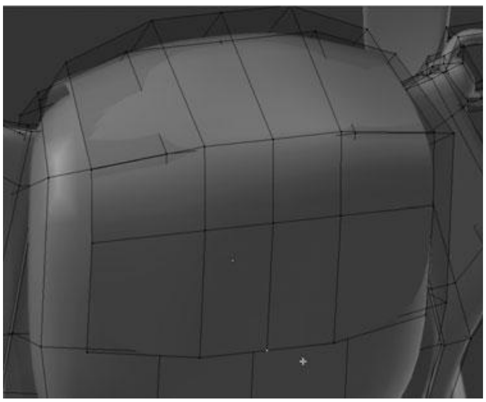

Figure 11.75
Duplicating and scaling the flap

After duplicating this portion, which will form the flap of the backpack, you should add another loop horizontally across the bottom faces and slide it up a bit to form Figure 11.76.

This new loop then gives you the ability to delete the bottom, center vertex in order to create the outline of the flap ends, as shown in Figure 11.77. Notice that

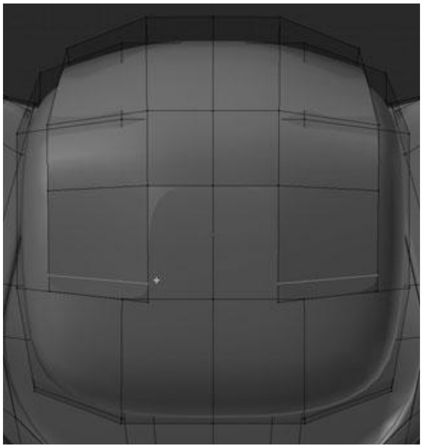

Figure 11.76
Add a loop across the bottom of the flap

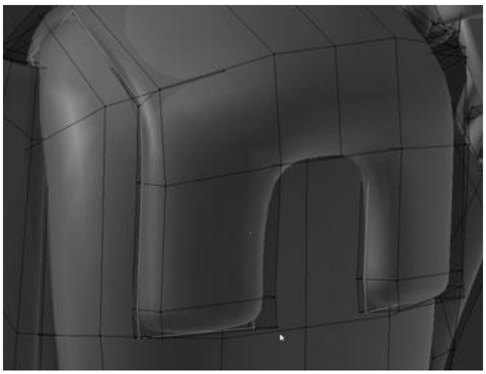

Figure 11.77
Deleting the center vertex and adding loops to the flap ends

I also added an extra loop to the bottom of the flap ends to square them off slightly.

Now that you have the basic shape of the flap, you can select the entire flap and extrude and scale along the normals to add thickness. Then after adding another loop along the newly created edge surface, you should be left with Figure 11.78.

Next, add a new loop to the side surface of the pack itself, sliding it back to form a shape that is flatter at the back. Following this, select all of the inner faces in

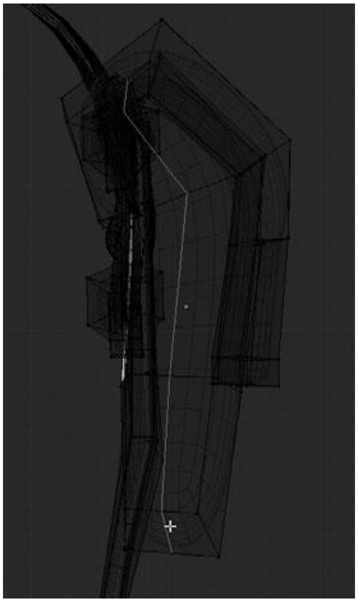

Figure 11.78
Adding depth to the flap

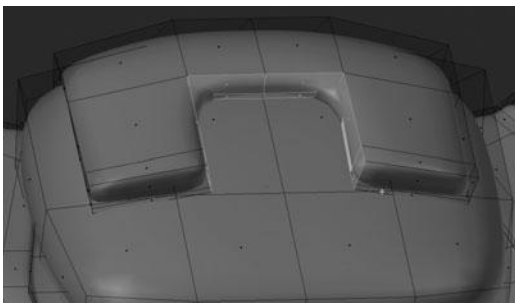

Figure 11.79
Selecting the inside of the flaps

the upside-down U shape that is the inside section of the flap, as shown in Figure 11.79. Then extrude and scale along the normals again to produce Figure 11.80.

This new extrusion has created a new path of faces that you can add loopcuts to without crossing the entire flap mesh. Add two loops, both close to the adjacent

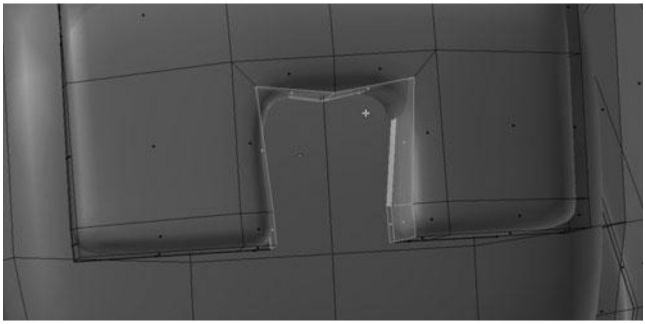

Figure 11.80
Extruding the inner flaps along their normals

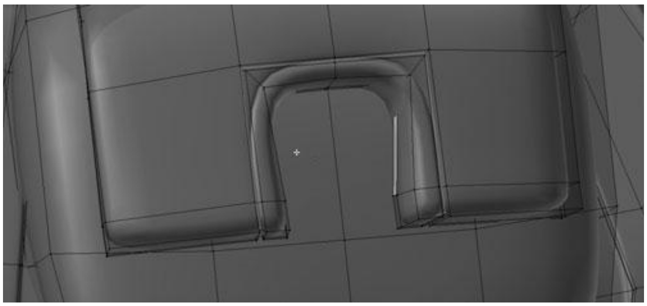

Figure 11.81
Adding edgeloops to form a crease along the inside edge

loop, and then scale the middle loop along the normals to create Figure 11.81. You may notice that I have also tweaked a few of the vertices a bit to get a cleaner shape.

You can then repeat the process along the side of the flap to get Figure 11.82.

And again on the pack, as shown in Figure 11.83.

To finish the pack section you can start by adding a loop to the bottom of the pack and the bottom of the flap. Next, move on by selecting the very bottom loop and using the Edge Slide tool to slide it in towards the character. You can then follow this with yet another loop on each piece to create a flatter edge. See Figure 11.84.

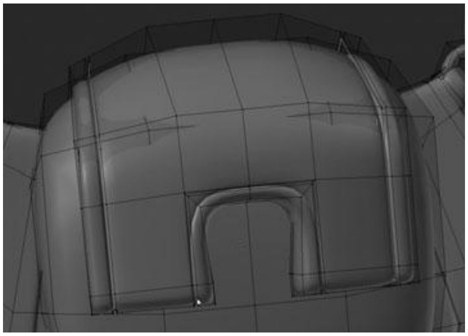

Figure 11.82
Adding edgeloops on the side of the flap for a crease

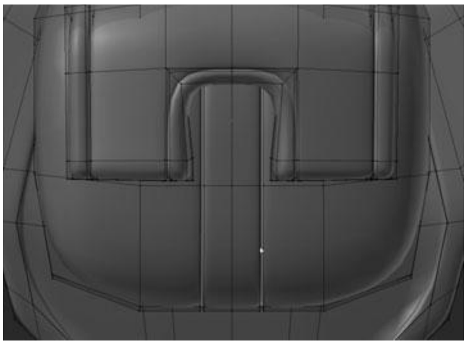

Figure 11.83
Adding edgeloops on the backpack for a crease

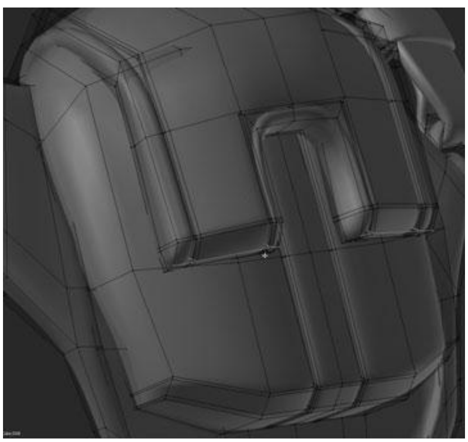

Figure 11.84
Flattening the front side of the bottom flap and backpack with edgeloops

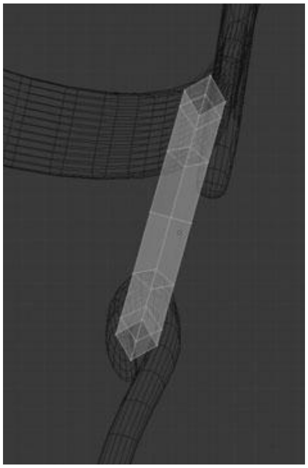

Figure 11.85
Adding a Subsurf Modifier and repositioning the lower ring

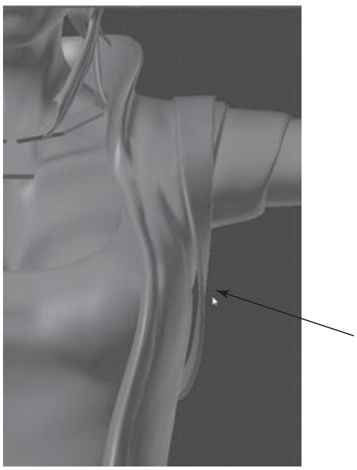

Figure 11.86
Backpack straps before adjusting their relative location to the body

The next step is to add a Subsurf Modifier to the lower, large ring and to reposition it slightly to fit behind the backpack support, as shown in Figure 11.85.

Finally, the very last step needed to finish the entire backpack is to select the portion of strap located directly beneath the character's arms and move it in slightly along the X axis so it lies against the coat. See Figures 11.86 and 11.87.

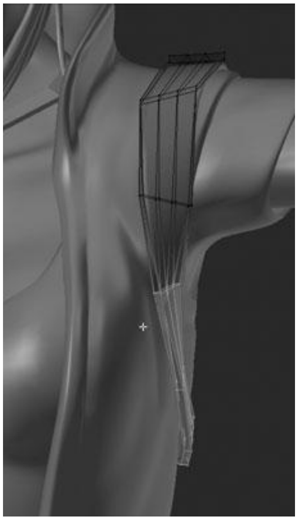

Figure 11.87
Repositioning the backpack straps

This finishes the backpack; you can now move on to the belt.

Modeling the Belt

Now that you have finished the backpack, you can begin modeling the belt. Most of the belt, primarily the strap, will be a relatively simple process to model. The buckle, on the other hand, is slightly more difficult due to the interlocking tab in the design. You'll use all the same modeling tools that you've been using, including the Loop Cut tool, the Extrude tool, and of course the Transform tools. Let's start by doing the easy part, the strap.

The first few steps of modeling the strap should be very familiar to you by now; add a Subsurf Modifier, set the shading to smooth, crease the corners, and add several perimeter edgeloops to sharpen the corners. Delete the inner face next to the belt buckle, and the inner face on the backside so as to prevent the strap from having a rounded end, caused by the Subsurf. See Figure 11.88. The result after creasing and adding the edgeloops can be seen in Figure 11.89.

Those last few steps leave you ready to model the belt loops. You can create these similarly to the way you created the original backpack straps and the necklace; use a pre-existing edgeloop as a starting point. In this case, select the

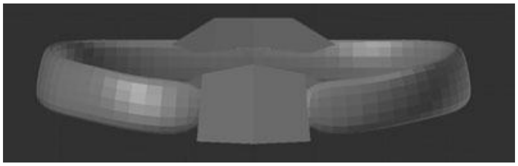

Figure 11.88
The rounded surface of the belt after adding a Subsurf Modifier

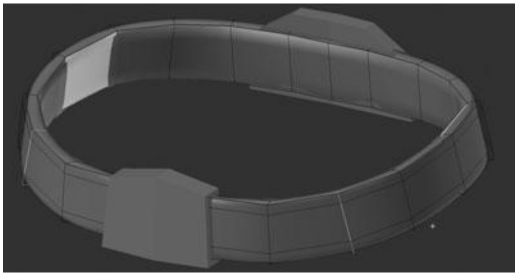

Figure 11.89
Creasing and adding edgeloops to the belt

third loop to the right of the buckle and then duplicate it, extrude it along the belt once, and then reselect the whole piece and extrude and scale along the normals to produce Figure 11.90.

After extruding, you select the horizontal loop at each of the four corners of the belt loop and crease them to 0.500 or so, as shown in Figure 11.91. This will help them look a little more rigid and not intersect with the strap of the belt so much.

The final step to finish the belt loops is to simply duplicate the whole piece twice and position accordingly around the belt, as shown in Figure 11.92.

With both the strap of the belt and the belt loops done, you can shift your focus to the back support. The first step, as with many of the previous parts, is to separate the support into its own mesh. After doing this, add the common Subsurf, smooth shading and perimeter edgeloops, as shown in Figure 11.93.

What you'll do next is create the inset that you can see in the concept. You can create this inset by adding a series of three new edgeloops: one vertical towards the side, and two horizontal towards the top and bottom. See Figure 11.94.

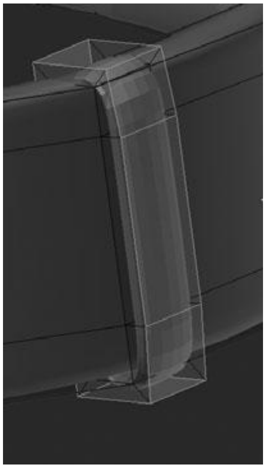

Figure 11.90
Creating a belt loop

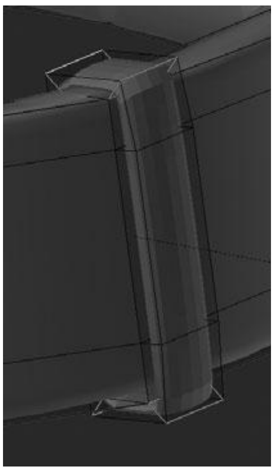

Figure 11.91
Creasing the corners of the belt loop

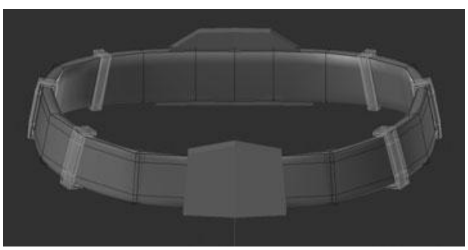

Figure 11.92
Duplicating the belt loop

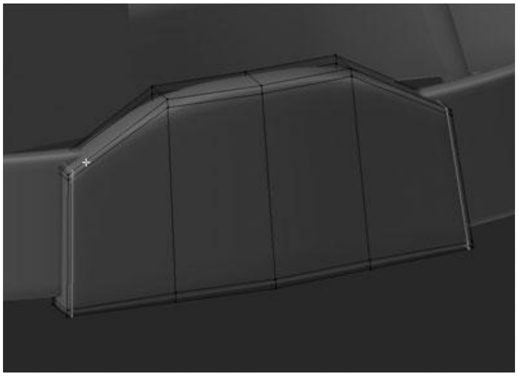

Figure 11.93
Adding edgeloops to the back support of the belt

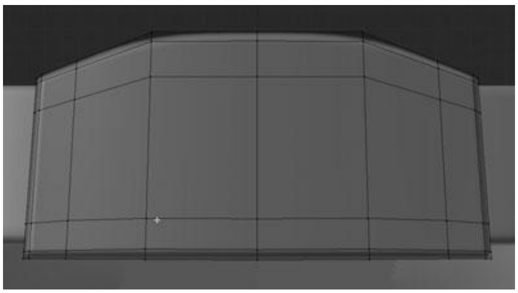

Figure 11.94
Adding additional edgeloops needed to create the inset

Following these new edgeloops, you can now select the inside two faces in Face Select Mode and extrude them in along the normal to create the inset. See Figure 11.95.

Next, you can crease the perimeter edges on both the inner and outer edges to sharpen the result and add three new edgeloops right up next to the inset to improve it even further. See Figure 11.96.

Note

Remember, when I refer to a number of edgeloops or faces, I am referring to those faces without including the Mirror Modifier.

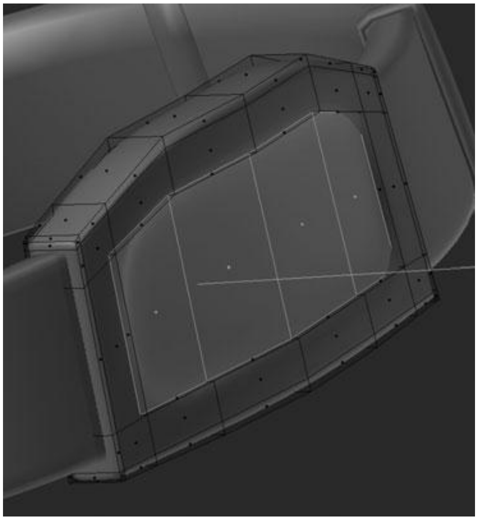

Figure 11.95
Extruding the inset

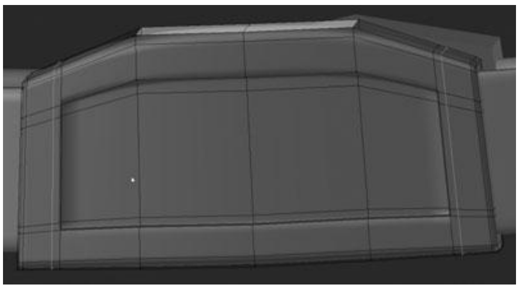

Figure 11.96
Creasing the inset and adding perimeter edgeloops

You can see the finished result, viewed with all other components, in Figure 11.97. You can now move on to the belt buckle.

The first step of the buckle is to add the Subsurf Modifier. After doing this, you can follow it up with the same type of perimeter edgeloops as you did on the back support. Adding these edgeloops gives what you see in Figure 11.98.

Next, you need to create the inset in the same way as the back, including creasing and the perimeter edgeloops. However, you should also create an

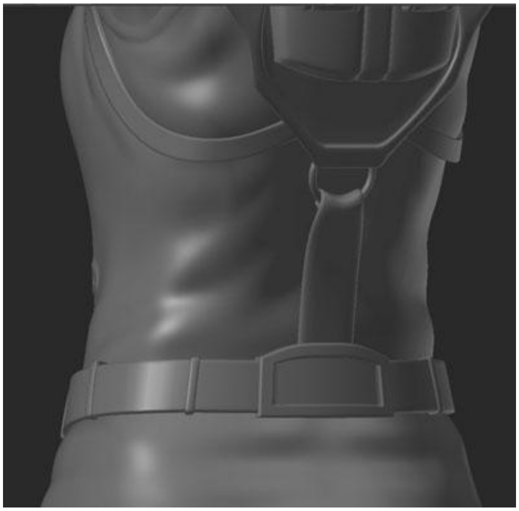

Figure 11.97
Final model for the belt's back support

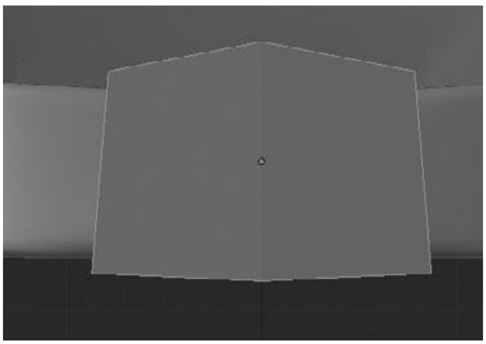

Figure 11.98
Adding perimeter loops to the belt buckle

additional edgeloop roughly in the center to give you a starting point to model the tab, as shown in Figure 11.99. (Notice that I have also reshaped it ever so slightly to make the top surface rounded.)

You are now ready to work on the center tab for the buckle. However, in order to do this, you first need to remove the symmetry from the mesh so as to make an asymmetrical model. Removing symmetry is done simply by pressing the Apply button on the Mirror Modifier while in Object Mode. Once you have a

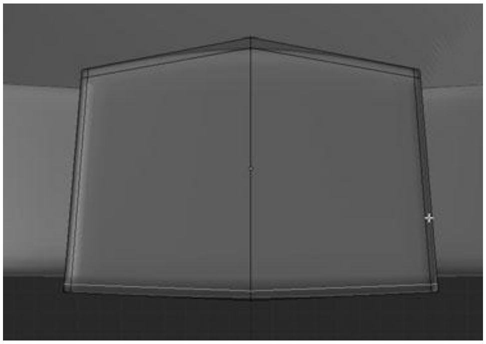

Figure 11.99
Result after extruding the inset and creasing

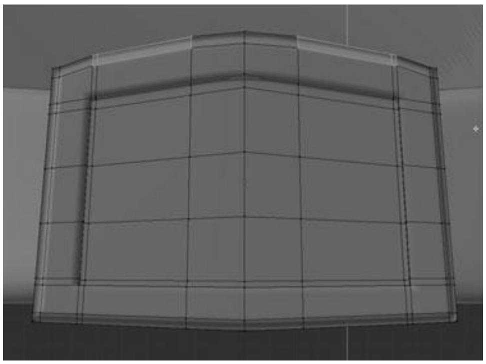

Figure 11.100
Squaring up the center vertices in preparation of modeling the tab

complete mesh that you can manipulate either side of, start by straightening out the six central vertices. First select the top three central vertices and scale them to 0 along the Z axis, straightening them out. Then repeat this process for the bottom three central vertices so that you are left with a nearly perfect rectangular shape, as shown in Figure 11.100.

Now that you have a roughly rectangular pair of faces in the center, you can select the entire center vertical edgeloop and press V to rip it from the other side. After activating the Rip tool, move it slightly along the X axis to create Figure 11.101.

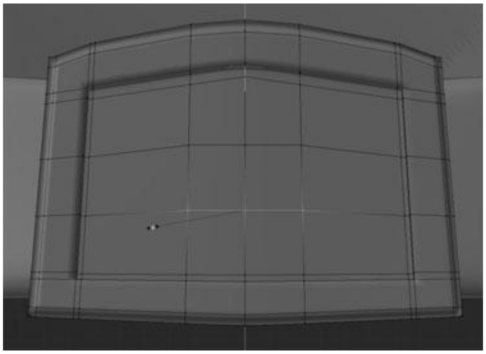

Figure 11.101
Ripping the center loop in order to separate one side from the other

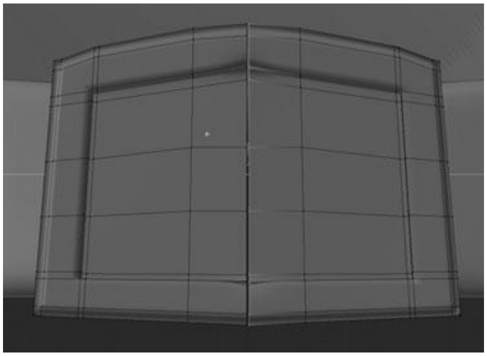

Figure 11.102
Deleting faces to leave room for the tab

Now select the center faces on the left side, on both front and back, and then delete just the faces by pressing X > Faces. See Figure 11.102. Immediately after this, you should select the opposite two edges and extrude them in to fill the spaces those faces previously occupied, thus creating the basic tab shape. See Figure 11.103.

After extruding those two edges, add an edgeloop above and below the tab to give Figure 11.104.

The next step is to fill in the faces between the front and back of the buckle. This can be done by first adding a new loop along the outer edge and sliding it up towards the front until it is even with the surface of the inset. After adding the

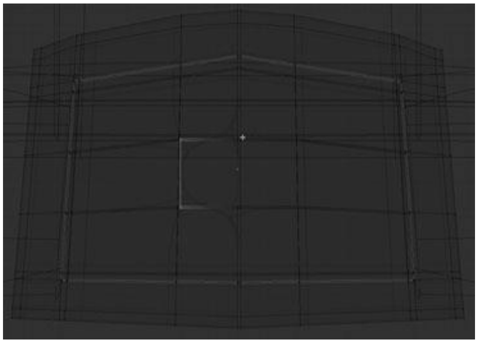

Figure 11.103
Extruding the tab

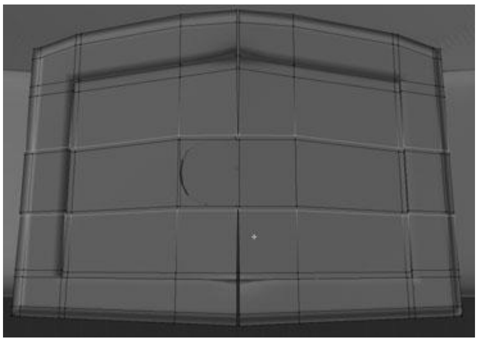

Figure 11.104
Adding edgeloops to sharpen the area around the tab

edgeloop it is simply a matter of filling in all the faces. The result for one side is shown in Figure 11.105.

Once the faces are filled in, add another edgeloop along the perimeter to sharpen up the back edge. Then, repeat this whole process for the other side of the buckle. The result is shown in Figure 11.106.

The last few steps are to add another vertical edgeloop across the front, on each side, to sharpen the inside edge where the two pieces meet. See Figure 11.107. Then switch over to the belt mesh and move the inside edges in along the Y axis where they meet the buckle, as shown in Figure 11.108.

The final model for the belt can be seen in Figure 11.109. The next section moves on to the goggles.

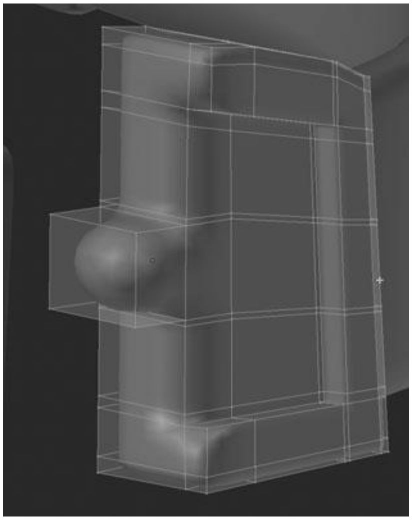

Figure 11.105
Filling in the faces along the inside edge of the buckle

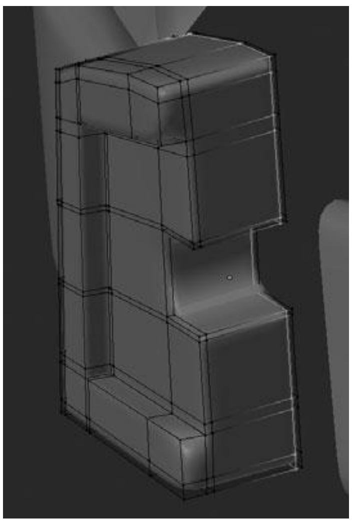

Figure 11.106
Sharpening in the inside edge of the buckle

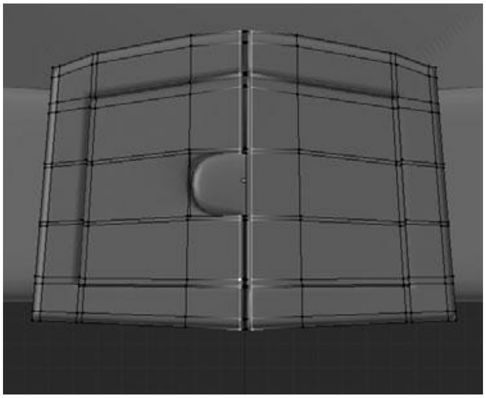

Figure 11.107
Adding edgeloops along the face by the tab

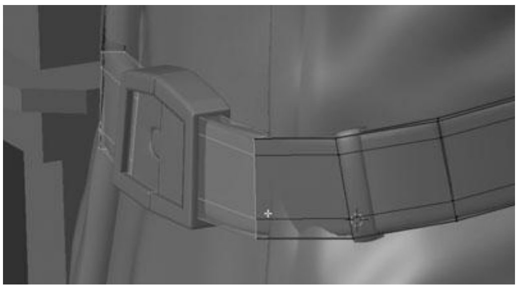

Figure 11.108
Repositioning the end of the belt with the buckle

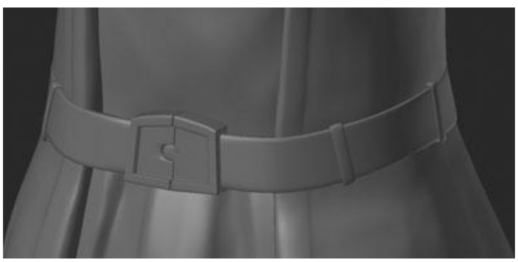

Figure 11.109
Final belt model

Modeling the Goggles

You are making good progress on the model and have just a few pieces left. In this section, you're going to work on the goggles. These are quite easy to model; the process primarily involves adding and moving edgeloops. Due to how you created the base mesh in the beginning, you have a perfect starting point to work from.

If you remember from the previous chapter, the current mesh is quite simple but it also represents the shape of the goggles quite well, which is the key. To get started, add a Subsurf Modifier and set the shading to smooth. After doing this, you will notice that there are some ugly black marks across the model, as shown in Figure 11.110. These marks are caused by inconsistent normal directions; this can be fixed by selecting everything in Edit Mode and pressing Ctrl+N to recalculate the normals.

Note

If you recalculate the normals and the black spots do not go away, they are likely due to interior faces. These are commonly created when you use a Mirror Modifier and forget to delete the center faces first. You must delete these interior faces in order to fix the normals.

You are now ready to begin adding edgeloops and modifying the shape of the goggles. The first two edgeloops you'll add are around the outer edge of the padding and strap and then around the outer edge of the lenses. See Figures 11.111 and 11.112.

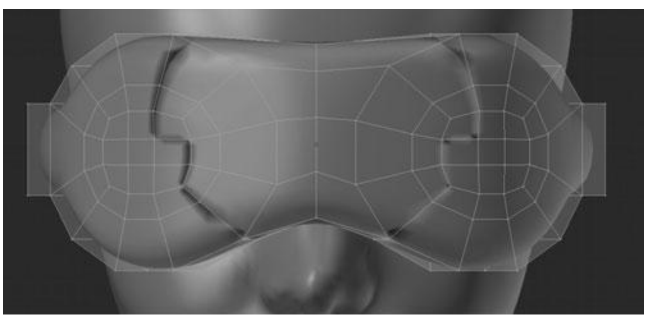

Figure 11.110
Black marks caused by inconsistent normals

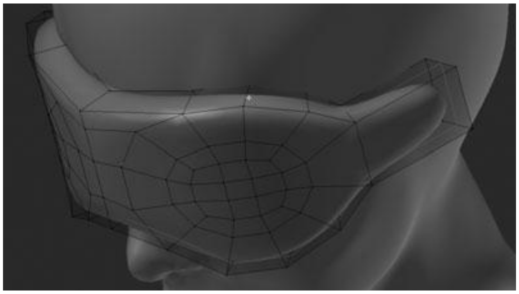

Figure 11.111
Adding loops around the outside edge of the goggles

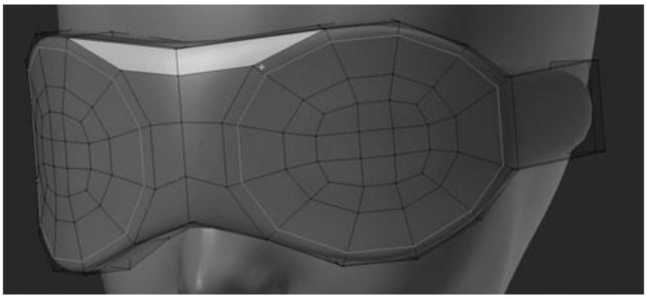

Figure 11.112
Adding a loop to the outer edge of the goggle lenses

Next, select all of the vertices that make up the lens area, excluding the outermost loop, and extrude them out slightly to form the first ridge of the rim. See Figure 11.113.

Having just extruded the first part of the rim, you can now add another loop around the inside of the rim and select the faces for the lens and extrude in. See Figures 11.114 and 11.115.

The next step is to select all of the vertices that make up the rim and the lens, scale them down along the Y axis to flatten them slightly, and then move them out along the Y axis. See Figures 11.116 and 11.117. These two shapes help to shape the goggles for more interest and to better fit the concept.

Now with that same selection as in the previous step, extrude out one more time, effectively creating a new loop on the outside of the rim and adding more depth at the same time. See Figure 11.118.

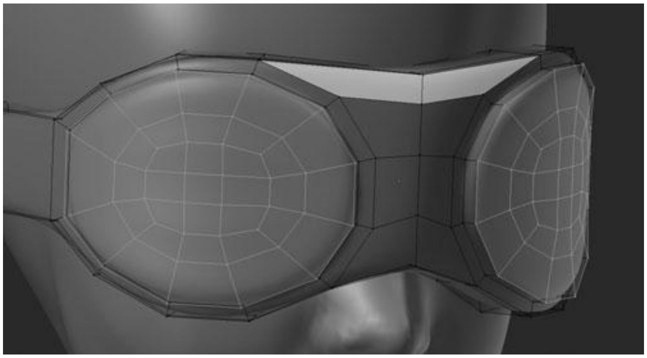

Figure 11.113
Extruding the lenses rim

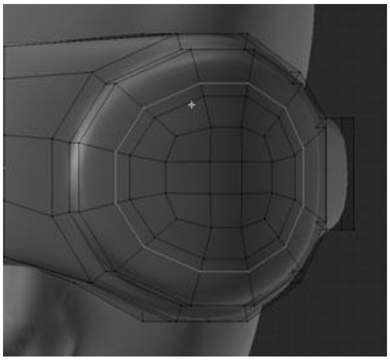

Figure 11.114
Adding another loop along the inside of the rim

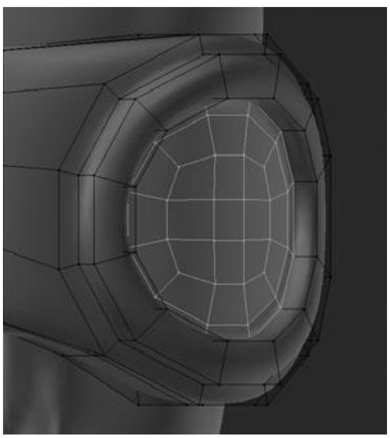

Figure 11.115
Extruding in the lenses

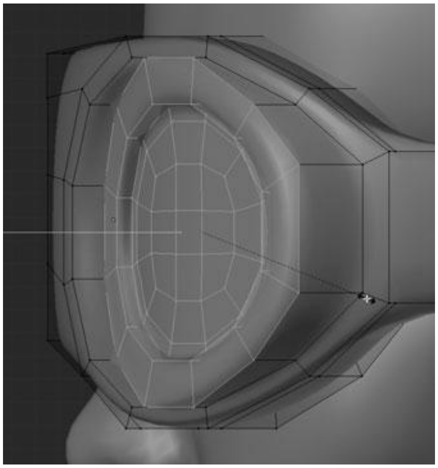

Figure 11.116
Scaling the lenses down along the Y axis

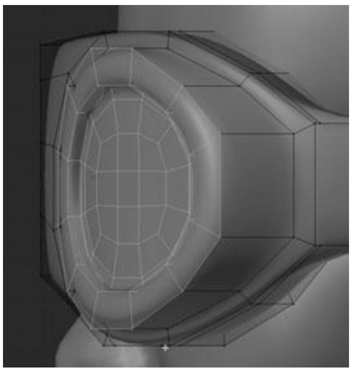

Figure 11.117
Moving the lenses along the Y axis

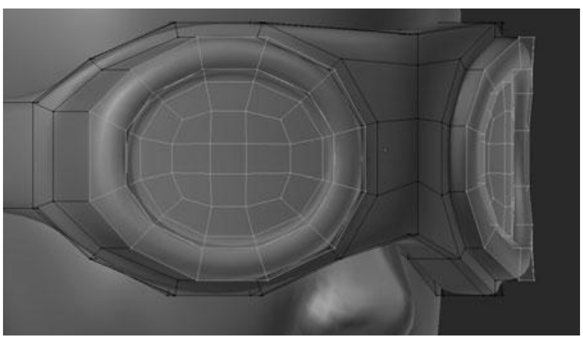

Figure 11.118
Extruding the rim and lenses again to add more depth

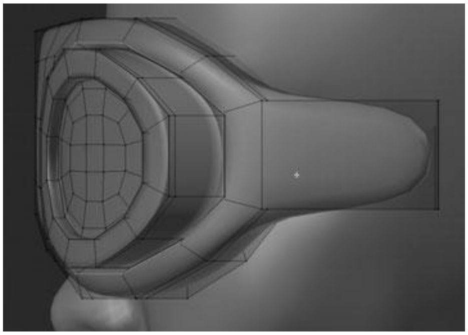

Figure 11.119
Adding various edgeloops and creases to sharpen the goggles

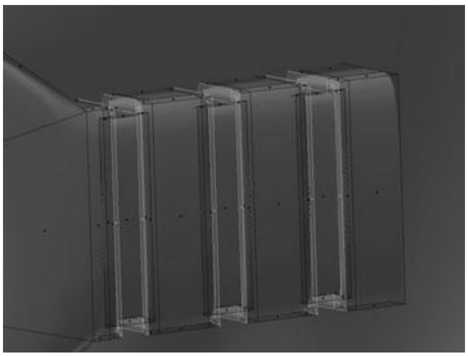

Figure 11.120
Creating the ridges on the strap

The next few steps are to add any additional edgeloops where needed for sharpness and to crease the perimeters of the lens and rim. See Figure 11.119.

Next, you should delete the faces at the end of the strap, near where the ear would be. Then, using the same process you used on the headband, add ridges to the strap, as shown in Figure 11.120.

Finally, to finish the goggles, add a couple more loops to the face of the rim to sharpen it a bit more. Tweak the middle loop over the nose to add some shape to the leather. See Figure 11.121.

The final goggles model, with everything else visible, can be seen in Figure 11.122. You can now move on to modeling the necklace and the pin on her shirt.

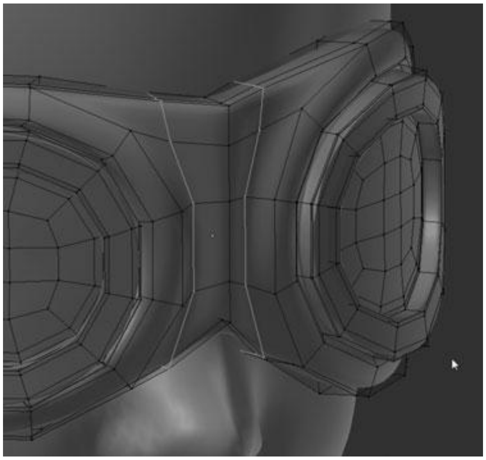

Figure 11.121
Shaping the goggles around the bridge of the nose

Figure 11.122
Final goggles model

Modeling the Necklace and Pin

Let's start off by working on the necklace. As with the other pieces up to this point, the first few steps on both parts is to apply or add the appropriate modifiers.

You can start on the necklace first by applying the Solidify Modifier and adding a Subsurf Modifier to the cord. Next, set the shading to smooth to finish the cord, as shown in Figure 11.123.

The next step is to work on the pendant and add the beads to the cord, which you'll create as part of the pendant mesh. The first thing you need to do is add an edgeloop down the center of the pendant, delete one half of the mesh, and then add a Mirror Modifier, as shown in Figure 11.124.

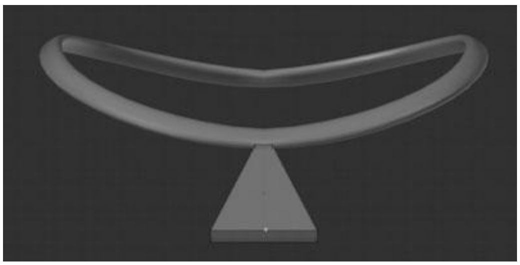

Figure 11.123
Applying the Solidify Modifier and adding Subsurf to the necklace cord

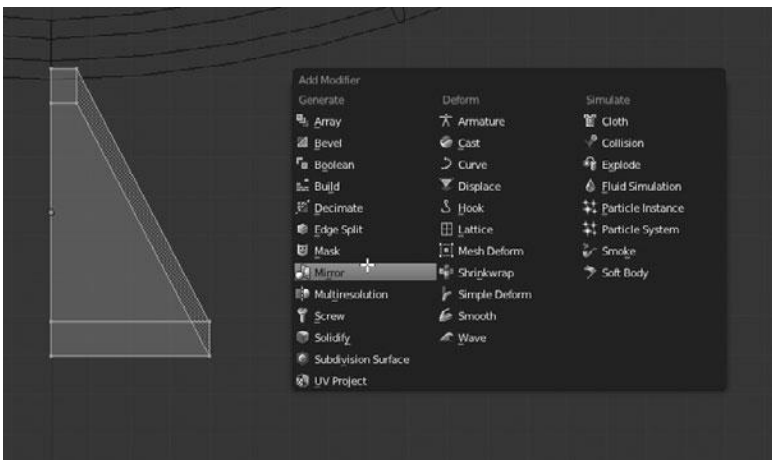

Figure 11.124
Adding a Mirror Modifier to the necklace pendant

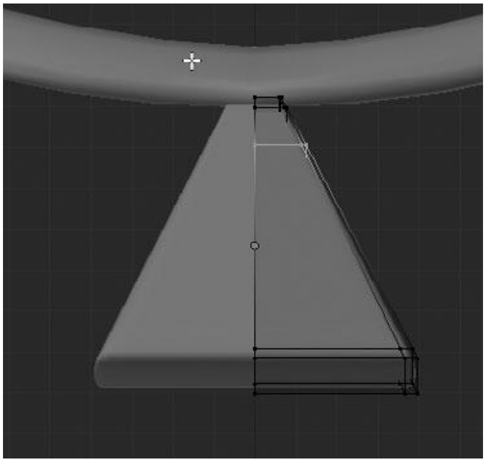

Figure 11.125
Adding edgeloops to the stone

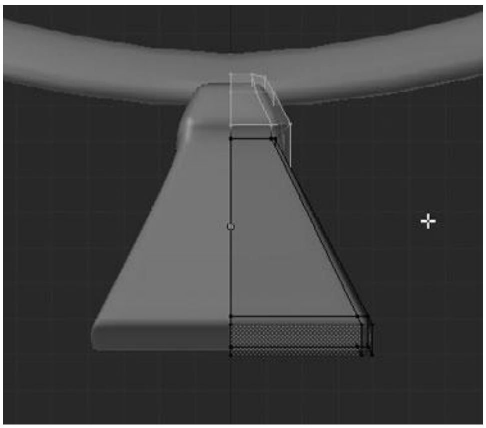

Figure 11.126
Extruding the stone setting

Follow this up by adding a Subsurf Modifier and adding an edgeloop along the side, top, and bottom of the pendant. Then add another edgeloop approximately 1/5 down from the top. See Figure 11.125.

This extra edgeloop will give you a starting point to create a setting for the stone. The setting can be modeled by selecting the top section, extruding it, and then scaling along the normals, as shown in Figure 11.126.

The next step is to select the top edgeloop of the stone, where it meets the setting, and rip it (V) so as to separate the mesh into two pieces. Doing this serves two purposes; it makes the seam between the pieces more distinct and it makes adding different materials to each piece in Chapter 13 much easier.

Create the top of the setting where it hooks to the strap. This step can be done by selecting the top faces of the setting and extruding along the normals until it envelops the cord nicely.

Next, you need to create the beads by selecting the top of the setting, the piece that you just extruded, and duplicating it along the X axis to sit on the cord. After duplicating, fill in the faces, where needed, to create a solid mesh. Then add an edgeloop along the left side so as to be consistent with the right side. See Figure 11.127.

You can then duplicate this bead twice more and move it over to finish the necklace, as shown in Figure 11.128.

Note

You may find it necessary to adjust the shape of the cord, and thus the position of the pendant, depending on how much you changed the shape of the neck and shoulders while sculpting.

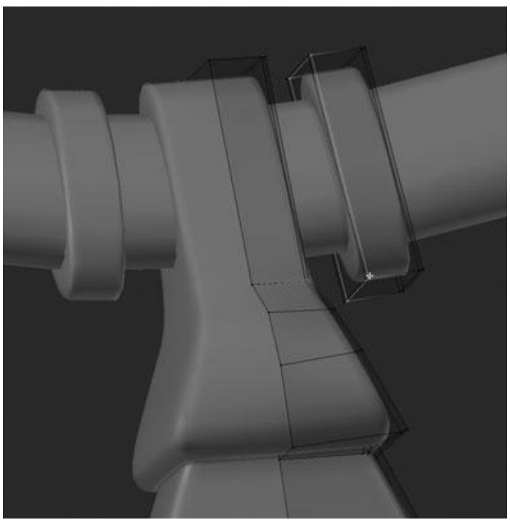

Figure 11.127
Creating the beads

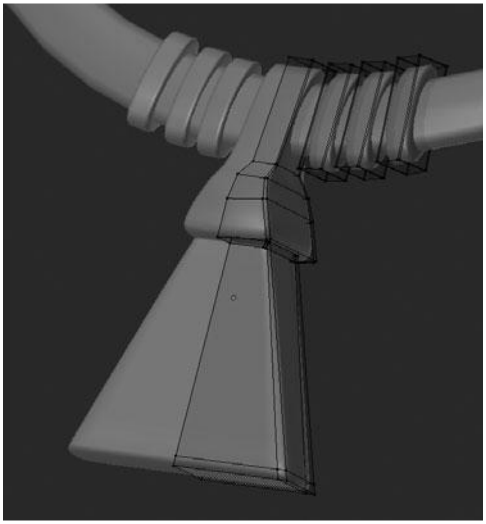

Figure 11.128
Duplicating the beads for the final necklace

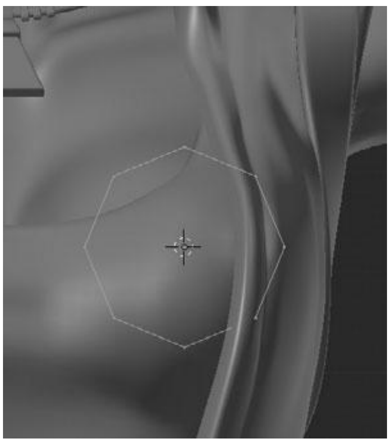

Figure 11.129
Adding a circle of eight vertices for the pin

With the necklace finished, you can move on to modeling the pin. This process is very simple and so I will not go into much detail. The process is simply a matter of positioning the 3D cursor correctly, adding a new circle mesh (examples here used eight vertices), as shown in Figure 11.129, and then extruding and scaling it a few times to create the shape. The shape is that of a flattened dome.

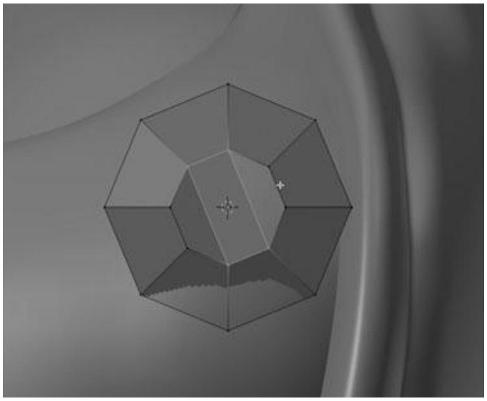

Figure 11.130
Filling in the center hole of the pin with faces

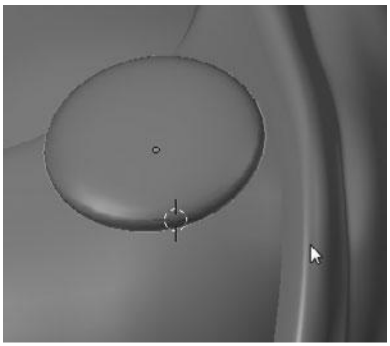

Figure 11.131
Final pin positioned on the shirt

After extruding and scaling, you fill in the center faces manually so as to maintain a mesh that is comprised of only quads, as shown in Figure 11.130. Next, set the shading to smooth, add a Subsurf Modifier, and then rotate and position the pin correctly on the shirt in Object Mode. See Figure 11.131. That is it; the pin is done.

Now that you are finished with all of the clothing and other various accessories that the character is wearing in some way or another, you are ready to move on to modeling the sword and scabbard.

Modeling the Sword and Scabbard

By this point you should be pretty comfortable with the modeling tools in Blender. Modeling the sword and scabbard is not going to be too different from anything else you have done up to this point. Let's start by working on the sword.

The first step you'll take on the sword is to create the sharp edge of the blade. This can be done by selecting all the vertices that make up the curved side, extruding and scaling slightly, and then scaling to zero along the Y axis to create a single sharp edge. See Figure 11.132. After scaling to zero, however, there are now two edgeloops placed, one atop another. This will cause problems with the Subsurf Modifier and so you need to remove the duplicate. This can be done by selecting everything and pressing W > Remove Doubles. See Figure 11.133.

Figure 11.132
Creating the sharp edge of the sword

Figure 11.133
Removing doubles on the sword

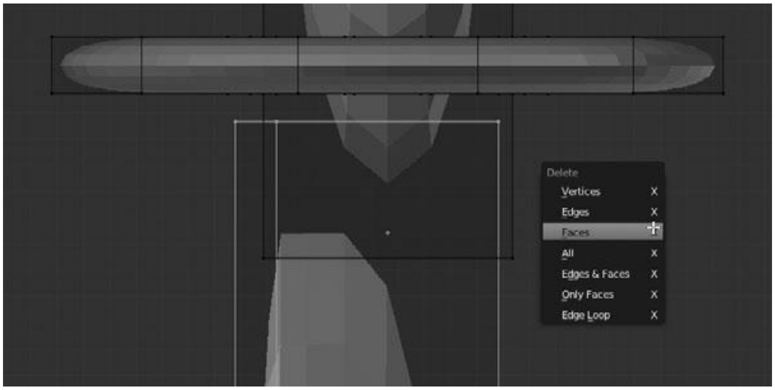

Figure 11.134
Deleting faces at the base of the blade

After removing the doubles, you can start working with the details. Before adding detail, though, first add the Subsurf Modifier. Next, select the faces at the base of the blade and delete them, as shown in Figure 11.134.

Next, select the curved side of the blade and scale it down along the X axis in order to make it fit within the setting on the hilt. See Figure 11.135.

Now that the shape is correct, you can add an edgeloop along the edge of the blade and along the inside edge of the blade. See Figure 11.136.

Add an edgeloop along the backside of the blade too, to make the corners more square. Select the entire blade so as to scale it down along the Y axis, as shown in Figure 11.137.

Moving on, select the top face of the hilt and extrude and scale it down several times to fit it around the blade, as shown in Figure 11.138.

You can now add two edgeloops horizontally across the hilt and then scale them down along the Z axis to fit within the guard. This allows you to delete the faces between the two loops that you just added, effectively separating the top of the hilt from the grip. See Figure 11.139. This is important as it gives you more control of the shapes while adding more edgeloops. You want the top of the hilt, where the sword meets, to be square, while the grip should be rounded. The top of the hilt can be made square simply by adding the appropriate perimeter edgeloops.

Figure 11.135
Fitting the blade to the hilt

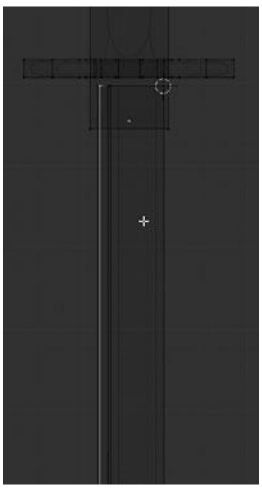

Figure 11.136
Adding edgeloops to the blade

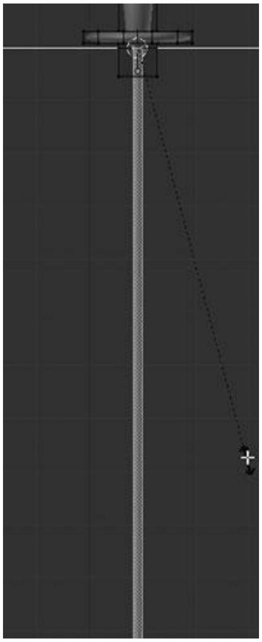

Figure 11.137
Scaling the thickness of the blade to fit the hilt

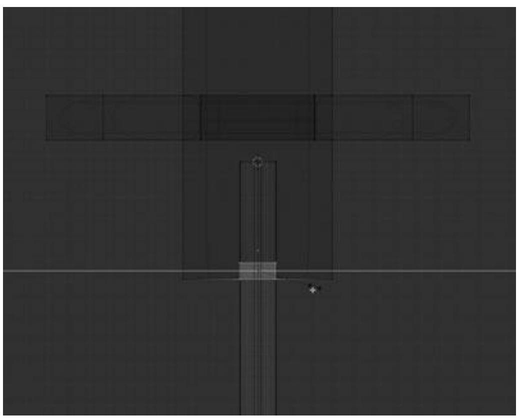

Figure 11.138
Extruding the inside edge of the hilt

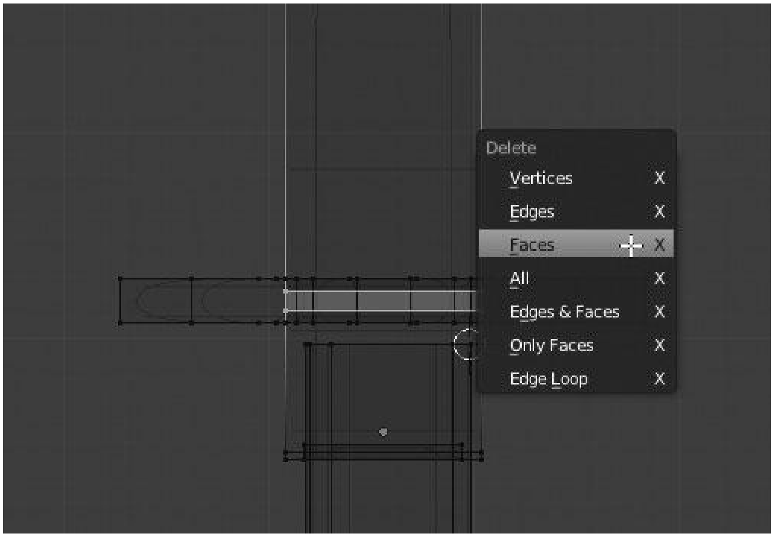

Figure 11.139
Deleting the faces that separate the top of the hilt from the guard

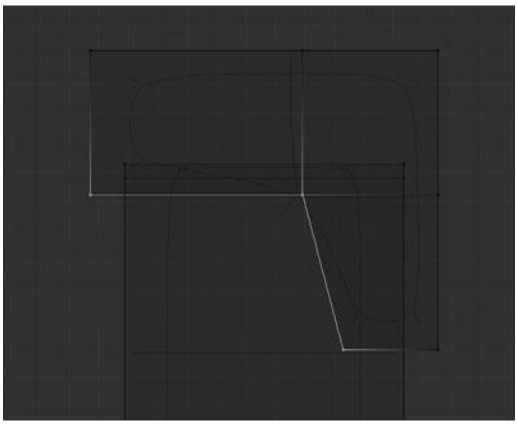

Figure 11.140
Selecting the inside vertices of the pommel

Following that, you need to add an edgeloop to the bottom of the grip to sharpen it and then move your focus to the pommel. My first steps on the pommel are to select the two inside faces, shown in Figure 11.140, and then extrude them in to get Figure 11.141. (I used Vertex snapping to line the sides up correctly.)

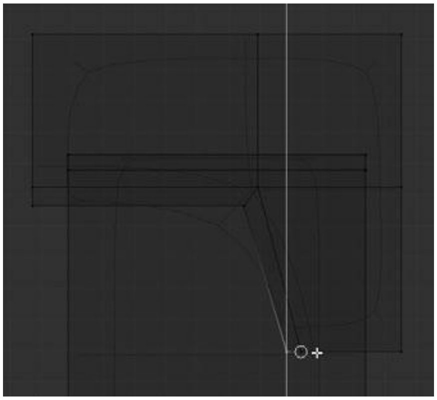

Figure 11.141
Extruding and shaping the inside of the pommel

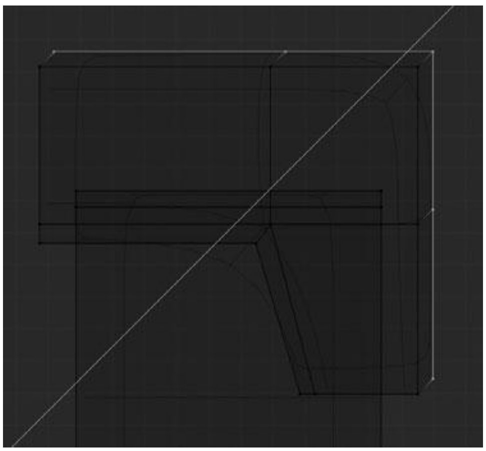

Figure 11.142
Extruding the outside of the pommel

Then repeat this process for the outside of the pommel, as shown in Figure 11.142.

After some slight shaping, you should be left with something similar to Figure 11.143.

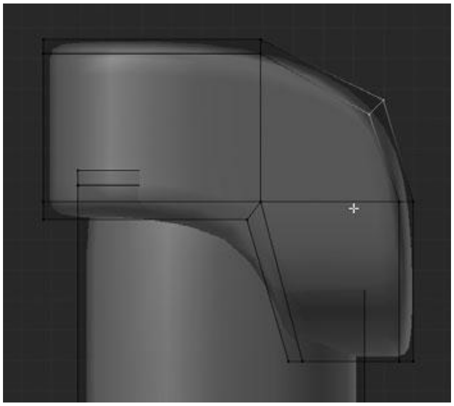

Figure 11.143
Shaping the outside of the pommel

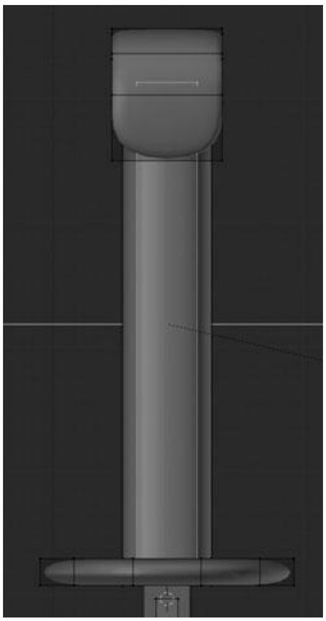

Figure 11.144
Adding two edgeloops to the side of the grip

Now you can move on to the grip. The first thing you'll want to do is add two vertical edgeloops down the face of the grip, which will allow you to select the sides and scale them down along the Y axis, as shown in Figure 11.144. This gives a more rounded shape to the grip.

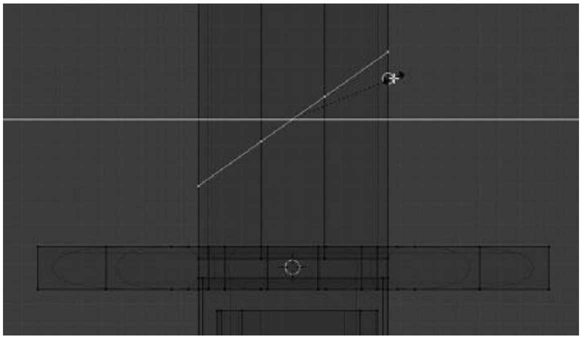

Figure 11.145
Skewing the duplicated loop to create the criss-crossing straps

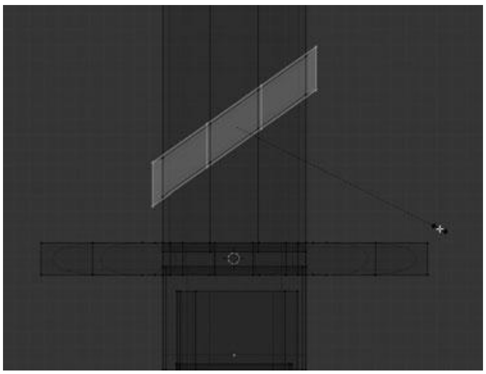

Figure 11.146
Extruding the strap

Next, you should create the criss-crossing straps on the grip by selecting the loop at the top, duplicating it, and then moving it up along the Z axis. After moving it, rotate it 45 degrees around the Y axis and then scale up along the X axis in order to make it fit the grip again. The scaling step can be done easily by setting the Snapping Mode to Edge and choosing the outside edge of the grip as the snapping target. See Figure 11.145.

After skewing the strap piece, extrude it up once and then extrude again only to scale it along the normals to get Figure 11.146. Then it is simply a matter of duplicating the piece multiple times along the Z axis, as shown in Figure 11.147, followed by duplicating all of the pieces and scaling to -1 along the X axis to flip them, as shown in Figure 11.148.

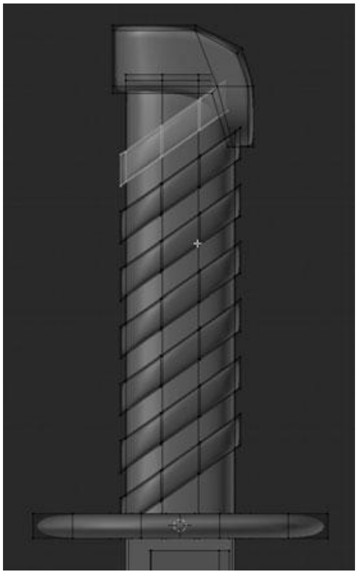

Figure 11.147
Duplicating the strap

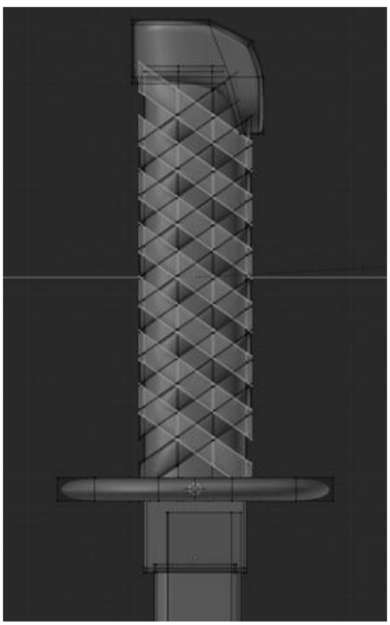

Figure 11.148
Duplicating and mirror all the straps

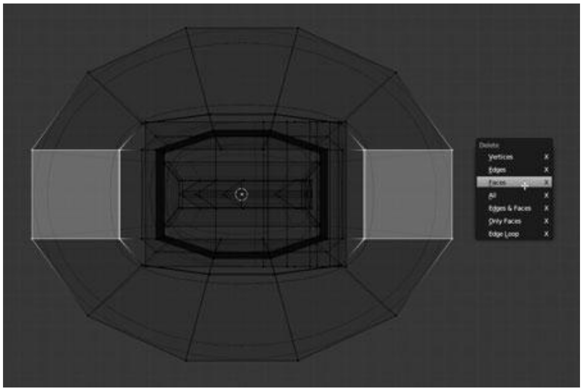

Figure 11.149
Deleting the faces on the guard to create notches

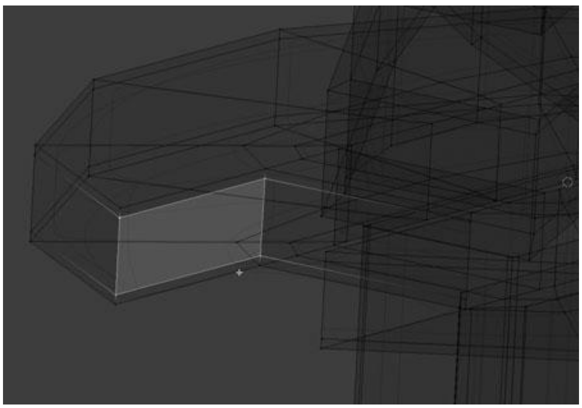

Figure 11.150
Filling in the faces on the notches and adding edgeloops

This finishes the grip and you will now move on to the guard. You can start the guard by adding two horizontal edgeloops along the rim and scaling them along the Z axis to sharpen the edge. Then select all the center faces on the outside of the ends, as shown in Figure 11.149, delete them, and then fill in the resulting holes. See Figure 11.150. This will leave you with two notches on either side so as to match the modeling sheet.

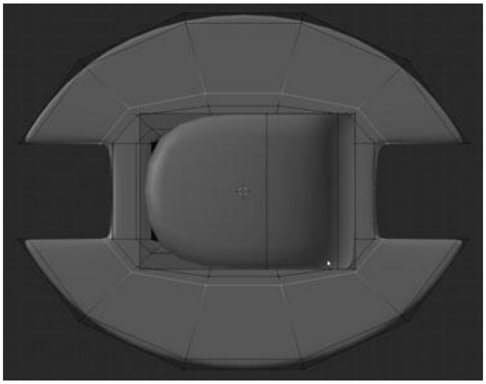

Figure 11.151
Adding edgeloops to the top face of the guard

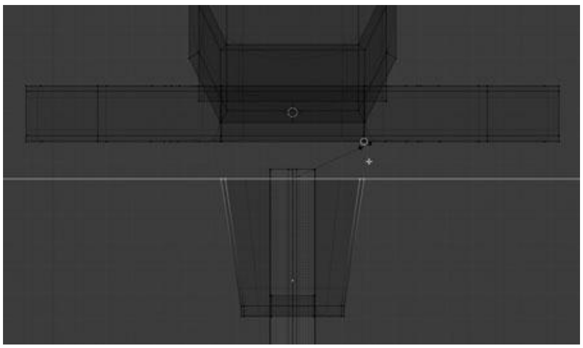

Figure 11.152
Moving and extruding the base of the hilt where it meets the guard

You can then add two more edgeloops on the flat surface of the guard—one along the outside and one along the inside to make the notches more square—see Figure 11.151.

The last step then on the sword is to select the bottom of the setting for the blade, move it down along the Z axis, scale it up, and then extrude back up against the guard. See Figure 11.152.

You are now finished with the sword and can move on to the scabbard.

Of all the objects I have modeled so far, the scabbard is perhaps the simplest. This is in part because of the well-prepared base mesh and the simplicity of the subject. Most of the process is just a matter of adding edgeloops where needed to get the correct shape. For this reason, I will jump through this fairly quickly, pointing out the key steps.

As with the other objects, the first step is to add a Subsurf Modifier and set the shading to smooth. After doing this, you can begin adding edgeloops. The first loop you add is right across the middle, followed by sliding it up towards the top to start making a band around the top. Next, add two more loops, one right up to the top and one in between the top and the first loop you added. Then you can select the top three loops and extrude and scale them to produce Figure 11.153. Follow this up with one more loop, slid right up to the band to create a sharp edge, along with one more on the bottom of the band. See Figure 11.154.

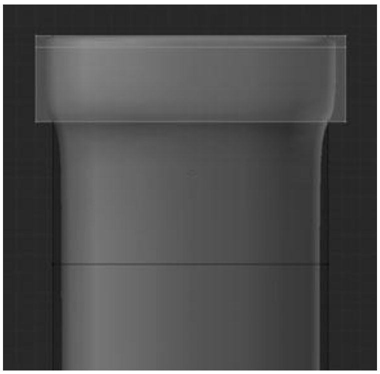

Figure 11.153
Creating the band at the top of the scabbard

Figure 11.154
Sharpening the band on the scabbard

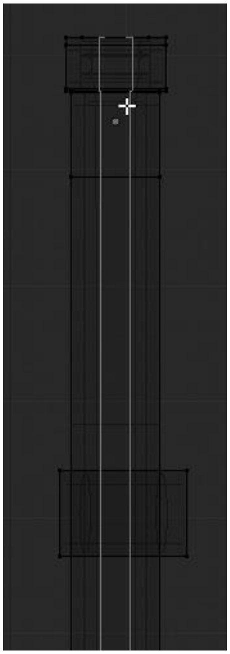

Figure 11.155
Squaring up the sides of the scabbard with edgeloops

Next, extrude and scale the top-most loop, to add extra thickness to the scabbard. Be sure you are still using a Solidify Modifier on the mesh, as it will save you some time.

You can now add two vertical loops down the entire length of the scabbard to square up the sides a bit, as shown in Figure 11.155.

Now add horizontal loops to the middle bracket to sharpen the edges, and vertical loops on the side to square it up. See Figures 11.156 and 11.157.

Add two loops at the top of the bottom cap and extrude and scale in the edges around the notch to get a nice sharp result, as shown in Figure 11.158. You can also add another horizontal loop to the scabbard, sliding it down toward the cap so as to get a good shape on the end.

Moving on, you can add a new mesh cube from Object Mode (so as to not replicate the Solidify Modifier) and place it in the center of the middle bracket.

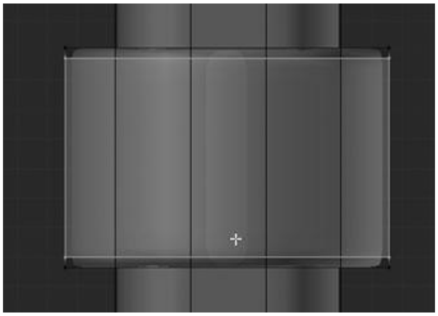

Figure 11.156
Adding loops to the middle bracket

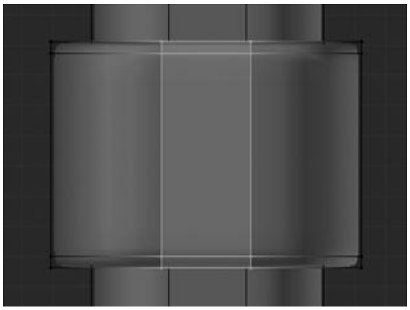

Figure 11.157
Adding more loops to the center bracket

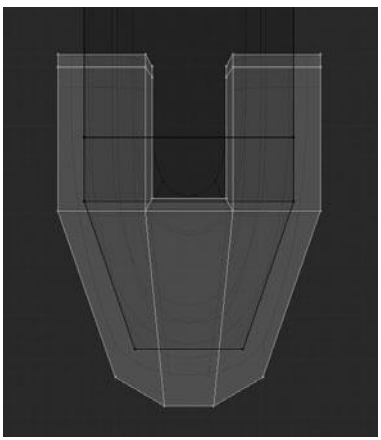

Figure 11.158
Adding loops to the scabbard tip and extruding the notch

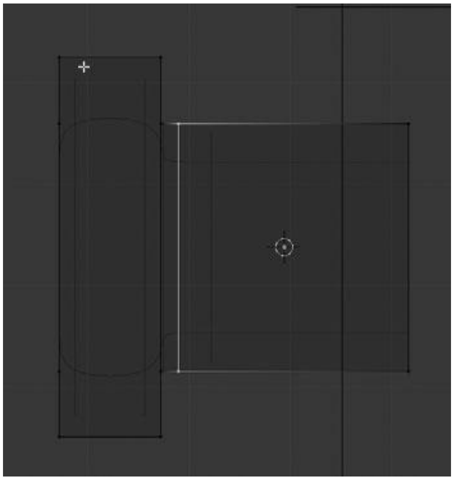

Figure 11.159
Adding the pin to connect the strap

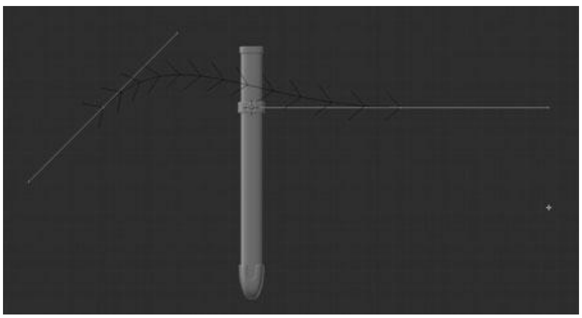

Figure 11.160
Adding a Bezier Curve to use for the strap

This is where you will attach the strap to attach to the character's belt. After extruding and shaping, you should have something similar to Figure 11.159.

The last step for the scabbard is to add a simple strap that can be adjusted to fit later when positioning the scabbard with the character. The way you do this is by adding a Bezier Curve object and then scaling it down in Edit Mode to approximately the right size. See Figure 11.160.

Note

If you are not familiar with curves, do not be alarmed. I have not covered them in detail during this book because they are not used often. However, I have included a tutorial on the DVD that gives you an introduction to using curves that can get you up and running.

Once you have it roughly in place, disable the Normals from drawing in the Viewport Properties under the Curve Display category. This will make the curve show as a simple line. You can now scale and place the curve more precisely, as shown in Figure 11.161.

After placing the first two points, you can select the lower of the two points and extrude it up to roughly mirror the placement of the first point, as shown in Figure 11.162.

The next step is to add thickness to the curve. This can be done by increasing the Bevel depth in the Curve Properties under the Geometry category, as shown in Figure 11.163.

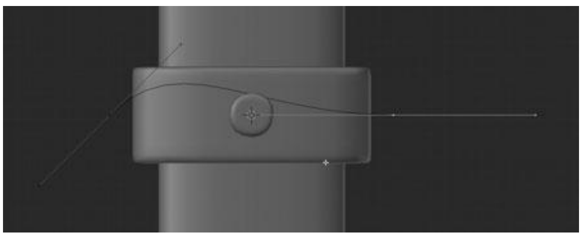

Figure 11.161
Scaling and positioning the curve

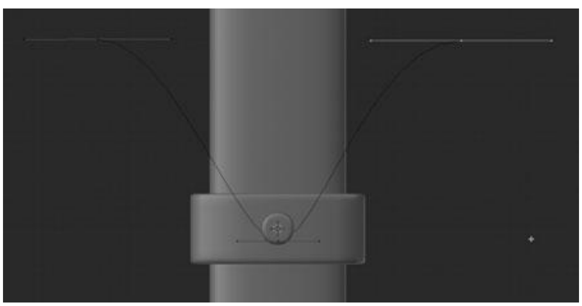

Figure 11.162
Extruding and shaping the curve

Figure 11.163
Beveling the curve

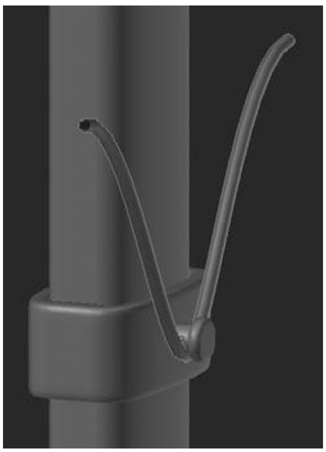

Figure 11.164
Disabling Front/Back to make the curve tubular

You may notice that the curve's thickness is only a simple angle; it is not a 3D tube shape like you want in order to represent the strap. Disabling the Front and Back options will fix this problem. After doing so, you should get a full 3D tube like the one shown in Figure 11.164. You can also increase the Resolution to 1 to get a smoother result.

Summary

That is it! You have just finished all of the modeling for the accessories. You can see the final result, showing the full character with all accessories, in Figure 11.165.

This chapter has covered a lot of modeling and some sculpting. You used the Loop Cut tool extensively, along with the normal Transform tool. You also used the Rip and Crease tools from time to time. I hope that by now you are feeling comfortable with all of the different modeling tools used and perhaps even exploring more tools on your own. In case you are still feeling a bit lost and need further instruction, I recommend that you check out the additional tutorials that I have included on the DVD. You will find tutorials focused on modeling, sculpting, and other topics that will help you gain a better understanding of the tools.

At this point, it's time to move on to retopologizing the character and accessories in order to create a lowpoly version of the models that can more easily be textured, posed, and even animated.

Figure 11.165
Final character model and accessories

Chapter 12

Retopologizing the Character

In the previous three chapters, you went through the sometimes arduous task of modeling and sculpting the character. Those chapters made use of the modeling sheets, various modeling and sculpting tools, and many different techniques for creating the character. The character looks quite good right now and in some cases could be called finished. However, there is a major problem with the character at the moment. Due to the high-resolution sculpting you have performed on most of the character, it is impractical to pose, animate, or even texture her right now. In order to solve this problem, you'll learn to create a lower resolution version of parts of the character in this chapter. You can use this low-resolution version for posing, animating, and texturing without losing all the fine detail you spent so much time creating.

You'll also use this low-resolution version of the character to bake, or create, normal maps to preserve the detail from the high-resolution model at render time. These normal maps will not be introduced until Chapter 16, though, and so if you are not familiar with them you can ignore them for the time being.

You'll learn to create this low-resolution version through a process called *retopologizing*.

Understanding the Process of Retopologizing

To retopologize a model means to recreate the mesh with a new, improved structure while mimicking the original surface forms. The structure a mesh follows is referred to as its topology. Thus, retopologize means to "recreate the topology." Before getting to the actual retopology process, I want to take a moment to talk about topology; it is a very important term for modelers to be familiar with.

What Is Topology?

Topology refers to the structure a mesh follows. This is key because a clean, proper topology drastically affects how well a model will deform while animating. It also makes it much easier to modify the model if need be.

The details and theory of topology deserve a book all of their own, so I will touch on them only briefly here.

Note

For more in-depth info on topology, be sure to check out the *Retopologizing a Human Head* tutorial included on the DVD. You can also find several of my tutorials that cover topology at http://blendercookie.com.

To get started right now, heed these key tips for achieving good, clean topology:

- Always aim for a mesh comprised of 100% quads. Triangles often cause artifacts in deformation and terminate edgeloops.
- Create edgeloops that encircle all primary details and forms, as shown in Figure 12.1.
- Edgeloops should follow major muscle/surface flows, as shown in Figure 12.2.

Those points just listed are only a few tips to get you started with topology. As mentioned earlier, the full subject of topology is beyond the scope of this book. I highly encourage you to check out the resources on the DVD; they should help you get up and running and feeling much more comfortable with topology. For the time being, I recommend you pay close attention to the way the mesh is structured throughout this chapter and try to replicate it on your own models. I will point out the key areas for the topology while retopologizing the character.

Once more, before getting to the actual retopology process, let me give you a run-down on how retopology works in Blender, through surface snapping.

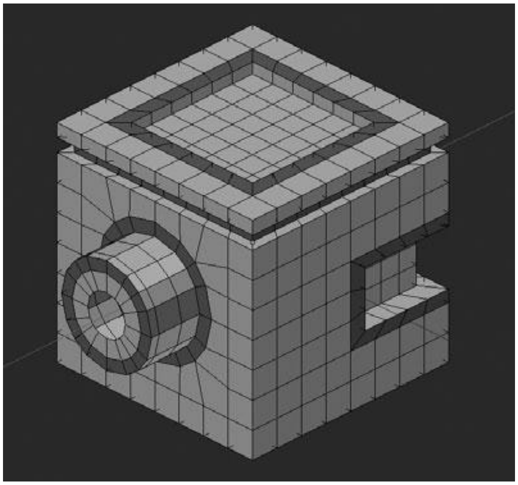

Figure 12.1
Example of edgeloops encircling primary details

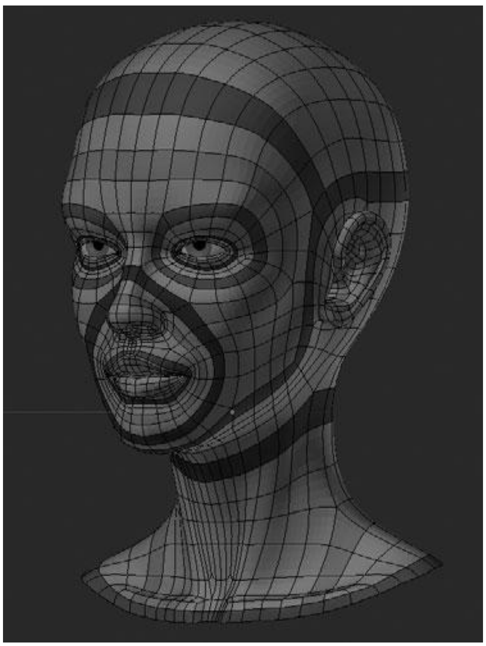

Figure 12.2
Example of edgeloops following muscle flows in the face

Figure 12.3
Project individual elements on the surface of other objects

Surface Snapping

Surface snapping is done by using the Face Snap Mode that was mentioned back in Chapter 4, while working in Edit Mode. However, there is one important extra step to get surface snapping working; by default Face Snap Mode will only snap to faces that are part of the active mesh. In other words, both the model you are retopologizing and the retopologized mesh must be part of the same object and thus in Edit Mode at the same time. This can cause some problems due to the sculpted meshes only showing the lowest resolution level in Edit Mode. This problem is solved by enabling the option called Project Individual Elements on the Surface of Other Objects, as shown in Figure 12.3.

With this option enabled, you can now create a new mesh for the retopologized, low-resolution mesh and leave the original model intact.

The workflow for Surface Snap retopo'ing consists of adding a new object, entering Edit Mode on that object, and deleting all the vertices. This leaves an empty mesh, which can be followed by enabling surface snapping. Then press Ctrl+LMB on top of the original model to place the first vertex onto the surface of the original model. After placing the first vertex, you can repeat that last step to add another vertex, which will automatically extrude the last selected vertex, forming an edge between the two. After this, both vertices can be selected to now extrude an edge at a time, either with E or by using Ctrl+LMB, following the flows of the mesh. This is the basic workflow that will be conducted over all the pieces that need to be retopologized.

All of that last bit may seem overly complicated, but it is actually quite easy once you get the hang of it. To give you a head start, I have included a tutorial on the DVD that goes through the process of *Retopologizing a Human Head*.

On that note, let's begin the actual retopo process.

Retopo'ing the Character

To get started on retopo'ing the character, let me first point out that not all parts of the character need to be retopologized. The only parts you need to work on are those that you sculpted extra details into. The parts that were modeled by hand, such as the backpack and sword, can be left as is. This means you will need to retopo the head, hair, shirt, coat, pants, boots, arms, armbands, and gloves. Let's first focus on the head, then move on to the hair and other parts. The main points you'll focus on in this chapter is creating good topology that can be used for animation while also setting it up so that you can easily apply different materials to each part as appropriate, based on the different surface types—leather, cloth, metal, and others.

Retopo'ing the Head

As mentioned just a moment ago, the first step to retopo'ing is to create a new mesh and then delete all the vertices to produce an empty mesh. You then need to enable Face Snap and set the option called Project Individual Elements on the Surface of Other Objects to on. In this case, you should add a new cube at the center of the head and isolate the new mesh and head by selecting them and pressing Shift+H in Object Mode. This will hide everything that is unselected.

After adding the cube, delete all the vertices in Edit Mode and then press Ctrl+LMB to place a single vertex on the bridge of the nose, immediately followed by pressing Ctrl+LMB again to extrude that vertex. Create two vertices connected by an edge, as shown in Figure 12.4. Since you have the snapping Face Mode enabled, all the vertices will automatically snap to the surface of the head mesh.

This extrusion method will be used throughout the retopology process and so I urge you to become comfortable with it. After extruding the second vertex, repeat the process several more times, creating a loop of vertices around the eye socket, as shown in Figure 12.5.

As soon as you have placed the last vertex around the eye socket, you need to connect the first and last vertices with an edge by selecting them and pressing F. At this point, you can add a Mirror Modifier and extrude the central edge in towards the center. Also be sure to enable clipping on the modifier so as to lock the vertices to the centerline, as shown in Figure 12.6.

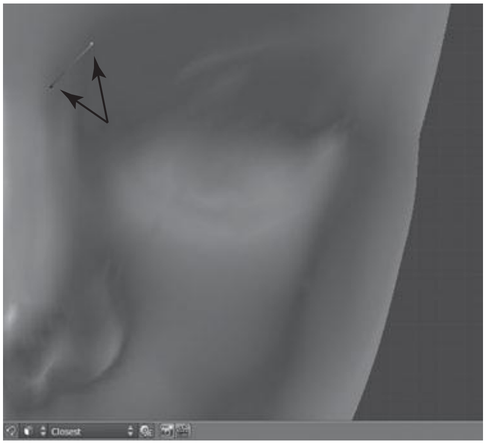

Figure 12.4
Adding and extruding the first two vertices for the face

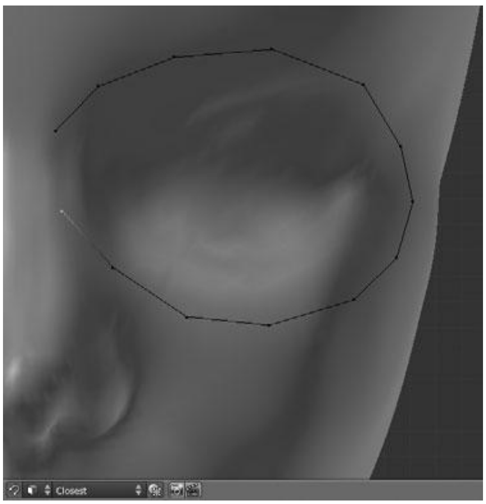

Figure 12.5
Extruding a loop around the eye socket

Now that you have created the first edgeloop around the eyes and started in on the bridge of the nose, select the loop around the eyes and extrude it in twice, as shown in Figure 12.7.

Using the various techniques just employed, continue this retopology process through the rest of the head. Due to the repetitive nature of the process, I will

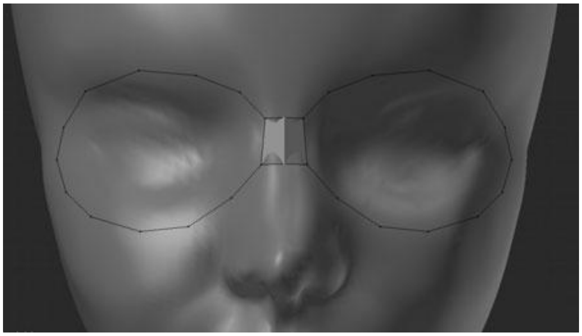

Figure 12.6
Completing the loop and extruding the bridge of the nose

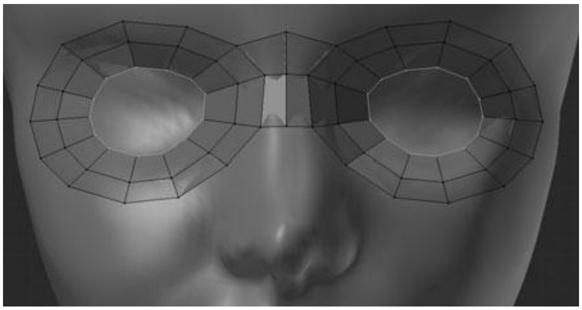

Figure 12.7
Extruding the eye socket loop inwards

not detail each step from here. Instead, I will show you each major step along the way. I will also provide a rundown on what you need to do at each stage.

In the previous step, you extruded the loop around the eyes twice, leaving you ready to fill in the hole left in the center, as shown in Figure 12.8.

After filling this hole, you can extrude on down the bridge of the nose, as shown in Figure 12.9.

Next, extrude the edges that encircle the nostril, as shown in Figure 12.10. Pay close attention to the way you lay out your edgeloops in this step and those that follow, because there are good reasons for how you are taught to do them. As mentioned earlier, many of these topology details and decisions are covered in the *Retopologizing a Human Head* video tutorial included on the DVD.

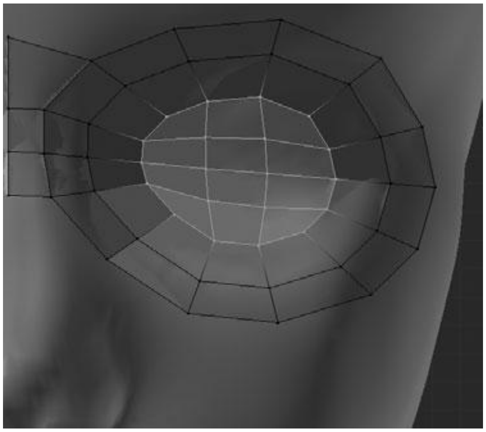

Figure 12.8
Filling in the eye socket

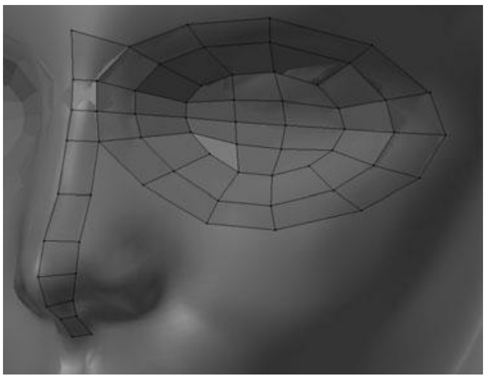

Figure 12.9
Extruding down the bridge of the nose

Following the nostril, you can fill in the side of the nose, as shown in Figure 12.11.

You can now move onto the mouth by using the same technique used on the eyes, extruding one vertex at a time to encircle the lips. See Figure 12.12.

After extruding and tweaking the loop you just created around the lips, you are left with the inner lips, as shown in Figure 12.13.

With the lips done, you can now create the area around the mouth that connects to the nose, as shown in Figure 12.14.

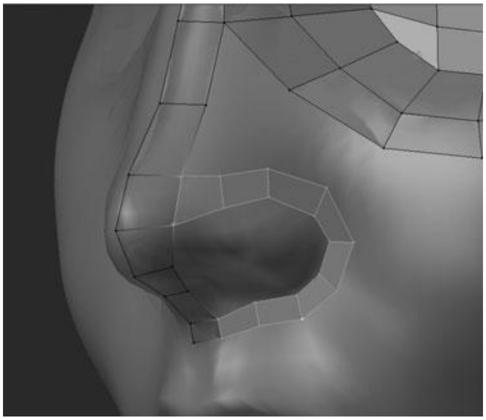

Figure 12.10
Extruding around the nostril

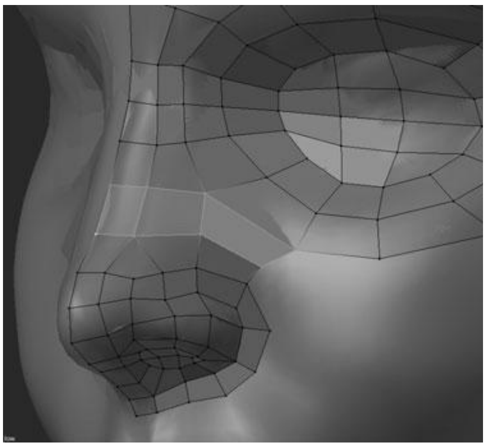

Figure 12.11
Filling in the side of the nose

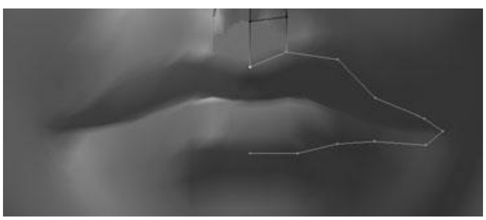

Figure 12.12
Extruding a loop to encircle the lips

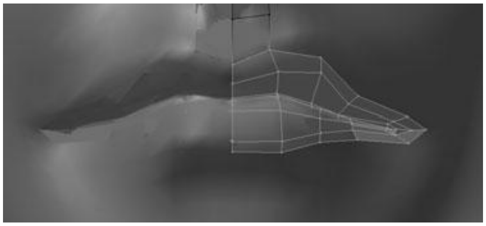

Figure 12.13
Filling the inner lips

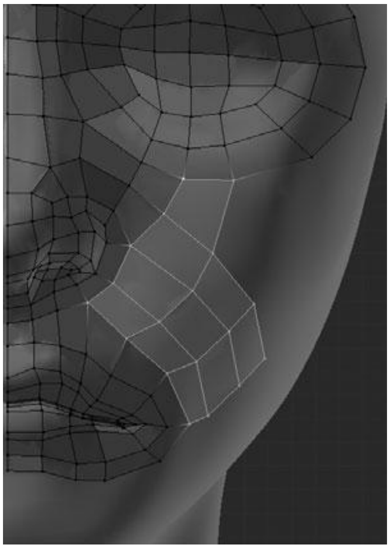

Figure 12.14
Filling in around the nose and mouth

Now you can begin to fill in the cheeks, as shown in Figure 12.15.

After a bit more extruding and filling, you should be left with Figure 12.16 to complete the majority of the face mesh.

Once you are done with one side of the face, move on to the rest of the head by laying down foundation loops on the forehead, side of the head, and back of the head. See Figures 12.17 through 12.19.

After extruding the edges to form the foundation, you can move on to filling in the gaps, as shown in Figures 12.20 through 12.22.

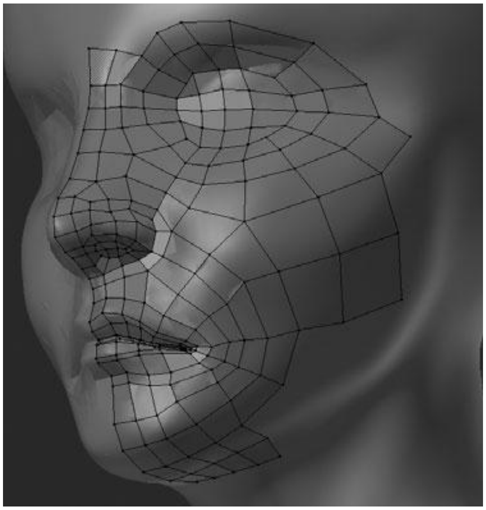

Figure 12.15
Filling in the cheeks

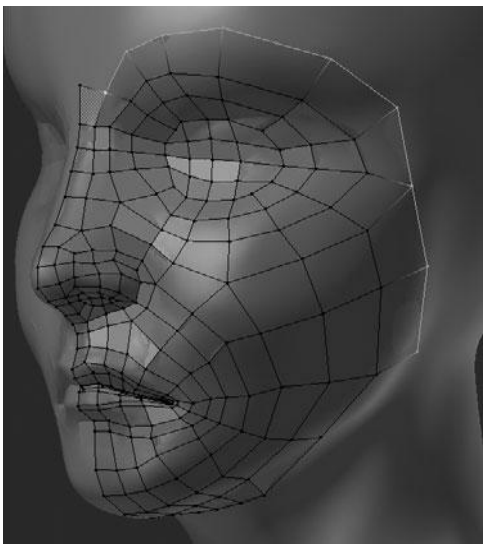

Figure 12.16
Completing the face

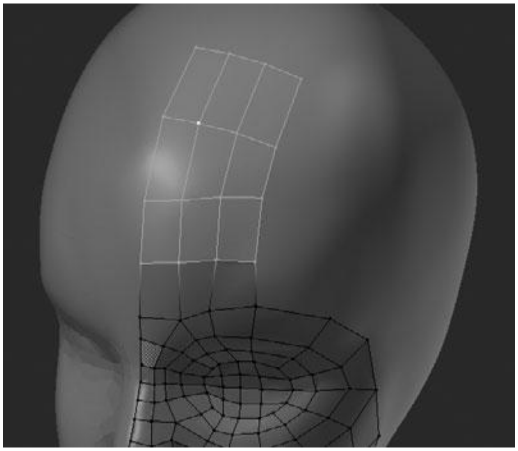

Figure 12.17
Foundation loops for the forehead

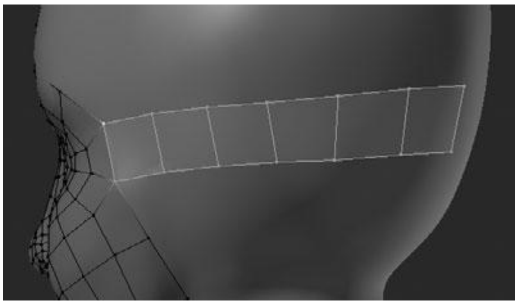

Figure 12.18
Foundation loops for the side of the head

You're now ready to work on the neck area. You must first extrude the neck muscles that run from the center of the clavicle to behind the jaw line, as shown in Figure 12.23.

Following the muscle extrusion, you can fill in the rest of the neck, adding edges where needed with the Loop Cut tool, as shown in Figure 12.24.

Now you can finish the remainder of the neck by filling in the back, side, and clavicle area. See Figures 12.25 and 12.26.

The last step needed to finish the head retopo is to extrude down the bottom edges to form the breasts, as shown in Figure 12.27.

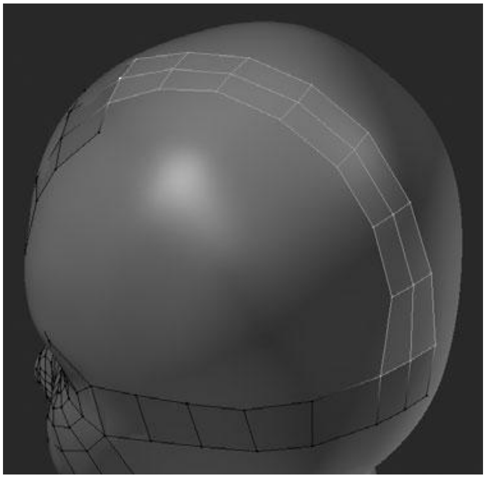

Figure 12.19
Foundation loops for the back of the head

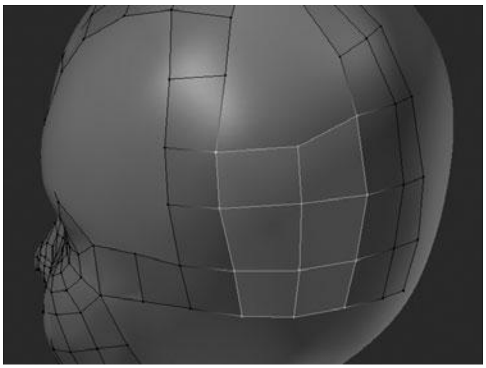

Figure 12.20
Filling in the back of the head

The finished side and back views are shown in Figures 12.28 and 12.29.

With that you're done with the retopology of the head and ready to move on to the hair and other parts. As with the majority of the head, I will not go into too much detail, as the process is the same throughout.

Retopo'ing the Hair

The first step on the hair, after adding the initial empty mesh, is to trace a path of edges along the center strand clump of hair, as shown in Figure 12.30.

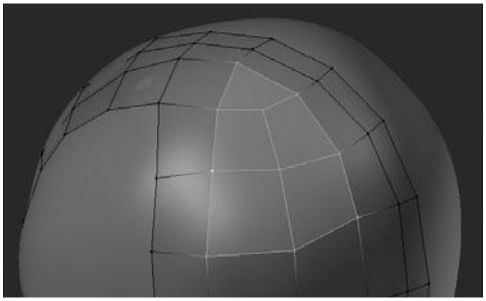

Figure 12.21
Filling in the top of the head

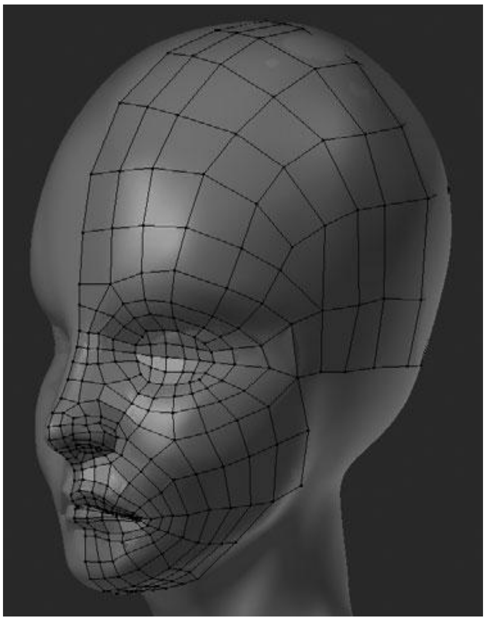

Figure 12.22
Filling in the forehead

Remember that you do this by using Face Snap and Ctrl+LMB to add or extrude a vertex. After extruding all the vertices, you can fill the gaps by selecting four vertices at a time and pressing F to fill a face.

Next, continue this same process to cover the other main strand clumps, as shown in Figure 12.31.

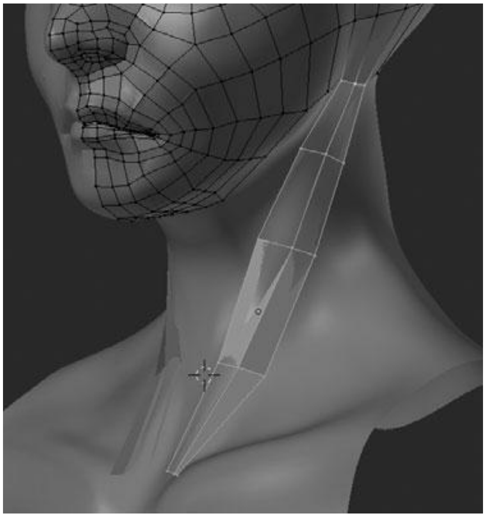

Figure 12.23
Extruding the neck muscles

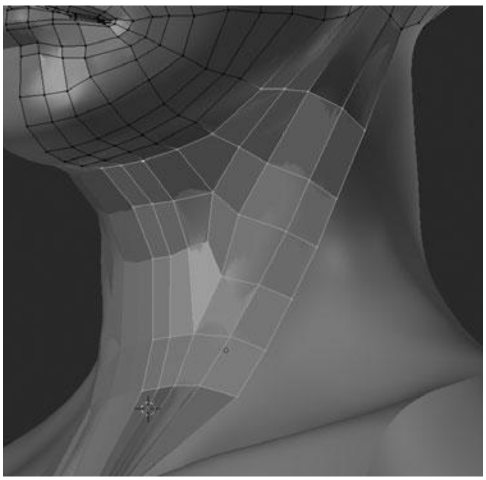

Figure 12.24
Filling in the front of the neck

Having placed the initial faces, you can add a loop down the center of each strand for added volume, as shown in Figure 12.32. After adding the loopcut, in order for the loop to snap to the surface, it is necessary to momentarily press G to activate the Grab tool after using the Loop Cut tool. By doing this, the snapping will be activated.

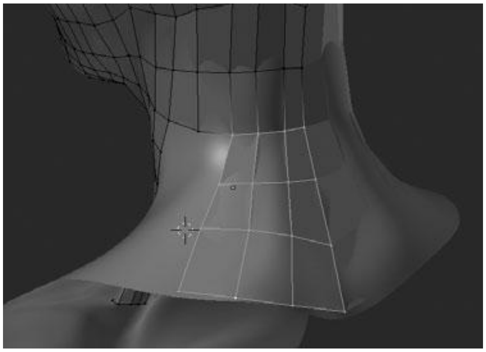

Figure 12.25
Filling in the back of the neck

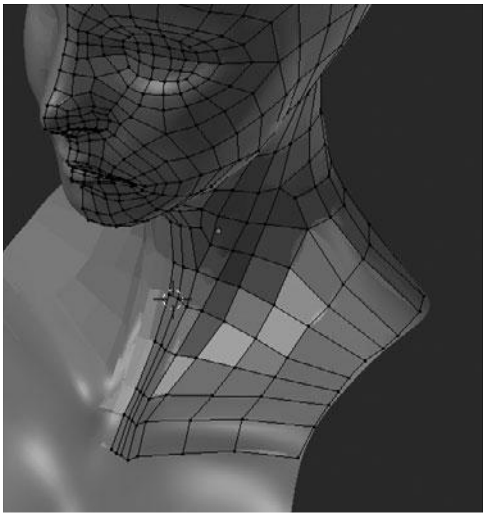

Figure 12.26
Filling in the front, clavicle area of the neck

Note

There are several tools that are not picked up by snapping. Using another transform tool immediately afterwards will activate snapping. Several of these include:

- Loop Cut
- Edge Slide
- Subdivide

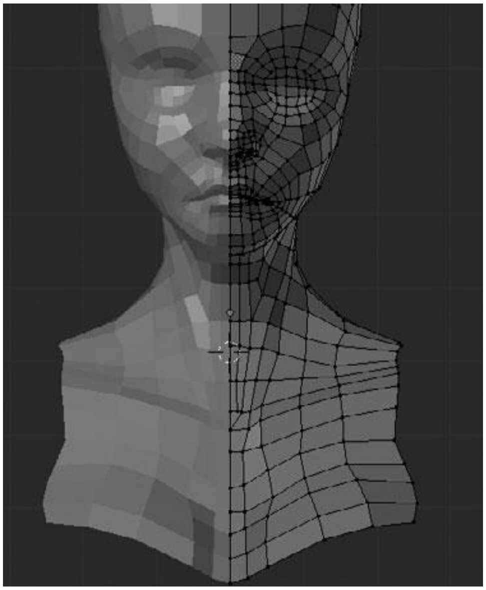

Figure 12.27
Extruding down the breasts

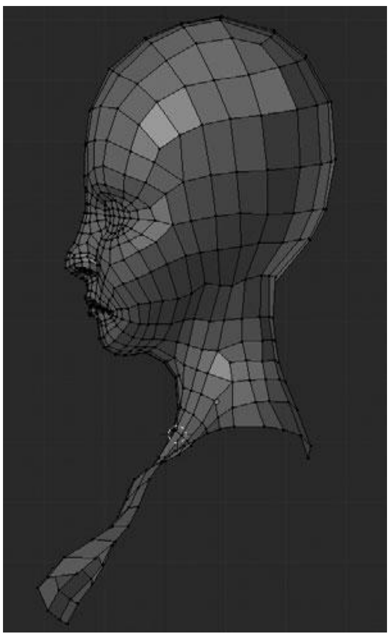

Figure 12.28
Side view of the finished head

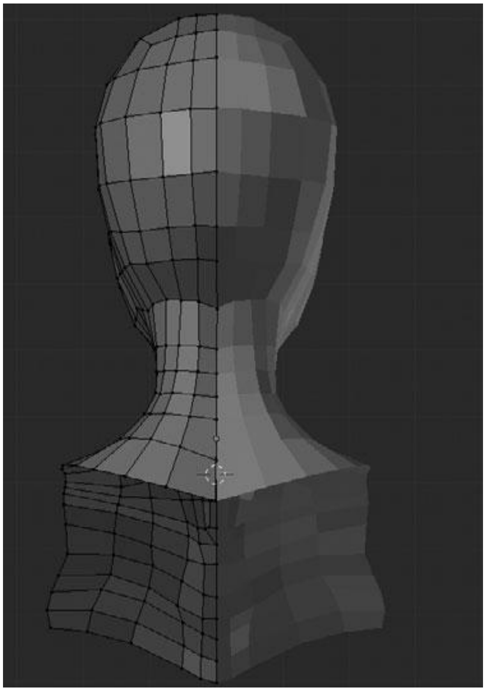

Figure 12.29
Back view of the finished head

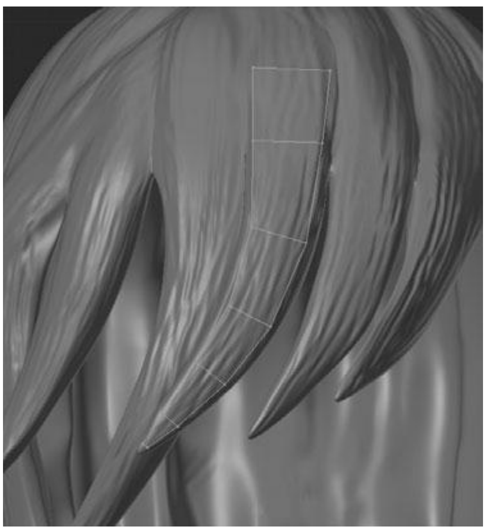

Figure 12.30
Extruding the first strand of hair

Figure 12.31
Extruding the other main strands of hair

Figure 12.32
Adding a loop down the center to correct the volume of the hair strands

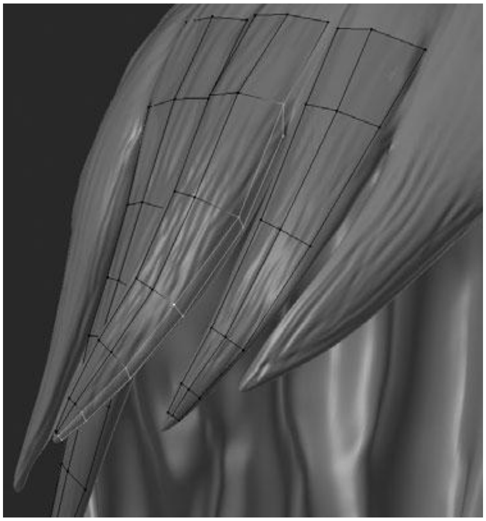

Figure 12.33
Adding thickness and connecting the strands

The next step is to begin adding thickness to the strands by extruding the sides, bit by bit so as to not mess up the snapping, followed by connecting each strand to its neighbor. See Figure 12.33.

After extruding the sides for thickness, you can fill in the tip of each strand. See Figure 12.34.

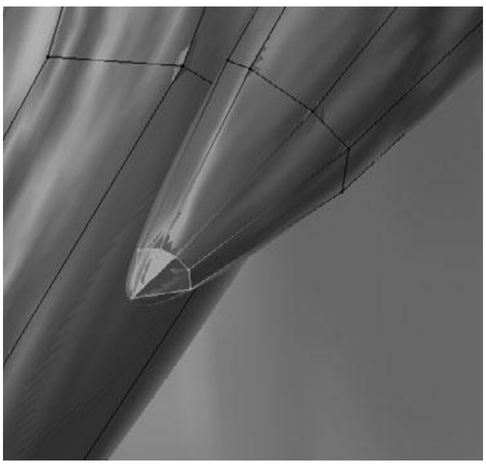

Figure 12.34
Filling in the tips of the strands

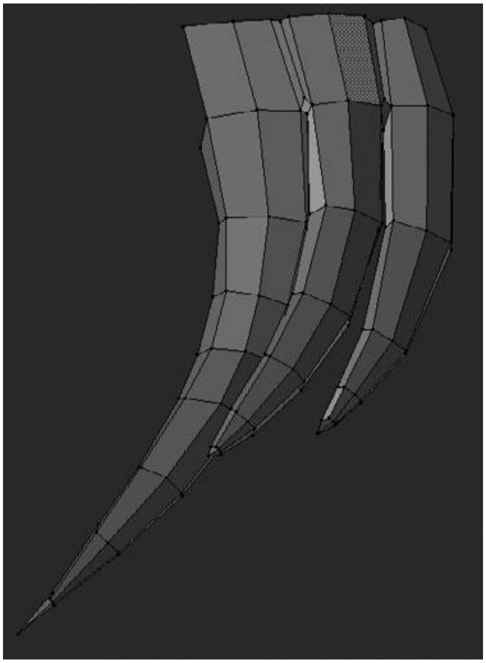

Figure 12.35
The current mesh for the three central strands

The mesh up to this point is comprised of the three central strands shown in Figure 12.35.

Using the same steps as for the previous strands, fill in the rest of the strands as in Figure 12.36.

Retopo'ing the sides and back of the hair is a slightly simpler procedure but still similar. The tools and techniques are identical. See Figure 12.37.

Next, fill in the top of the head in the same way. The main point to keep in mind throughout this whole process is to try to keep a clean edge flow comprised of 100% quads. You can see the front, side, back, and top of the final mesh in Figures 12.38 through 12.41.

Looking at the final mesh you can see how the edge flow follows the main forms of the hair, which will help replicate the original volume of the hair best. Notice that I have used what I generally refer to as "diamonds" several times to slim

Figure 12.36
Filling in the remaining strands

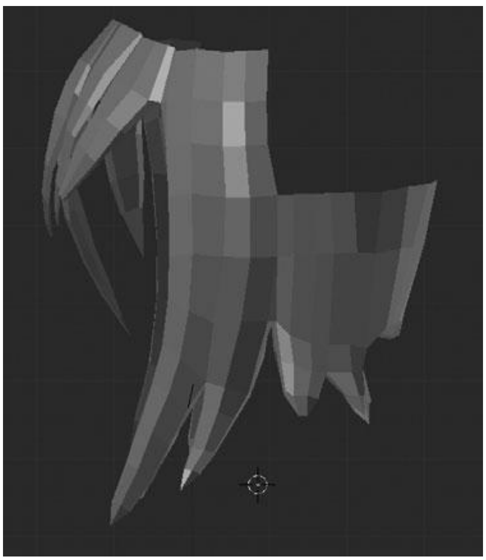

Figure 12.37
Creating the sides and back of the hair

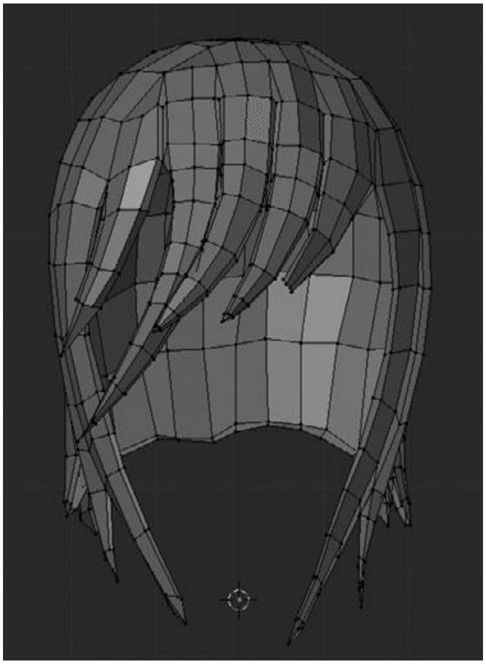

Figure 12.38
Front view of the final hair mesh

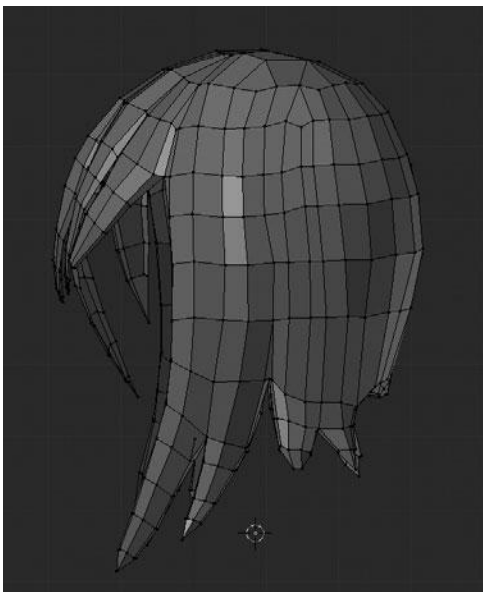

Figure 12.39
Side view of the final hair mesh

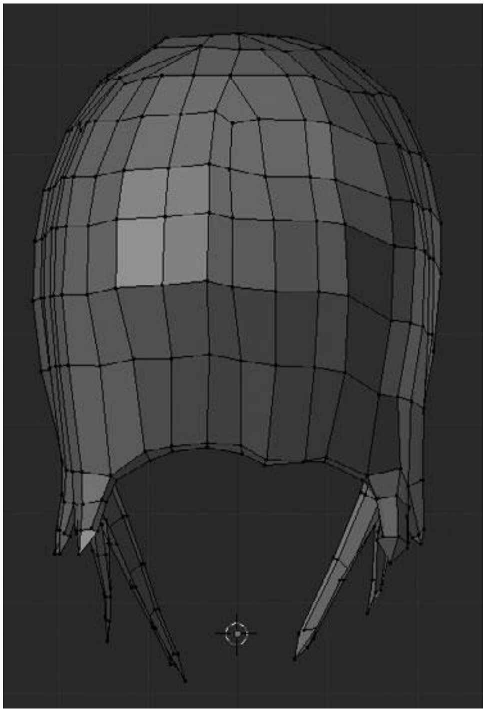

Figure 12.40
Back view of the final hair mesh

down the number of loops. These "diamonds" are quads that are rotated to effectively merge three edgeloops into a single loop. Several of these diamonds are highlighted in Figure 12.42.

With that, you are done with the hair and can move on to the shirt and coat.

Retopo'ing the Shirt and Coat

The shirt and coat for the character will be retopo'ed in a very similar way to the head and the hair. The first focus on these two pieces will be to lay out the main edgeloops that will determine the structure throughout the meshes.

To get started, create the first edgeloop around the neckline of the shirt, as shown in Figure 12.43.

With the first loop down, you can extrude the whole loop out to form a full face loop, as shown in Figure 12.44.

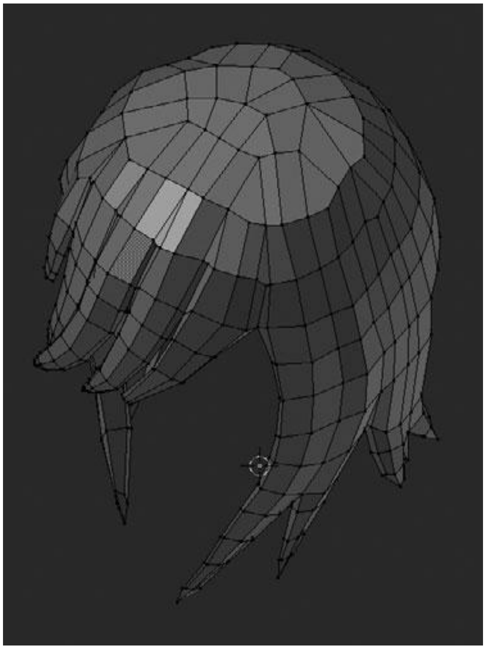

Figure 12.41
Top view of the final hair mesh

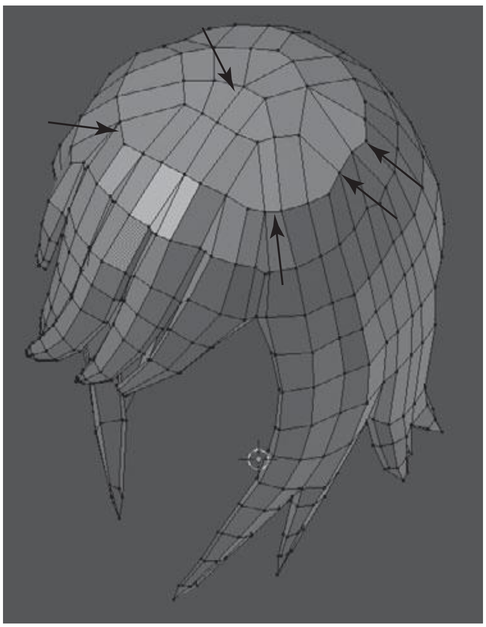

Figure 12.42
Diamond polygons can help control your edge flow

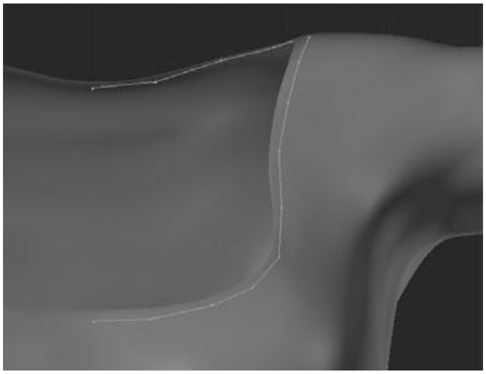

Figure 12.43
Extruding a loop around the neckline of the shirt

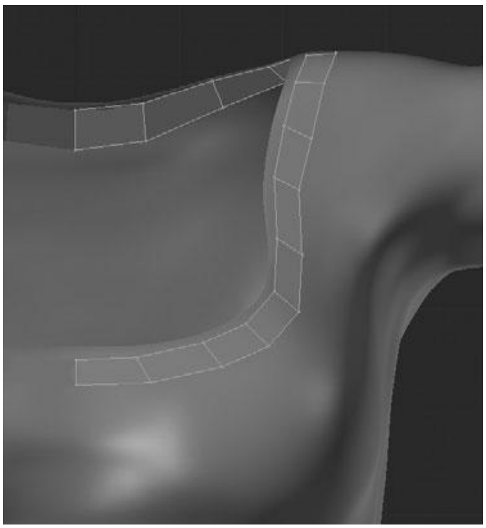

Figure 12.44
Forming a face loop for the neckline

Next, do the same thing around the shirtsleeve and just below the bust line, as shown in Figure 12.45.

These three face loops will work as the foundation for the remainder of the mesh. From here, it is just a matter of filling in the gaps. This is most easily done by starting out with the sections that directly line up, mainly in the center of the chest, over the shoulder and under the arm. See Figure 12.46.

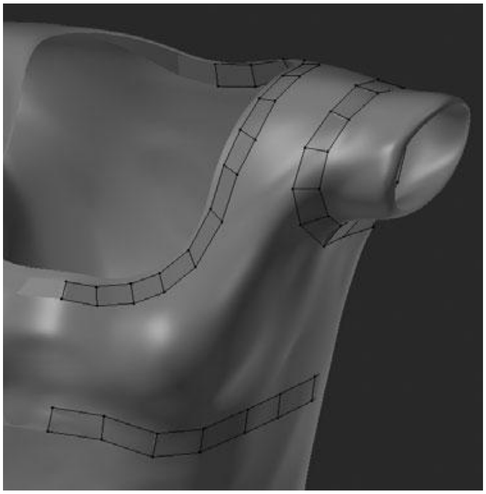

Figure 12.45
Adding loops around the shirtsleeve and below the bust line

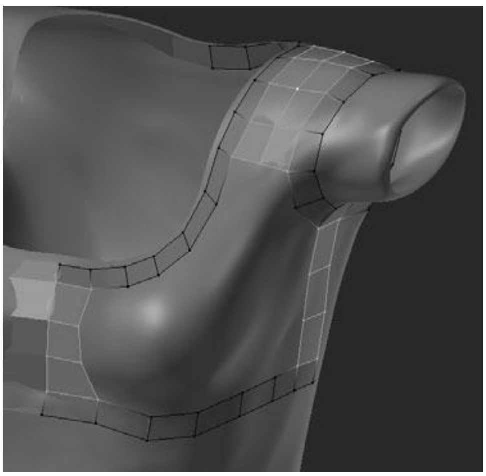

Figure 12.46
Starting to fill in the gaps

After filling in the remaining areas, you're left with Figure 12.47.

At this point, you can just extrude down the bottom loop—section by section so as to not disrupt the snapping—multiple times to form the rest of the shirt. See Figure 12.48.

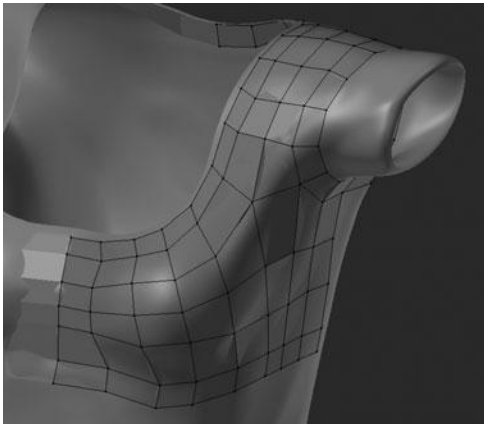

Figure 12.47
Filling in the remaining gaps

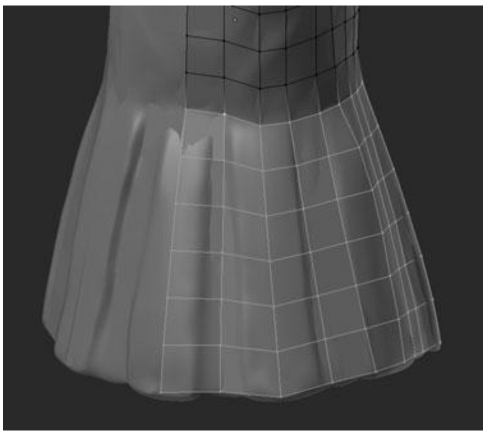

Figure 12.48
Extruding down the remainder of the shirt

The next step is to add depth to the edges and extrude the rest of the shirtsleeve to finish the shirt. See Figure 12.49.

Moving on, you can do the coat in much the same way. As with the shirt, first lay out the main loops, as shown in Figure 12.50.

Now fill in the area around the shoulder, shown in Figure 12.51. Then finish the rest of the coat, as shown in Figures 12.52 through 12.54.

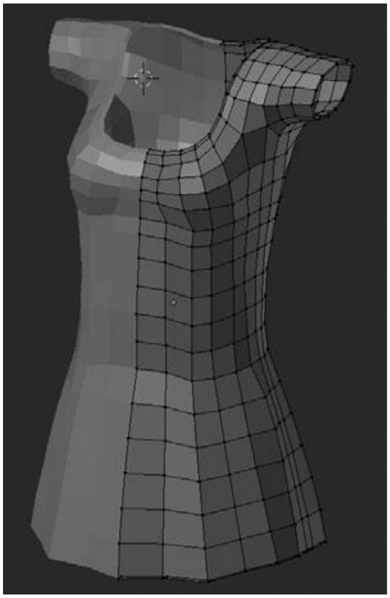

Figure 12.49
Adding depth and extruding the shirtsleeve

Both the shirt and the coat are now done. This finishes the main retopology work, the work that is done by hand. The next few pieces will all be retopo'ed through a more automatic process.

Retopo'ing the Arms, Armbands, Gloves, Pants, and Boots

Unlike the process used for retopo'ing the head, hair, shirt, and coat, you'll switch gears in this section and retopologize the arms, armbands, and gloves using the Shrinkwrap Modifier. This process is not so much retopologizing the mesh as it is reshaping it.

The Shrinkwrap Modifier is a great tool that works exactly like its name implies. Using the modifier, you can input one mesh to shrink against another. By using this modifier, you can take a simplified version of each mesh and shrinkwrap it to the highpoly version in order to replicate the surface forms and silhouette while maintaining a lower poly count.

To do this, start with the arms by duplicating the mesh and then applying the Multires Modifier at level 1. Immediately after applying the Multires, go into

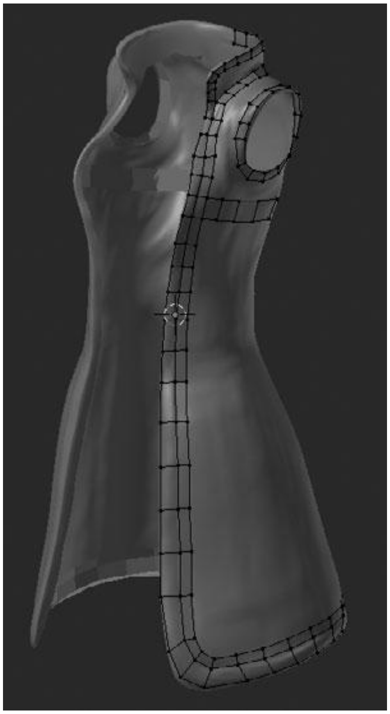

Figure 12.50
Laying down the foundation loops for the coat

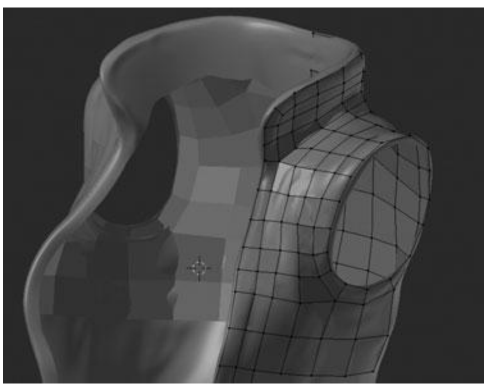

Figure 12.51
Filling in the shoulder area on the coat

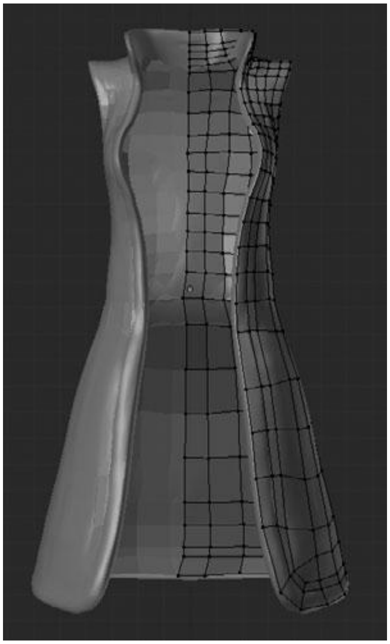

Figure 12.52
Front view of the finished coat

Edit Mode, delete one side of the mesh, and then add a Mirror Modifier. This way the retopo process will affect both sides equally. After adding the Mirror Modifier, also add a Shrinkwrap Modifier. On the Shrinkwrap Modifier, set the Target to be the original arm mesh, which in this case is named "geo_arms." See Figure 12.55. The low-resolution mesh should now be shrunk against the high-resolution surface.

In this case the shrinkage is minimal but still helps to replicate the original surface. The final step to complete the arms is simply to apply the Shrinkwrap Modifier to make the changes real. You can now move on to the armbands.

Much like the arms, you should first duplicate the armbands, apply the Multires Modifier at level 1, and then add a Shrinkwrap Modifier. However, there is one more step involved due to the Solidify Modifier you originally used on the armbands. Currently the armband mesh is two-sided, but for the low-resolution mesh you do not need the interior faces and so you should remove them. The easiest way to go about this is to switch into Face Select

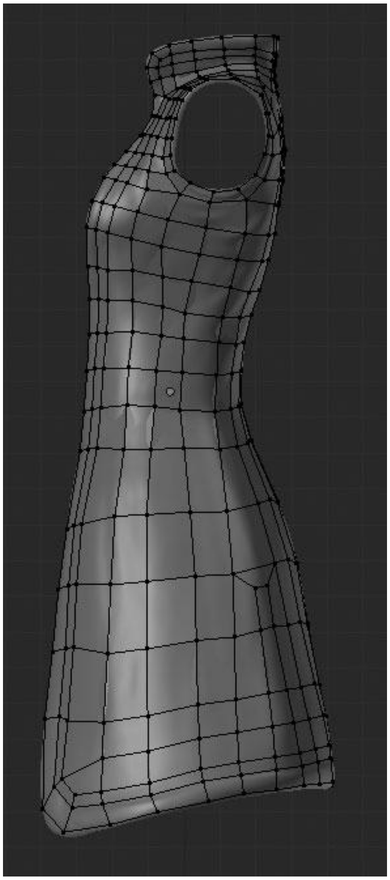

Figure 12.53
Side view of the finished coat

Mode and press Alt+RMB on one of the edges that is perpendicular to the face ring along the perimeter. This will select all faces along the side. You can then press H to hide these faces, leaving the interior faces separated. Then select these interior faces by hovering your mouse over one of the edges and pressing L, which will select all vertices that are linked to the edge under your mouse. Then delete all the faces using X > Delete Faces. See Figure 12.56.

After deleting the faces and adding a Mirror and Shrinkwrap Modifier (see Figure 12.57), you're ready to apply the Shrinkwrap Modifier to make the deformations real on the armband.

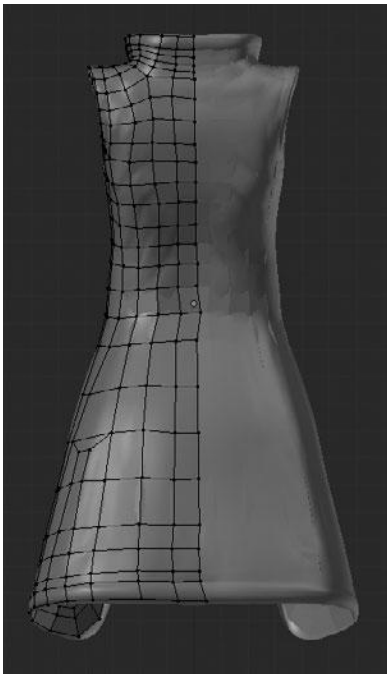

Figure 12.54
Back view of the finished coat

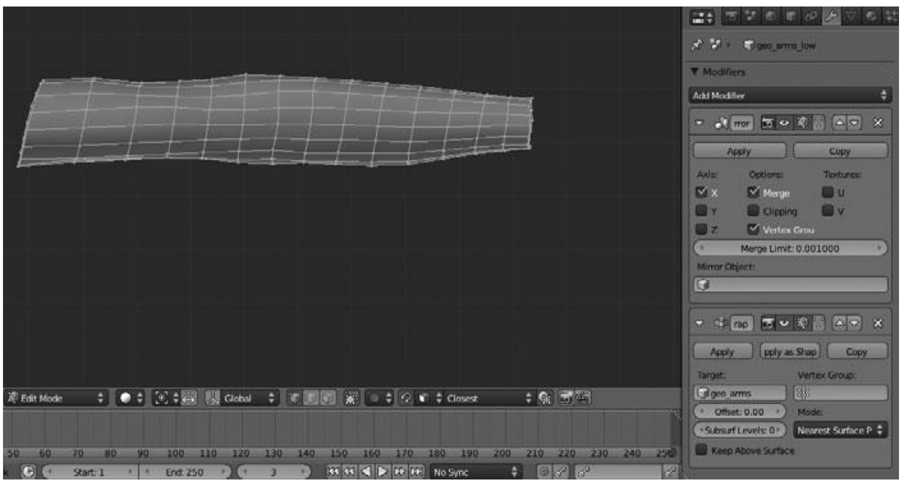

Figure 12.55
Adding a Shrinkwrap Modifier to the arms

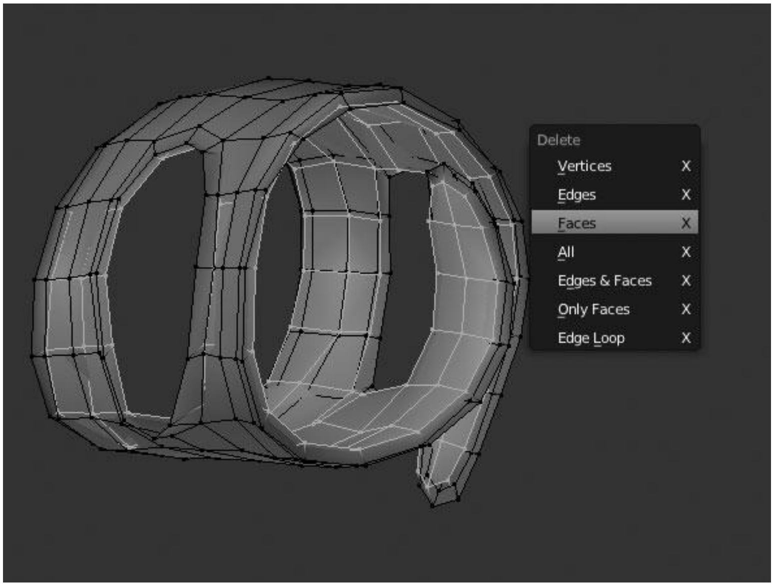

Figure 12.56
Deleting the interior faces on the armband

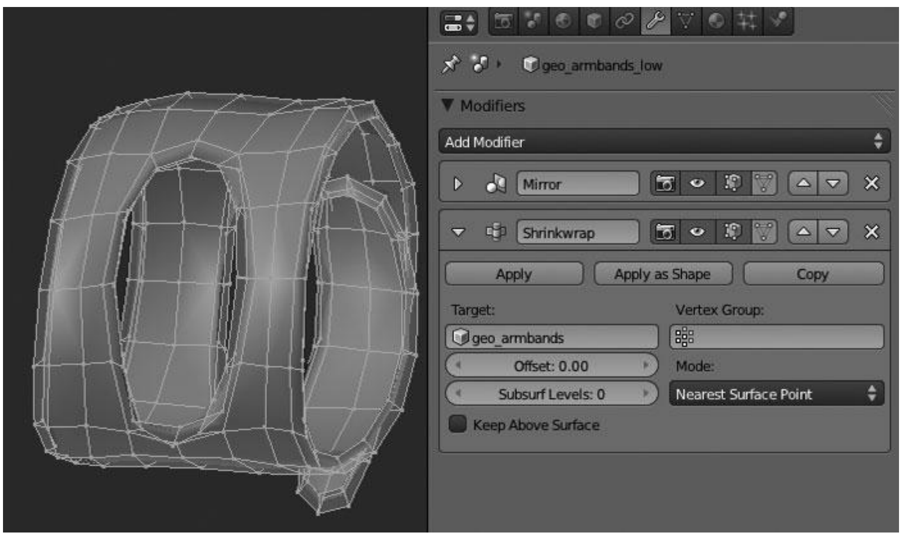

Figure 12.57
Adding a Shrinkwrap Modifier to the armband

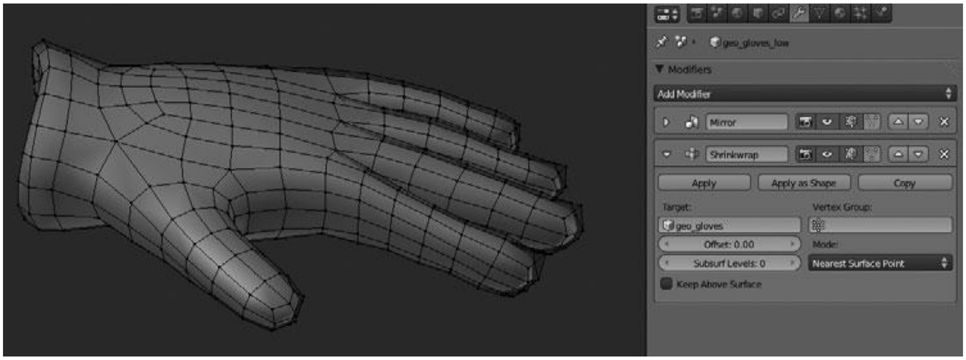

Figure 12.58
Retopo'ing the gloves with the Shrinkwrap Modifier

You can then repeat the same steps used for the arms on the gloves, as shown in Figure 12.58.

Follow the same steps for the pants, as shown in Figure 12.59.

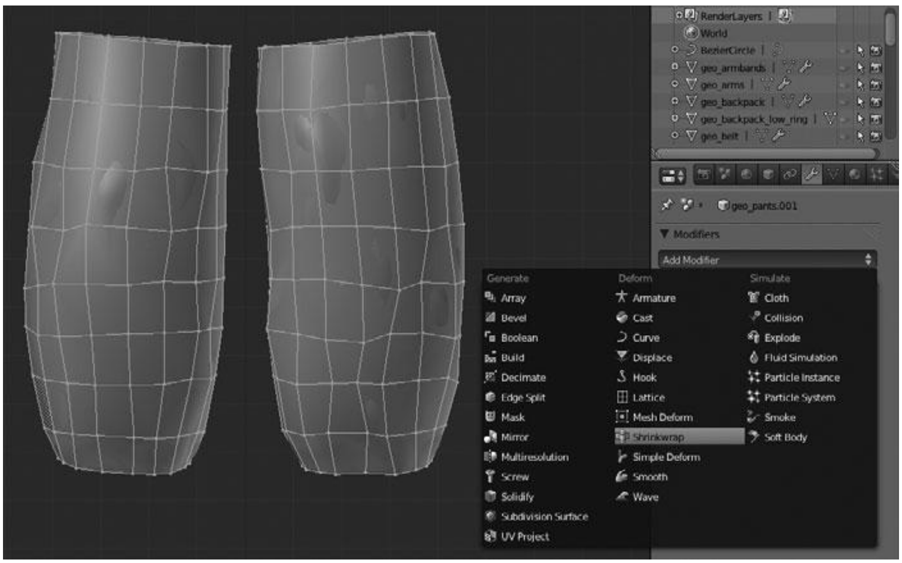

Figure 12.59
Retopo'ing the pants with the Shrinkwrap Modifier

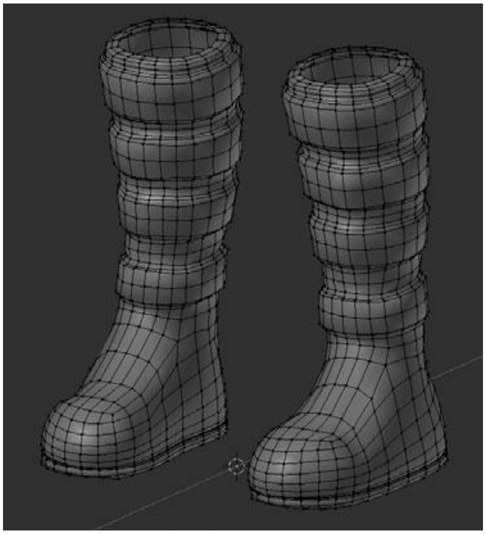

Figure 12.60
Original boots mesh after applying the Multires

Next for the boots, duplicate and apply the Multires level 1, just like with the previous parts. Unlike the other parts, though, you need to slim down the poly count on the boots slightly; currently it is slightly denser than needed. All you need to do to slim down the poly count is to remove a few of the edgeloops where needed. You can see the original mesh in Figure 12.60 and the slimmed-down mesh in Figure 12.61.

The final step then is to add the Shrinkwrap Modifier in the same way as with the previous parts. See Figure 12.62.

With that, you are finished with all the necessary retopology. You now have a series of meshes that will be much easier to pose and animate in the future if you choose to.

Summary

This chapter took a brief look at topology and looked over two different methods used for retopology. Each of these methods has its place and time.

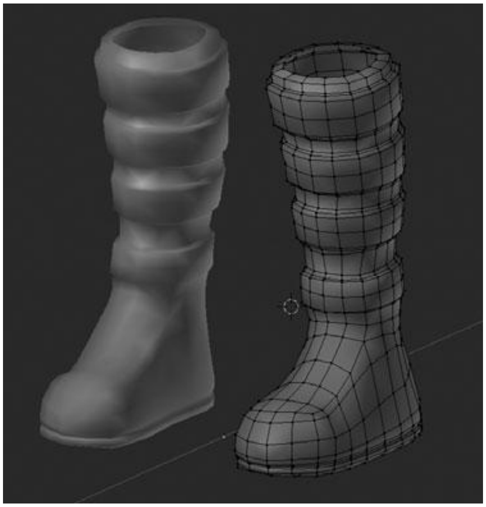

Figure 12.61
New boots mesh after removing a few loops

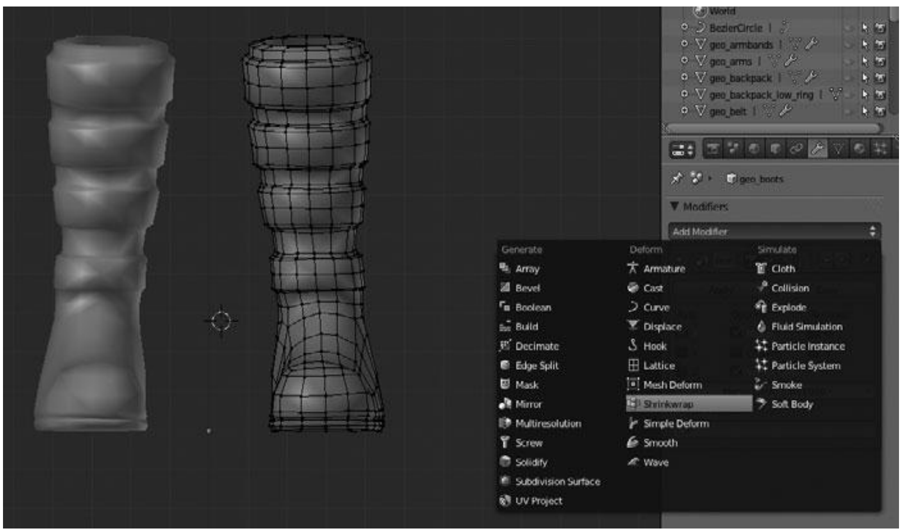

Figure 12.62
Retopo'ing the boots with the Shrinkwrap Modifier

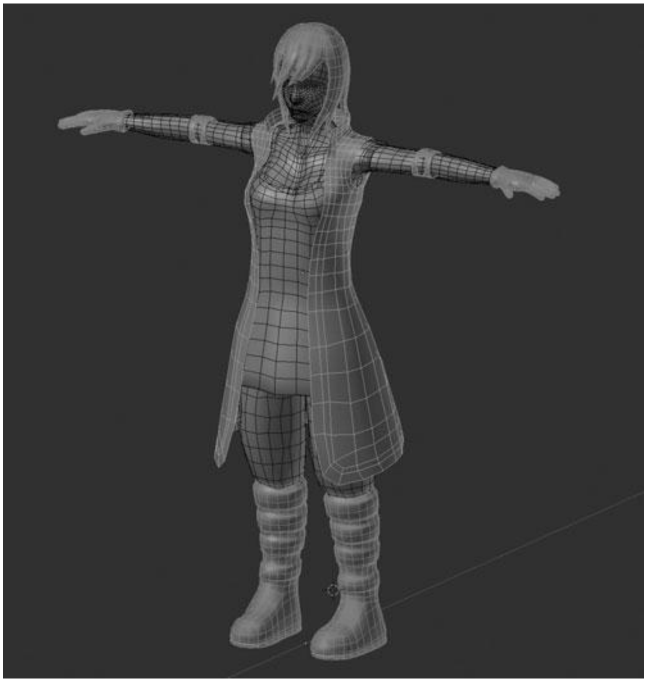

Figure 12.63
Final lowpoly models after retopologizing

The manual process, which is done by using the surface snapping, is best when you need fine control of the topology, particularly if the topology of the original model was drastically different. The other method, using Shrinkwrap, is best used when working with relatively simple topology. In this case, it worked because each of the objects were quite simple, as far as their topology was concerned. The base meshes you created in the beginning already had clean topology, giving you an excellent starting point. The final lowpoly model is shown in Figure 12.63.

All of the modeling is complete and it is now time to move on to working with lighting and rendering to help showcase all the hard work that has gone into the modeling of the character.

Part IV

Lighting and Rendering the Character and Adding Materials

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Chapter 13

Lighting and Rendering

Through all the work of the previous chapters, you should now have a fully modeled character, including lower resolution versions for all the sculpted parts. This model is now ready to be shown off but simply taking screenshots of the Viewport does not lend to a very polished presentation. It is at this point that lighting and rendering techniques come into play. As with some other aspects of 3D, lighting and rendering really need a book of their own to get the process down pat. In this chapter, I aim to give you just enough of a rundown to get you started and give you enough knowledge to start lighting and rendering your own characters.

Basics of Lighting and Rendering

To get started, this section takes you through the basic properties that apply to lamps and then describes each of the different lamps that are available for use. It will also go on to show you the basic rendering and environment properties. Then, you'll learn how to create a simple scene and lighting setup to showcase the character.

Note

For an excellent, in-depth lighting and rendering resource, I recommend checking out *Digital Lighting and Rendering – Second Edition,* by Jeremy Birn. You can find it at Amazon.com and other retailers.

Before getting to the lighting and rendering properties, let me give you a quick rundown of how the process works:

- **First**, assuming you have a fully modeled character and/or scene, you need to set up lights to illuminate the scene and position your camera.
- **Second,** you can adjust the Render properties to determine the image resolution and specify where the render is to be saved on your computer.
- **Third,** you can adjust the World properties to define how the environment will look and how it may affect the appearance of your scene.
- **Fourth,** you press Render and enjoy the fruits of your efforts.

With that said I will now take you bit by bit through each of the main properties that deal with lighting and rendering, starting with lamp types.

Lamp Types

When setting up lighting in Blender, and in any other 3D package, there are many scenarios that you may want to light. You may be attempting an outdoor scene, a dark hallway, a bright spotlight, or any number of other scenarios. In order to better re-create different scenarios and situations, there are several different kinds of lamps available to use in Blender (see Figure 13.1), each of which has its specific attributes.

Here is each available lamp and a brief description of what it does:

- **Point:** An omni-directional lamp that emits an equal amount of light in all directions.
- **Sun:** Emits lights at a constant intensity in a single direction to replicate the effects of the sun.
- **Spot:** Emits a cone-shaped beam of light in any specified direction.
- **Hemi:** Provides uniform light from a 180-degree hemisphere.
- **Area:** Simulates emitting light from a surface, such as a TV.

Each of these lamps has specific and generic settings that apply to it which brings you to the next section on Lamp Properties.

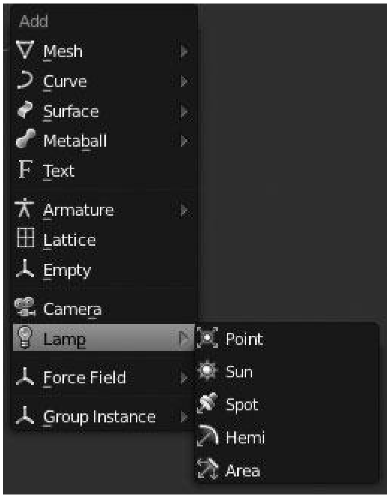

Figure 13.1
Lamp types available in Blender

Lamp Properties

Like all objects, there are options that can be defined for lamps. These options can be accessed via the Lamp Properties panel, as shown in Figure 13.2. I will not go over each and every setting here as many of them do not come into use often.

The settings that I want to point out, which apply to nearly all lamps, are the ones listed here. These are the settings that you will change most often when starting out and so I want to ensure you are aware of them right off the bat.

- **Light Color:** Just as the name applies, this setting allows you to change the color of a lamp, as shown in Figure 13.3.
- **Energy:** Determines the amount of light that is emitted, as shown in Figure 13.4.
- **Distance:** Determines how far the light is emitted before dissipating (this option is not available for Sun and Hemi lamps). See Figure 13.5.

These three settings are enough to get you started with adjusting your lamps in Blender. There are still many more settings available, many of which are specific to the type of lamp that you are using.

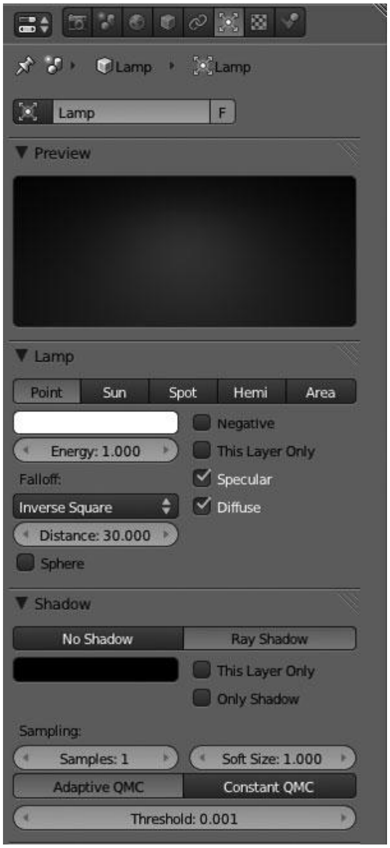

Figure 13.2
Lamp Properties panel

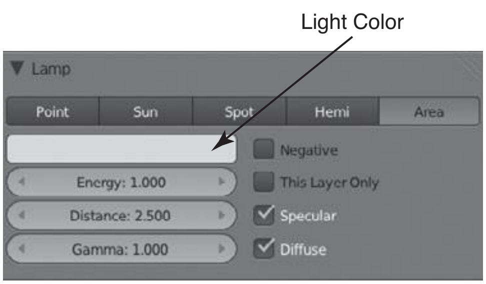

Figure 13.3
Lamp color

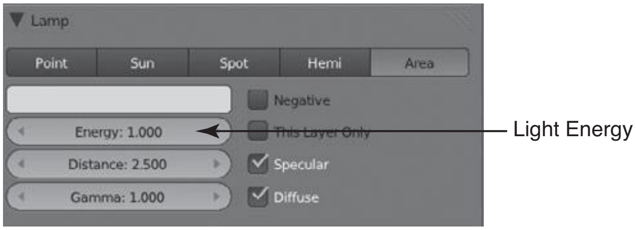

Figure 13.4
Lamp energy

Figure 13.5
Lamp distance

I will not cover them all here but I encourage you to experiment with the settings to see what they do. Oftentimes the tooltips are a great help, which display when you hover your mouse over an option.

For the time being, I will now move on to the basic render properties so that you can get a little closer to actually rendering the character.

Render Properties

As with all other areas of Blender, when it comes to rendering, there are properties that can be set to help customize and optimize the final render output. If you remember from Chapter 1, the render properties are located in the panel that is displayed by default. The render properties are shown in Figure 13.6.

Much like many other areas of Blender, there are a lot of different settings. Most of these settings will be used only from time to time, so once again I will focus on the commonly used ones. In this case the settings that I want to bring your attention to are found under the Render, Dimensions, and Output sections, as discussed in the following sections.

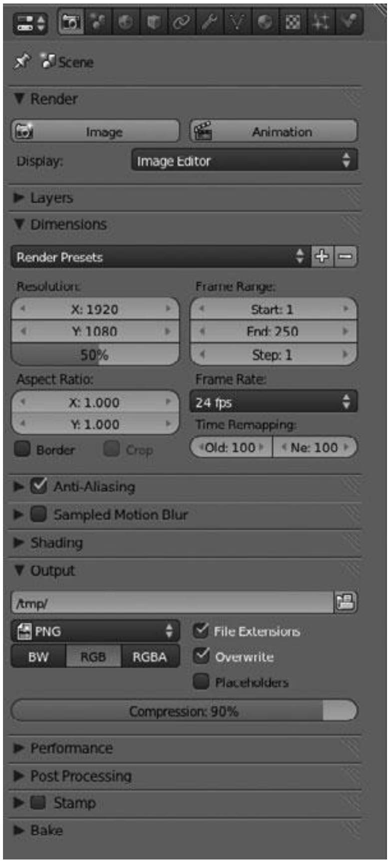

Figure 13.6
Render properties

Render

The Render buttons let you start either a still frame or animation rendering and define where you want the final output displayed, as shown in Figure 13.7.

Dimensions

These settings should be fairly obvious; they allow you to change the resolution of the render output, give you controls to define pixel Aspect Ratio, and let you determine the Frame Range and Frame Rate for animations. See Figure 13.8.

Figure 13.7
Render buttons

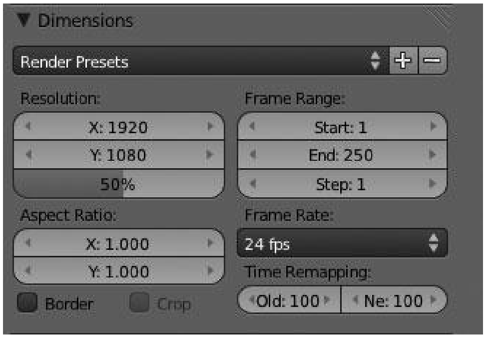

Figure 13.8
Dimensions section

Output

This section lets you determine the location for saving the render output and the format to save it in. See Figure 13.9.

Most of the time the only two settings you will adjust, initially, are the Resolution and the Output. Many of the other settings are available for use to optimize your render either for quality or testing purposes. As with many of the

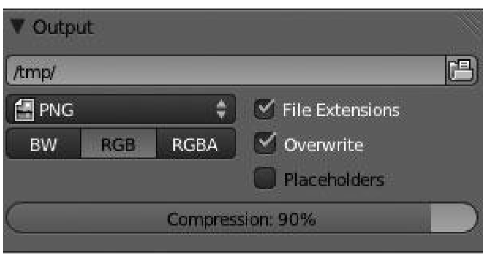

Figure 13.9
Output options

Lamp settings, I encourage you to read the tooltips to understand what each setting does if you are not already familiar with them.

Having looked at a few of the render properties, let's now move on to the World properties so that you can get closer to actually lighting and rendering your character.

World Properties

Aside from lighting, the World properties offer a few of the most important tools that can be used to achieve a good render result in Blender. The World settings determine how the 3D environment around your scene looks and behaves. Here you will find settings to control the background color, environment lighting, mist, and even stars. This section gives a brief rundown of each of the tools. In the next section, you'll begin lighting and rendering the character and you'll use these tools to do so.

In the interest of organization, let's start at the top of the World properties, as shown in Figure 13.10, and go down, one item at a time.

Preview

The Preview section, shown in Figure 13.11, gives you an approximation of what the final world will look like at render time. It is not completely accurate but does a good job of giving you a preview while adjusting settings.

World

The World section, shown in Figure 13.12, lets you determine how the background will be displayed at render time. You can choose between Paper Sky, Blend Sky, and Real Sky, each of which causes the background to be mapped to the background and environment differently. In most cases when a background color is defined by the World, you will use either the Real Sky or Blend Sky options.

You may also set the Horizon, Zenith, and Ambient colors using the color pickers below the Sky options.

Ambient Occlusion

The Ambient Occlusion section, shown in Figure 13.13, lets you enable Ambient Occlusion to cause shadowing of an object based on the distance between it and

Figure 13.10
World properties

other objects. In simple terms, if an object is in close proximity to an other object, they shadow each other. The amount of Ambient Occlusion can be set via the Factor slider and the mode can be set to either Add or Multiply. In most cases, you will always use the Multiply option; the Add option just brightens everything.

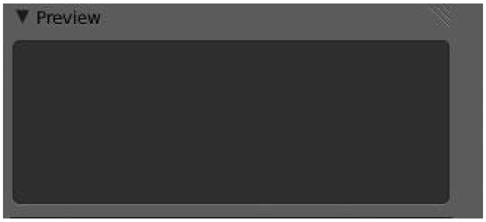

Figure 13.11
Preview section of World properties

Figure 13.12
World section of World properties

Figure 13.13
Ambient Occlusion section

Environment Lighting

Environment Lighting, shown in Figure 13.14, is a basic kind of global illumination that causes the environment to emit lighting from all angles. Using this lets you get a much more evenly illuminated scene without the need for a multitude of lamps. You can increase or decrease the amount of lighting with the Energy slider and you can change the light energy colors via the drop-down menu on the right to White, Sky Color or Sky Texture.

Figure 13.14
Environment Lighting section

Figure 13.15
Indirect Lighting section

Indirect Lighting

Indirect Lighting, shown in Figure 13.15, causes certain kinds of lights to bounce off of objects and illuminate the objects nearby. The only light that is bounced via Indirect Lighting is the light from materials that make use of the Emit option. I will not be making use of this at all, but if you want to try it out you simply need to add a material to one of your objects and increase the Emit value on the material.

You can control the amount of light that is contributed by surrounding objects with the Factor slider and adjust the number of light bounces with the Bounce option.

Note

> Indirect Lighting works only with the Approximate gathering method. Gather is covered in the next section.

Gather

The Gather method, shown in Figure 13.16, lets you choose which mode is used for Ambient Occlusion, Environment Lighting, and Indirect Lighting. You can choose between Raytrace and Approximate. The Raytrace method provides more accurate results but is much slower and has noise. The noise can be

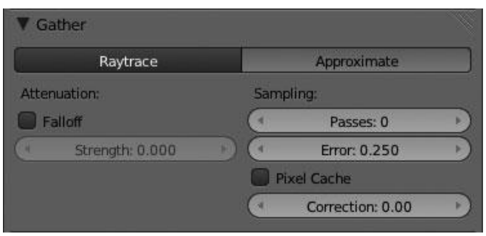

Figure 13.16
Gather method section

Figure 13.17
Mist section

removed by increasing the number of samples, but beware that this will also increase the render time.

The Approximate method is noise-free and faster, but it is also inaccurate. In most cases, Raytrace is the better option unless you want to use Indirect Lighting, in which case you must use Approximate.

Mist

The Mist option, shown in Figure 13.17, allows you to create a mist effect over the render. The Intensity slider controls the amount of mist. Then the position, depth, and height can also be controlled by their respective sliders.

This Mist tool is good when used in creative ways via the Compositing Nodes for achieving certain effects, but its use as actual mist in a scene is fairly minimal and for most users will go unused. The Compositing Nodes are a topic for another book, though.

Stars

The Stars feature, shown in Figure 13.18, will mostly go unused, as it simply does not provide the quality most artists are looking for. If it does provide what you need, then you can use it to generate stars in the background of your scene with basic control of the stars Size, Colors, Minimum Distance, and Separation.

Figure 13.18
Stars section

At this time, you'll now move on to the process of lighting and rendering the character you have modeled.

Lighting and Rendering a Basic Scene for the Character

With all of those tedious bits behind you, it's time to learn to set up a basic rendering and lighting environment to showcase the character you have modeled. In this section, you'll learn to do three things:

- Model a basic backdrop for the character so that she is not simply floating in space.
- Set up each of the lamps for your scene.
- Adjust a few Render and World settings to give the final result.

This final result can be seen in Figure 13.19.

The setup that you'll create for this scene is a good way to showcase the character, as there is nothing to distract from the model. Let's get started.

Modeling a Basic Backdrop

In order to ground the character and keep her from appearing to float in space, you'll model a very basic backdrop that provides a sort of infinite ground plane. This technique is commonly used in photography when showcasing a product and you're going to do the same here.

The backdrop can be modeled by starting with a plane, scaling it up, and then extruding it back and up several times to create a nice smooth curve, as shown in Figure 13.20.

After extruding the basic shape, add a Subsurf Modifier at level 2 and add two edgeloops right up to each edge so as to ensure a solid background in the Camera view. Widen the entire backdrop, once again to ensure it fills the entire Camera view. See Figure 13.21.

The backdrop is now complete and you can move on to positioning the camera.

Figure 13.19
Final result of lighting and rendering the character

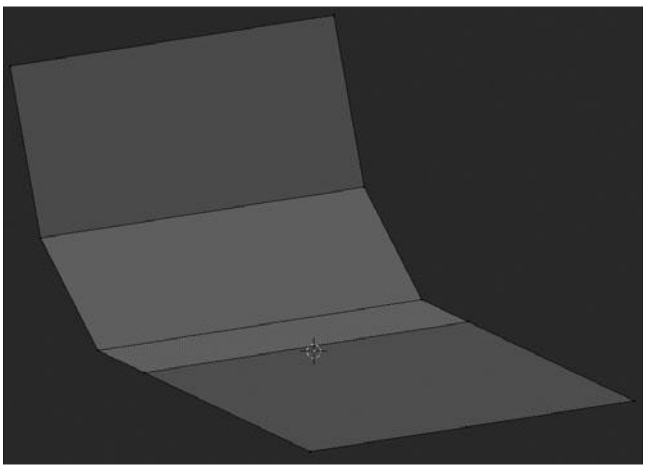

Figure 13.20
Modeling the backdrop

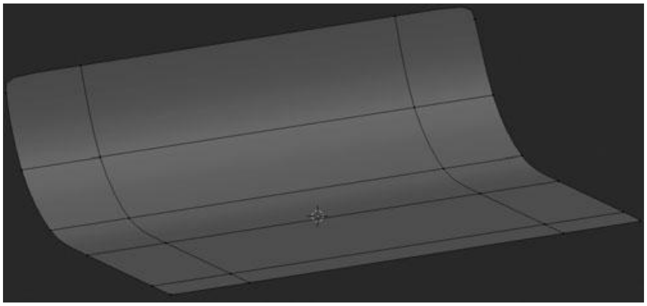

Figure 13.21
Final backdrop after widening it

Positioning the Camera and Adjusting the Render Properties

One of the most important parts of the rendering process is positioning the camera. Just like in photography, this determines what will be seen in the final rendered image. The first step to setting up the camera is to choose a resolution for the final image, as this will directly change the size of the camera in the Viewport.

The resolution of the camera can be set from the Dimensions section of the render properties. During the testing phase, I generally set this to 600 × 800 but this depends entirely on what you are doing and what the final target platform is. The next step is to position the camera.

The camera, just like any other object in Blender, can be manipulated with the Transform tools. Positioning it is just a matter of moving and rotating it until you like what you see. In order to check what the camera is looking at, be sure to switch into Camera view with Numpad 0. You can see the camera position, along with the character and backdrop, in Figure 13.22.

Once your camera is in place, you can start adding lamps to the scene.

Setting Up the Lamps

As you learned in one of the previous sections, there are several different lamp types available in Blender. In this case, you'll use my favorite lamp type to

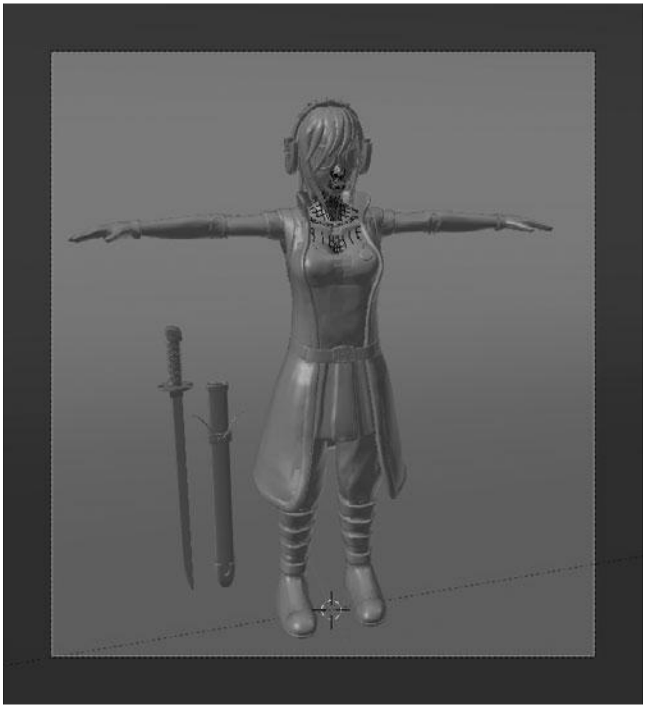

Figure 13.22
Final camera position

illuminate the character, the Area lamp. This lamp works very well for achieving even illumination and soft shadows.

You'll use a total of three area lamps for the scene—one key lamp to provide the primary illumination and highlights. Then you'll also use two fill lights, one on each side, to help soften the shading and add some mood to the image through the use of colors.

Start off by adding a single area lamp to act as the key lamp. Position this lamp to the upper left, behind the camera, and pointing directly at the character. The settings for the lamp are listed here:

- **Color:** Hex code of A89978–This slightly brown color will give you a softer feel to the image rather than a harsh white/grey.
- **Energy:** 1.000–The default value on area lamps is generally fine, instead you can adjust the distance.

- **Distance:** 8.000–This helps to create soft lighting by making the light begin to dissipate before reaching the character.
- **Shadow:** Ray Shadow, 6 samples–The increased samples will soften the shadows and improve the lighting, but also increase render time.
- **Area Shape:** Size of 5.000–Using a larger size will provide more even illumination, rather than having all light coming from a single, small point.

Any other setting that's not listed above has been left as default. If you render the scene now, you should have something very similar to Figure 13.23.

Note

Do not forget to change or delete the default lamp when working with your own scenes.

Figure 13.23
Render result after adding the key light

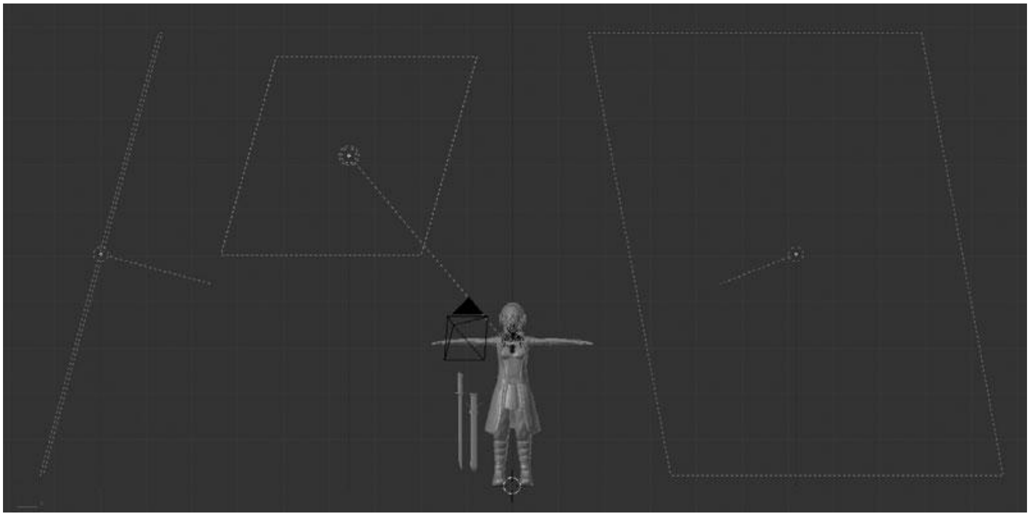

Figure 13.24
Adding the fill lights to the scene

That last result looks okay, but the contrast is a bit too strong and there is too much brown in the image. The first step to improving this is to add the fill lights. You should add two more area lights, at approximately a 30-degree angle pointing down at the character, as shown in Figure 13.24.

The settings for the lamp on the character's right are as follows:

- **Color:** Hex code of D6EAFF–This light blue color will help to "cool" the left side of the image and add some relief from the strong brown of the previous result
- **Distance:** 2.500
- **Shadow:** No shadow, samples 4
- **Area Shape:** Size of 10.000

Figure 13.25
Render result with all three lamps

And the settings on her left are as follows:

- **Color:** Hex code of FFD495–This light orange color will help to "warm" the right side of the image and complement the light blue from the other fill lamp
- **Distance:** 2.500
- **Shadow:** No shadow, samples 4
- **Area Shape:** Size of 10.000

With these two lamps added, your rendered result should look like Figure 13.25.

The render is starting to look pretty good but it can still be improved a lot. What you'll now do is move on to adjusting the World properties, which will improve the image even more.

Figure 13.26
Render result after adding Ambient Occlusion

Adjusting the World Properties

In order to improve the render result even more, beyond what the lamps alone can do, you'll enable both Ambient Occlusion and Environment Lighting.

On the Ambient Occlusion, change the mode over to Multiply. After rendering, you can see the result in Figure 13.26.

The render looks better now, particularly the shadowed areas, but the contrast is still a bit too strong and the whole scene is too brown. You can fix this by enabling Environment Lighting.

For the Environment Lighting, lower the Factor to 0.250 so that it is not too strong. If it is too strong it will tend to wash out the render. Now when you render everything should look much better, as shown in Figure 13.27.

Figure 13.27
Final render result after adding Environment Lighting

Summary

At this point, the lighting and rendering of the character is pretty complete. However, since all the pieces are the same color, there is not very much delineation between the separate pieces. You'll learn to solve this problem in the next chapter, though, by adding some simple materials to the character.

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Chapter 14

Adding Materials

Through the work of the previous chapter, the character is now nicely lit and well presented. However, the presentation could be improved further by adding more delineation betweens pieces through the use of colors. By adding different colors to the parts, you can improve the presentation and make it immediately clear to the viewers that the character is made up of many different pieces.

These colors can be added through the use of materials. Materials allow you to determine the color, specularity, and many other attributes of a surface at render time. Before adding materials to the character, it's important that you get a basic rundown on Blender's material system.

Note

> Blender's material system is due to receive a total overhaul within the next year or so. For that reason, among others, I have not gone into too much detail on the material system. Keep an eye out for "Project Mango" from the Blender Foundation.

Using the Material Properties

You access and modify materials in Blender through the Materials properties panel, shown in Figure 14.1. From this panel, you can add or remove materials and modify existing materials.

The Materials properties panel is made up of multiple sections that give you access to all the options available. I will not cover all of these options but instead

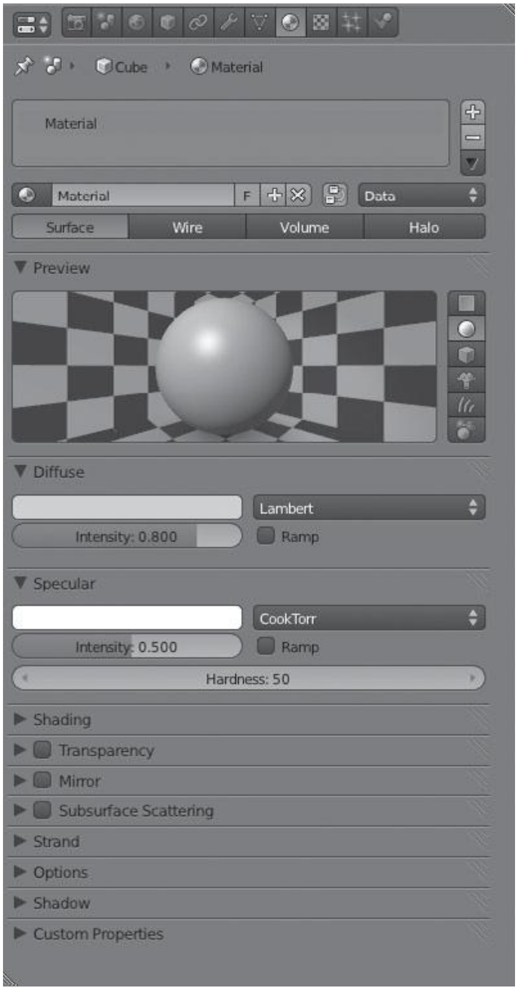

Figure 14.1
Materials properties panel

will give you a rundown of the main settings. The four sections covered in this chapter are the Data, Preview, Diffuse, and Specular sections. After giving you an overview of what each section does, the chapter will show you the workflow for adding materials to an object.

Data

The Data section, shown in Figure 14.2, gives you access to all materials that are assigned to the active object selection. It allows you to add or remove materials

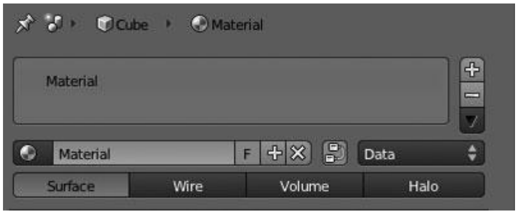

Figure 14.2
Material Data section

from the material slots and lets you rename or reorganize materials. It also permits you to change the material type between Surface, Wire, Volume, and Halo. Each of these material types has its own uses but in this book, you'll only be using the Surface material type.

When in Edit Mode, you will find an additional three buttons in the Data section for Assign, Select, and Deselect. These buttons allow you to assign the selected material to the active selection, select all vertices assigned to the current material, and deselect all vertices assigned to the current material.

Preview

As its name implies, the Preview section, shown in Figure 14.3, gives you a hint of what the material will look like at render time. On the right side of the panel, you can change the preview object type to get a better idea of how the material will look on different objects, including a sphere, cube, and hair strands.

Diffuse

The Diffuse section, shown in Figure 14.4, is where you set the color and intensity of the material. The intensity refers to how much light is reflected from the

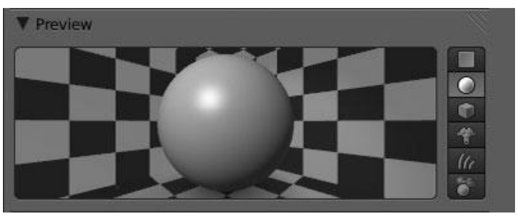

Figure 14.3
Material Preview section

Figure 14.4
Material Diffuse section

surface, effectively controlling the brightness. You can also change Diffuse Shader Model from the default Lambert if you want, but this chapter sticks with the default. These shader models affect how the diffuse shading is calculated. You can also enable a Ramp shader if you want to create gradients that react differently depending on which Input mode you choose. I will not be using the Ramp shaders in this chapter, and so I will not go into any further detail on them.

Specular

The Specular panel, shown in Figure 14.5, is where you set the intensity and sharpness of specular highlights on the material surface. The amount of specularity is determined by the Intensity slider and the sharpness is controlled by the Hardness slider. You can also change the Specular Shader Model in the same way you can change the Diffuse Shader Model; once again this affects how the specularity is calculated. Ramp shaders may also be added to the specular highlights just like the diffuse ramps.

As you have surely noticed, there are several more panels beside the four covered here; these other panels control everything from transparency to reflections to shadowing options. I encourage you to explore all of these settings and see what they do. I have chosen not to detail them here, as I will not be using them. You can find more information on them and all material settings through the tutorials at http://blendercookie.com.

Figure 14.5
Material Specular section

With the basics of the material system laid out, you can move on and learn the actual workflow of adding materials to objects. You'll do this by creating several materials and assigning them to the character.

Adding Basic Materials to the Character

The materials you'll create for the character are quite simple. The goal is to add slight colors and highlights to give a better impression of each surface type and to visually separate the different pieces better. The final render, after adding the materials in this section, can be seen in Figure 14.6.

If you look closely at the render, you will see that there are six materials, including:

- Skin
- Hair

Figure 14.6
Final render after adding materials

- Light cloth
- Dark cloth
- Light metal
- Dark metal

You'll assign the appropriate material to each part of the character based on the surface types and in such a way as to provide clear contrast between each part. For example, you'll add the Dark Cloth material to the shirt and the Light Cloth material to the coat so as to provide clear contrast between the two. This creates a much more appealing render, whereas in the render from the previous chapter all the details tended to blend in with one another.

Let's get started by creating the Skin material and assigning it to the head mesh.

Creating the Skin Material

The skin material you'll create is not really a skin shader of any kind; it's simply a basic material that will be unique to the head mesh. This skin material, along with all the other materials you'll create, is very basic and only makes use of Diffuse color, Specular color, Specular Intensity, and Specular Hardness.

Before getting started, it's important to know that you'll be assigning all the materials to both the highpoly mesh and the lowpoly counterparts. However, for the time being, until you get to Chapter 16, you should leave the lowpoly meshes hidden from the Viewport and at render time. You can hide the lowpoly meshes by pressing the eye and camera icons in the Outliner next to the object names, as shown in Figure 14.7.

The first step to create the skin material is to select the head mesh and add a new material to it by pressing Add New. In some cases, there may already be a material added to the object. If this is the case, you can just modify it as needed.

The next step is to rename the material (named Skin in this chapter). This is not an essential step but it helps to keep the scene organized.

After naming the material, you can adjust the Diffuse color, Specular color, Specular Intensity, and Specular Hardness settings to finish the material. The exact settings used for the skin material shown in Figure 14.8 are as follows:

Figure 14.7
Toggling visibility in the Outliner

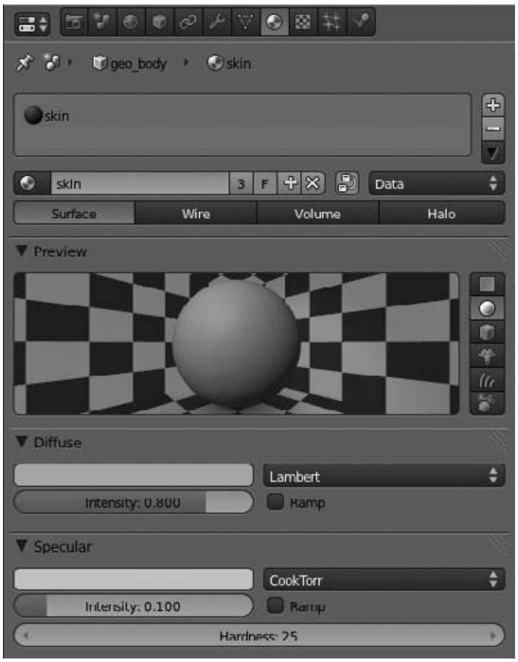

Figure 14.8
Skin material settings

- **Diffuse hex color**: B6B6B6
- **Specular hex color**: CECECE
- **Specular Intensity**: 0.100
- **Specular Hardness**: 25

These settings will give you a very soft, light grey material that helps to give the impression of a smooth surface. Now you can create the hair material.

Creating the Hair Material

For the hair material, you can add the material in the same way, by selecting the mesh and then assigning the material. The shader you want to create is one that will contrast nicely with the skin material you just finished while still showing some soft highlights. The settings used here can be seen in Figure 14.9.

- **Diffuse hex color**: 5D5958
- **Specular hex color**: A7A7A7
- **Specular Intensity**: 0.400
- **Specular Hardness**: 60

Now you can move on to the light and dark cloth materials.

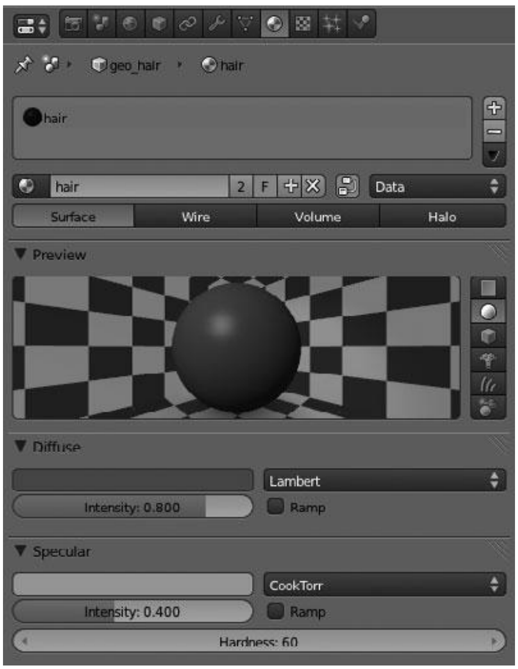

Figure 14.9
Hair material settings

Creating the Light and Dark Cloth Materials

The workflow for these two materials is very similar to the previous ones with the addition of one step when adding the materials to some of the accessories. Before getting to that though, you must first create the materials. Start by creating light cloth material and adding it to the coat. As a reminder, this is done by selecting the coat and then adding the material. The settings for the light cloth material are shown in Figure 14.10.

- **Diffuse hex color**: C2C2C2
- **Specular hex color**: E5E5E5
- **Specular Intensity**: 0.100
- **Specular Hardness**: 30

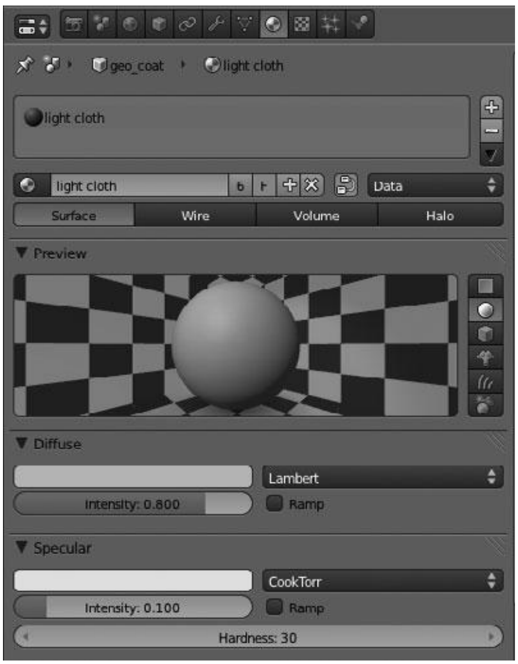

Figure 14.10
Light cloth material settings

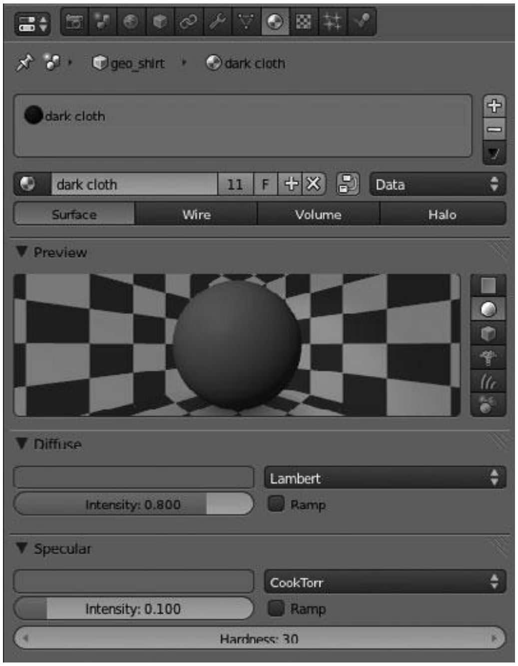

Figure 14.11
Dark cloth material settings

After creating the light cloth material and assigning it to the coat, you can move on to create the dark cloth material with similar settings, as shown in Figure 14.11. Assign this material to the shirt.

- **Diffuse hex color**: 757167
- **Specular hex color**: 747474
- **Specular Intensity**: 0.100
- **Specular Hardness**: 30

Now that you have created these two materials, you can go back and add the materials to the other pieces that need them. Select the object and then choose the material from the drop-down menu, as shown in Figure 14.12.

Assigning the materials to the other parts is easy except you might run into a problem when you want to assign multiple materials to a single mesh.

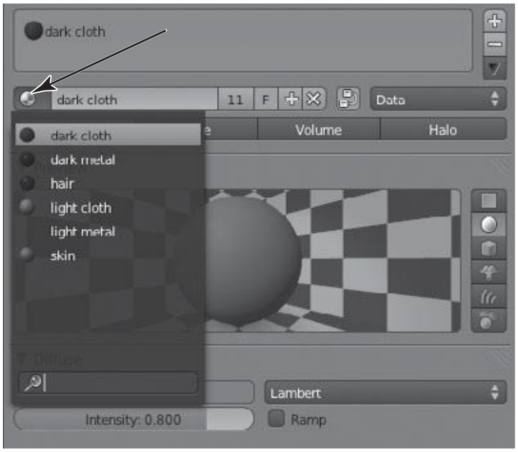

Figure 14.12
Drop-down menu of all current materials

This brings you back to the extra step that I mentioned a moment ago. This extra step is the method you use to apply one material to only part of a mesh, while applying a different material to the other parts of the mesh.

To learn to do this, let's start with the boots. You want to add the light cloth material to each of the bands on the boot and to the sole of the boot and then add the dark material to the rest of the boot. This is done by first choosing the dark cloth material from the drop-down menu in order to assign it to the boot then pressing the + button to add a second material slot. You can then choose the light cloth material from the drop-down menu to add it to the second slot, as shown in Figure 14.13.

After adding the light cloth material to the second slot, enter Edit Mode, select each of the bands and the sole of the boot, and then press Assign to set the selected mesh to the light cloth material. See Figure 14.14.

Using this technique, you can add as many slots and materials as you like to each object. You can use it to separate the details on each accessory as you see fit. However, before doing that, you still need to create the last two materials—the light and dark metals.

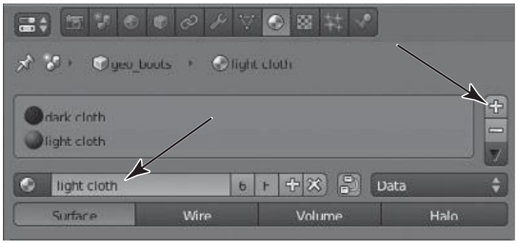

Figure 14.13
Adding a second material slot

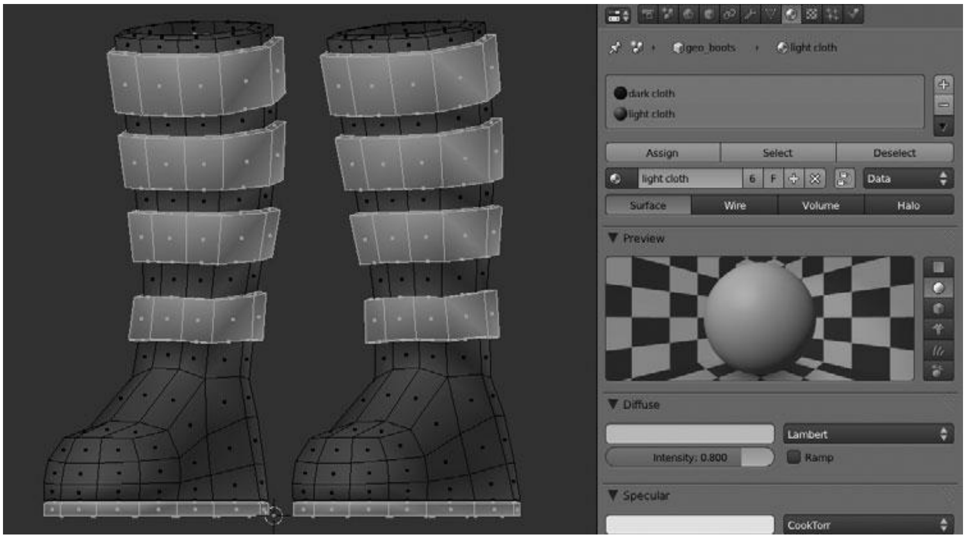

Figure 14.14
Assigning multiple materials to the boots

Creating the Light and Dark Metal Materials

Much like the previous materials, these two metal materials will also be quite simple. The main difference with these is that you will use higher specularity and hardness values to give the materials a bit of a metal look.

The Light Metal settings are as follows:

- **Diffuse hex color**: B6B6B6
- **Specular hex color**: DDDDDD

- **Specular Intensity**: 0.600
- **Specular Hardness**: 200

The Dark metal settings are as follows:

- **Diffuse hex color**: 4B4D50
- **Specular hex color**: DDDDDD
- **Specular Intensity**: 0.600
- **Specular Hardness**: 200

After adding these last two materials, you can go in and assign the appropriate materials to each part of the character. You can see the final result, when viewed from the Viewport and rendered, in Figures 14.15 and 14.16.

A comparison of the character with and without the materials can also be seen in Figure 14.17.

Figure 14.15
Front view of character with all materials

Figure 14.16
Back view of character with all materials

Figure 14.17
Comparison of character with (right) and without (left) materials

Summary

With all of the materials now assigned, you can call the materials finished. This chapter touched on the basics of the material system and went through the process of adding multiple materials to the character. There is much more you can do with Blender's material system, but these basics should be enough to get you started.

You're now ready to move on to the next chapter in order to work with UV Mapping for the character.

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Part V

UV Mapping and Normal Mapping

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Chapter 15

Using UV Mapping

This chapter focuses on something called UV Mapping, or sometimes UV Unwrapping. Those of you who already know what this is might be biting your lips already, knowing that UV Mapping is generally considered one of the most tedious and cumbersome tasks in 3D. However, using Blender's UV tools makes the process relatively simple and in most cases painless.

The UV Mapping process enables you to take all of the faces that make up your model and project them into a 2D, planar space that you can then use to map textures to your model, with total placement control. A simple example of this can be seen in Figure 15.1, in which you will notice that each face of the cube displays a specific number that corresponds to the same number in the 2D UV map of the cube.

The next few pages provide a basic introduction to UV Mapping in Blender and then take you through the process of unwrapping each of the lowpoly counterparts of the character. You may wonder why unwrapping the highpoly versions is not covered here. This is because you'll use UV Mapping as a means of creating normal maps in the next chapter. If you are unfamiliar with normal maps, then hang tight, you'll get there shortly. For the time being, let's start with a rundown of Blender's UV tools.

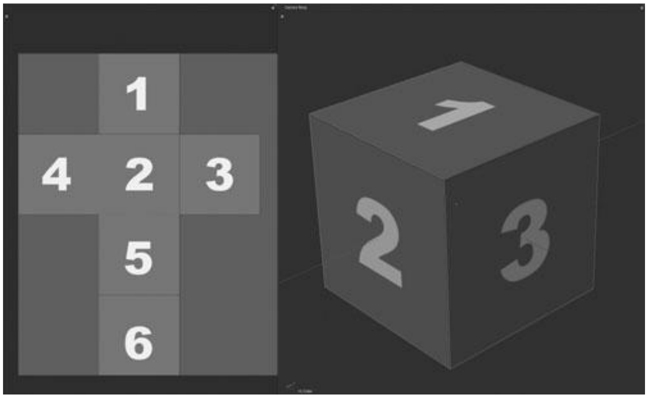

Figure 15.1
UV Mapping example

UV Mapping Basics

UV Mapping in Blender works by using both the 3D Viewport in Edit Mode and the UV/Image Editor window, as shown in Figure 15.2. A common workflow is to split the main Viewport into two sections, one side displaying the UV/Image Editor and the other showing the 3D Viewport, as shown in Figure 15.3.

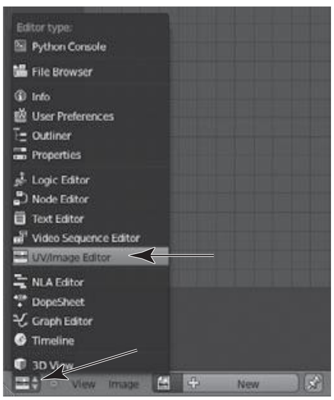

Figure 15.2
UV/Image Editor

Unwrapping a mesh in Blender is quite easy; you select the faces you want to unwrap in Edit Mode and then press U > Unwrap, as shown in Figure 15.4. When using the default cube, this Unwrap command results in Figure 15.5.

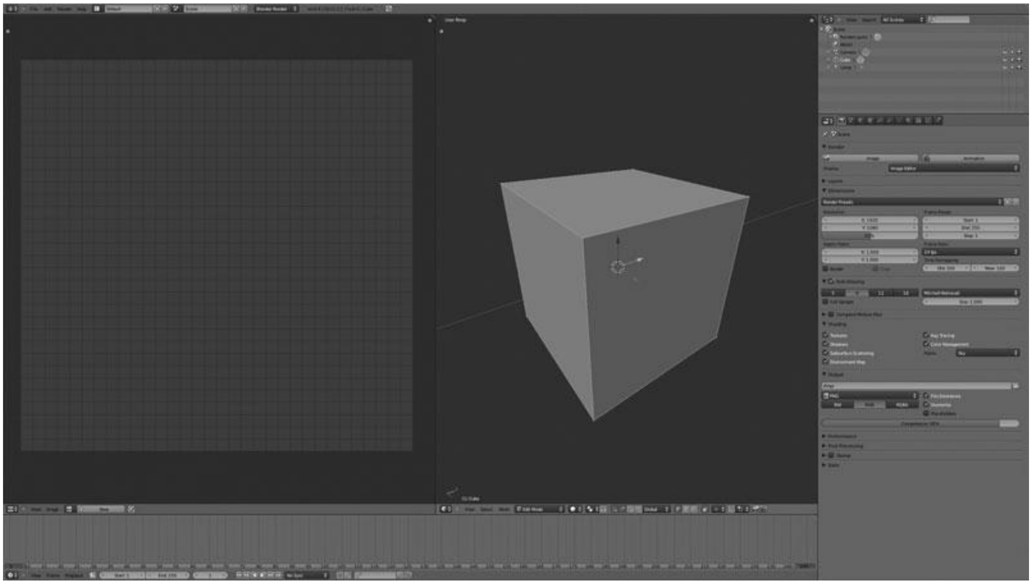

Figure 15.3
Split workspace with both UV/Image Editor and 3D Viewport

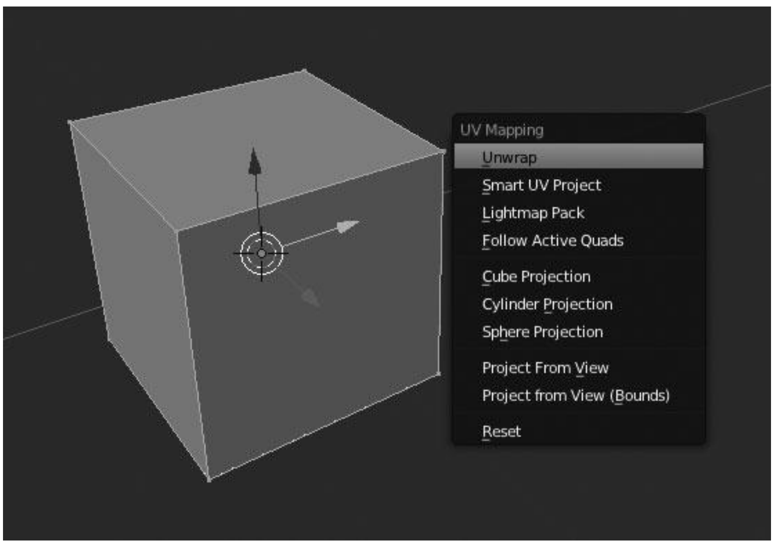

Figure 15.4
Unwrap menu

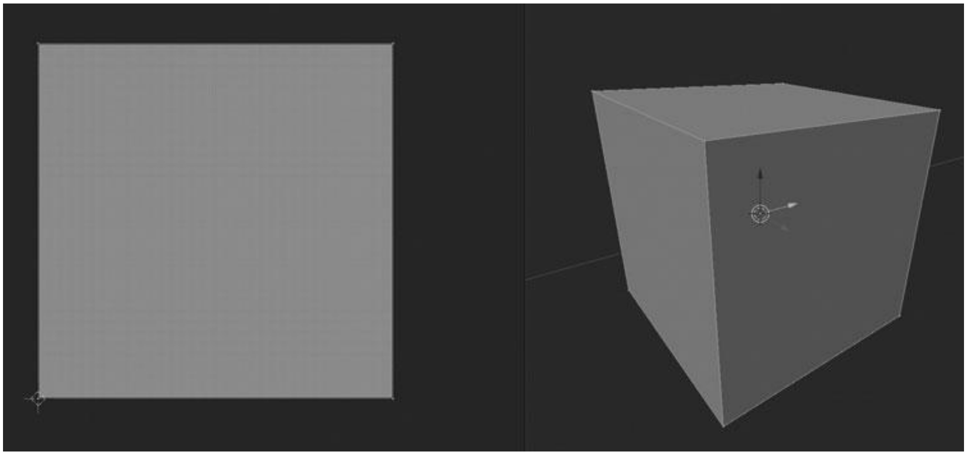

Figure 15.5
Unwrapped cube using the Unwrap command

Note

You may notice that there are several more options beyond just the Unwrap command; these each allow you to unwrap the mesh using different algorithms. However, I will not be looking at these in this book, as their use is mostly restricted to specific cases. The Unwrap option is what you will use most of the time.

At this point, after unwrapping, you can apply any image of your choosing to the UVs by choosing Image > Open. You may also generate an image right inside Blender by pressing Add New. Generating an image will allow you to create a basic grid pattern that is perfect for demonstration purposes. Choosing this grid pattern is just a matter of choosing Add New > UV Test Grid, and then clicking OK, as shown in Figure 15.6.

After adding the grid image, you would expect the image to immediately be displayed on the mesh in the 3D Viewport; however, there is one more step to do. To display the applied image in the Viewport you must press N to bring up the Viewport Properties panel and then enable Textured Solid under the Display category. See Figure 15.7.

Currently, you will notice that all of the faces are stacked on top of one another in the UV/Image Editor, resulting in each face of the cube displaying an identical part of the image. Except for occasional cases, this is not ideal. Instead what is

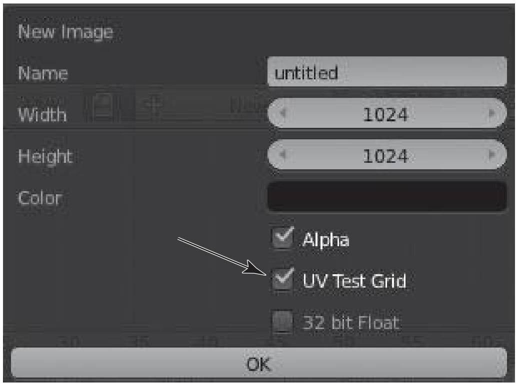

Figure 15.6
Adding a UV test grid

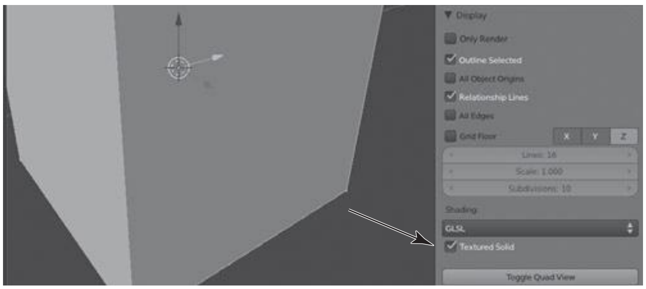

Figure 15.7
Textured Solid option

needed is a way to control where and how each face of the cube is unwrapped in the UV space; this is done by using *seams*.

Using Seams for Control

The Seams tool is used when UV Mapping allows you to designate lines where the mesh is split apart. It behaves exactly like seams in actual clothing, which is also a very good way to think about it going forward as it will help you understand the process. Setting seams on a mesh is just a matter of selecting the edges where you want the mesh to be split and then pressing Ctrl+E > Mark Seam or pressing the Mark Seam button in the toolbar. See Figure 15.8.

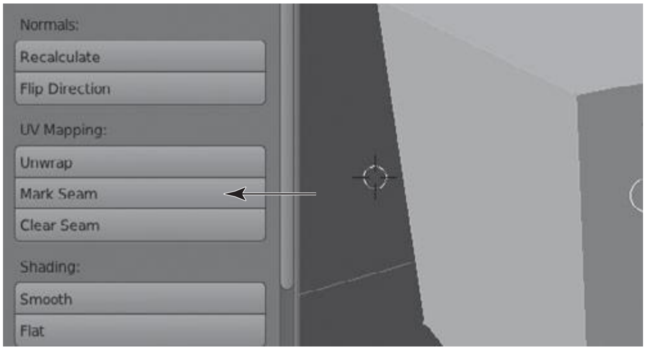

Figure 15.8
The Mark Seam tool

The most difficult part of using seams is understanding where to put them, which is why I stress the idea of thinking of your mesh as if it were a fabric pattern. The seams on your mesh should be placed where the fabric pattern would come together.

In order to demonstrate how seams work better, let's go back to the default cube. Currently, you have a cube that is unwrapped but each face shows an identical image. In order to fix this, you can add a seam to each of the edges indicated in Figure 15.9.

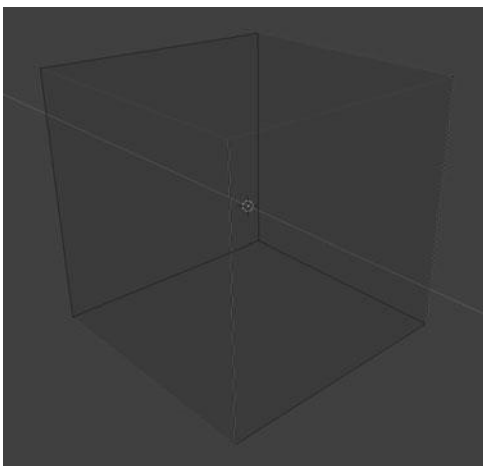

Figure 15.9
Adding seams to edges of the cube

After adding the seams, you can unwrap the UVs with U > Unwrap. The UV/Image Editor should now show the UVs laid out as a perfect cross; this is exactly what you need. With this cross layout, you can easily map any kind of image to the cube without fear of overlapping.

This is the basic process of UV Mapping. When working with simple objects, the task really is not too bad when you have a general understanding of the process. This leads to the next task—unwrapping the character.

Unwrapping the Character

Before you get started on unwrapping the character, I want to assure you that this really will not be that much different from unwrapping the cube. It is simply a matter of placing the seams appropriately. I will walk you through the process and show you where you should place each and every seam. You'll start with the head. However, before you start, you should hide all of the highpoly meshes from the Viewport so that you can narrow your focus exclusively to the meshes that need unwrapping. You can see each of the meshes you will unwrap in Figure 15.10; they are all the lowpoly meshes that you retopo'ed in Chapter 12. You will also apply the Mirror Modifiers on all the lowpoly meshes; when unwrapping, you generally need to work with a whole mesh.

After going through and unwrapping each mesh, you then need to go back and join several of the objects together and organize the UVs into a single set. This will allow you to use fewer normal maps in the next chapter.

Unwrapping the Head

The first step on the head is to add an initial seam and then unwrap. You will work by adding a single seam and then checking the unwrap for distortion. If there is distortion, generally indicated by variations in the size of the test grid when displayed on the model, then you'll need to add a second seam and unwrap again. You do this until the unwrapped UVs show an evenly distributed test grid. Ideally, each of the unwrapped faces should be the same size as the original faces in 3D, particularly relative to the adjacent faces.

Figure 15.10
Lowpoly meshes to be unwrapped

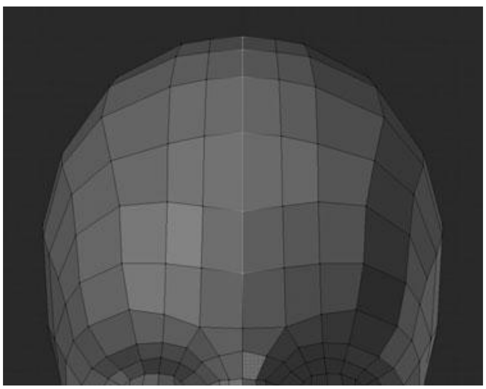

Figure 15.11
Seam up the forehead and over the top of the head

You can start by adding a seam that starts at the forehead and then travels all the way down the back of the head to the bottom of the neck. See Figures 15.11 and 15.12.

After setting the seam and unwrapping, you're left with something similar to Figure 15.13. You should notice that the UVs that represent the neck and chest

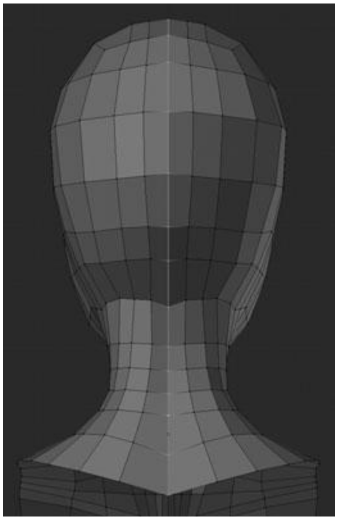

Figure 15.12
Seam down the back of the head

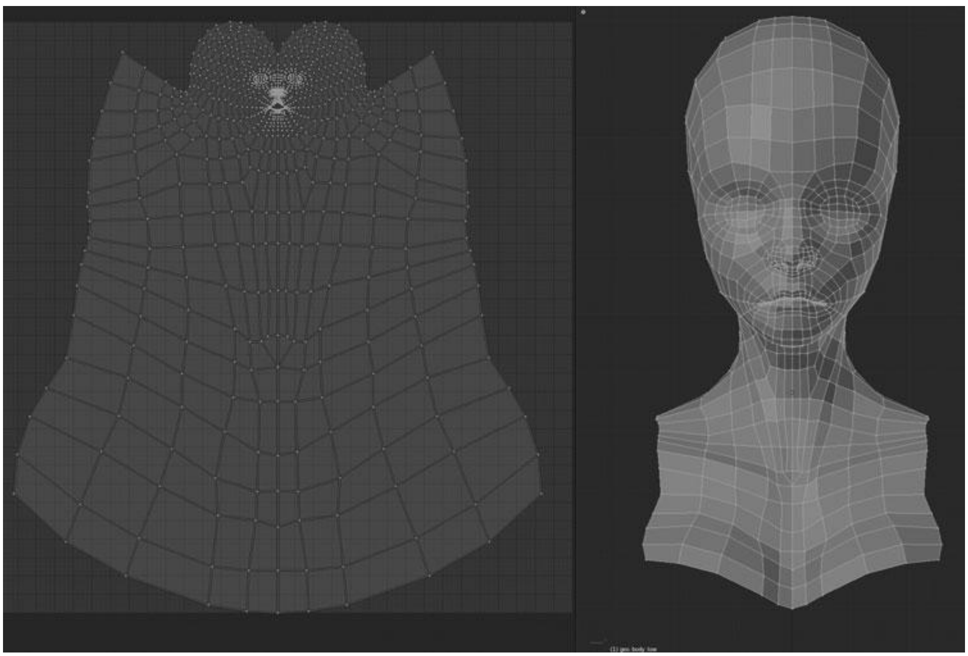

Figure 15.13
Unwrap result after the first seam

are significantly larger than the UVs of the face and remaining head. This is a clear indication that you need to add more seams.

The new seam you will add is right across the brows, as shown in Figure 15.14. After unwrapping, you're left with Figure 15.15.

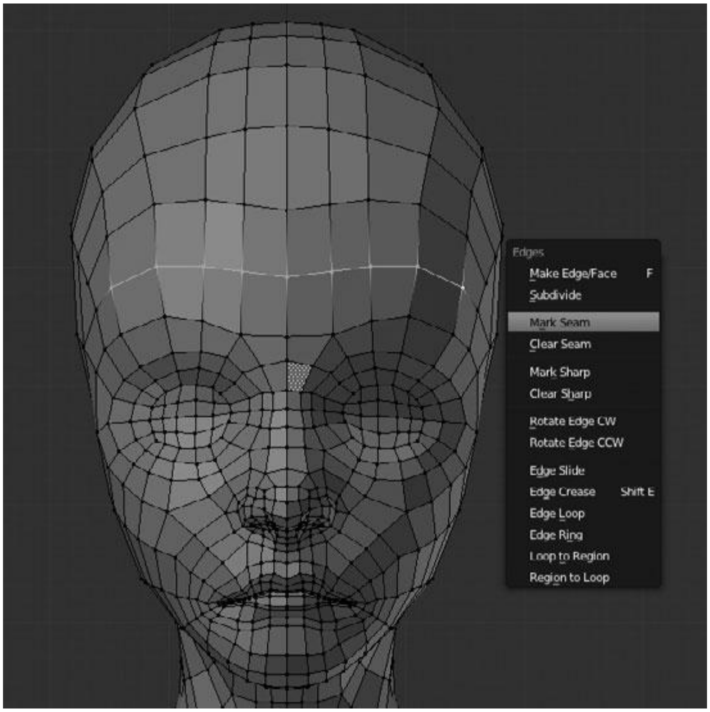

Figure 15.14
Seam across the brows

You can see that it looks a lot more evenly distributed but it is still not quite there. If you were to apply a test grid right now, there would still be some size variation across the face and neck. However, you can remove some of this variation by adding another seam at the back of the head. See Figure 15.16. This seam, and the one across the forehead, allow the head to unwrap in a much more natural way. Remember, you are trying to take a roughly

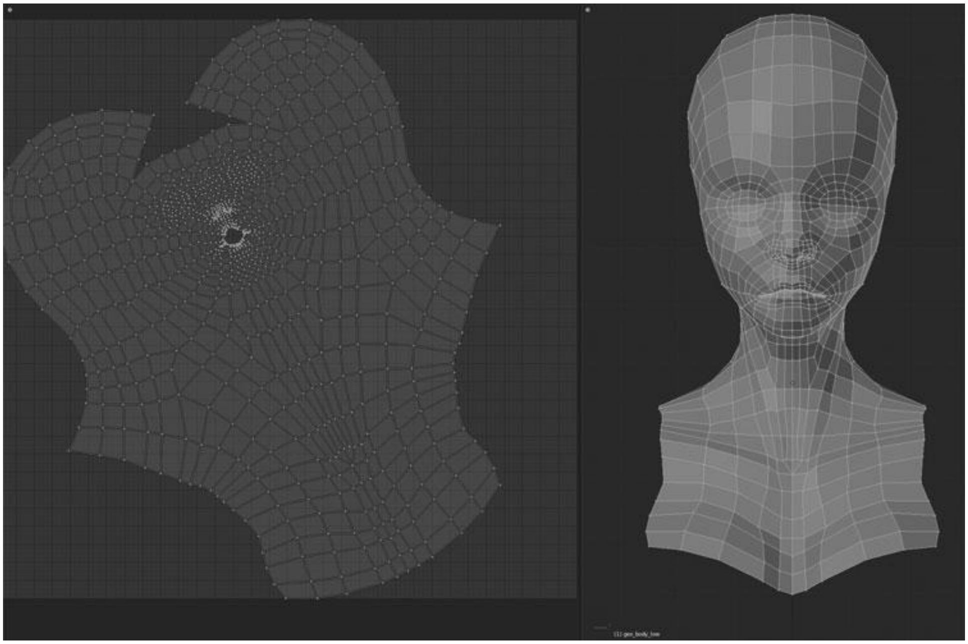

Figure 15.15
Result after unwrapping with second seam

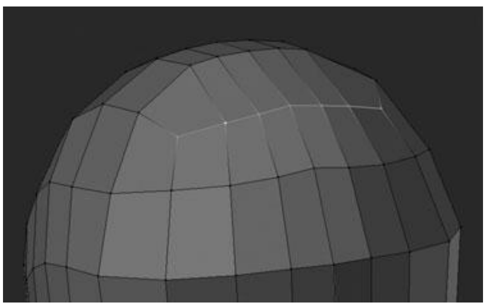

Figure 15.16
Adding a seam to the top of the head at the back

spherical form and lay it out flat. It has to be split in a few places or it will never lie flat.

The unwrapped result from that last seam can be seen in Figure 15.17. The head is now completely unwrapped and so you can move on to the hair.

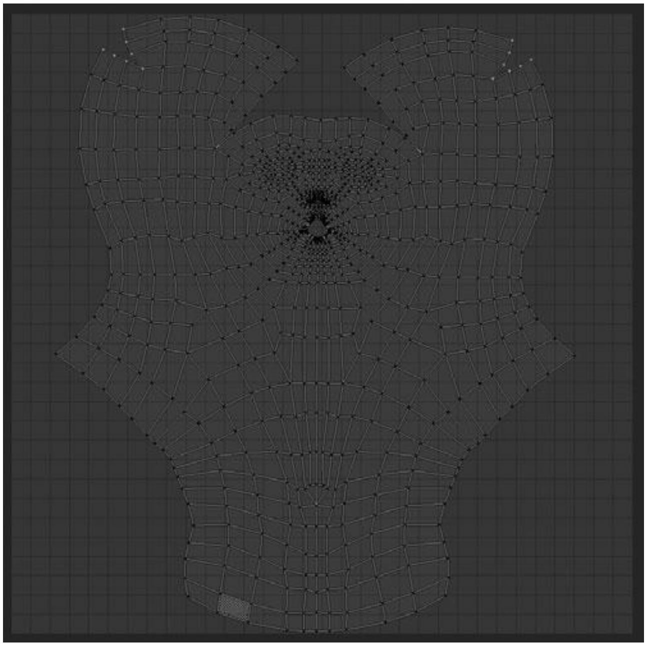

Figure 15.17
Result after adding the third seam

Unwrapping the Hair

A good way to start unwrapping any mesh is to first see what it looks like without any seams. This can give you a basic idea about where you need to add seams—by looking at the distorted areas. In the case of the hair, the unwrap looks like Figure 15.18 before adding any seams.

Note

> You can better see the distortion on UVs by pressing N to bring up the properties panel and enabling the Stretch option. This option will color all the UVs, with blue representing no stretch and red representing complete stretching. The shades of green and yellow are low to medium stretching.

You can add the first seam to the hair in between the major clumps on the left side, as shown in Figure 15.19.

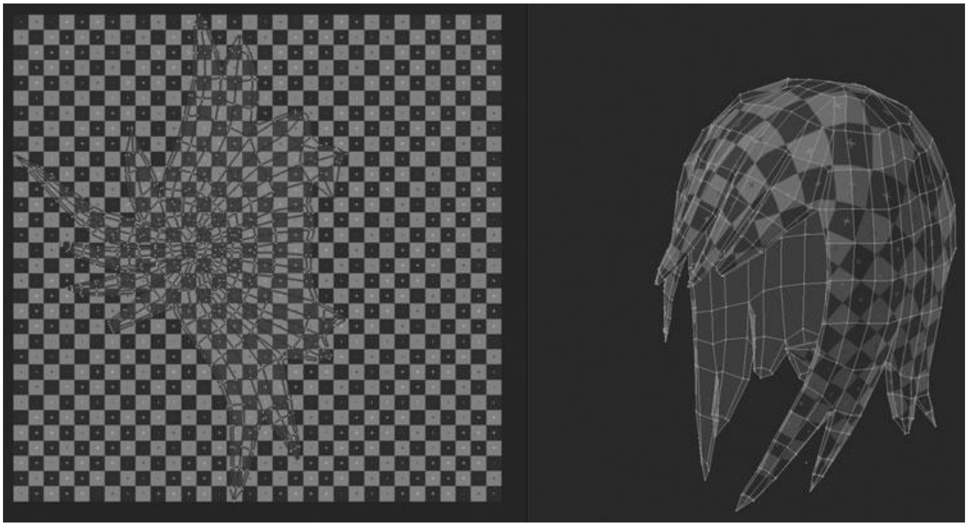

Figure 15.18
Initial result of unwrapping the hair with no seams

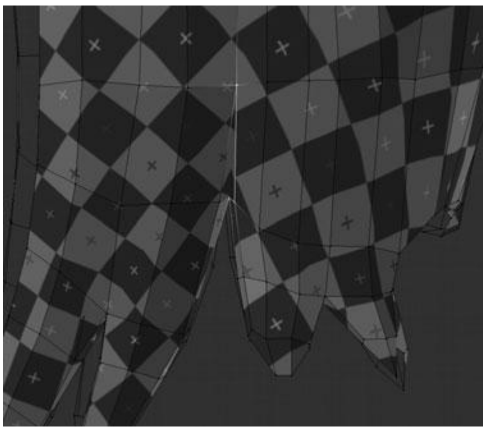

Figure 15.19
Adding a seam to the left side of the hair

Then add another in roughly the same place on the other side, as shown in Figure 15.20. Notice that you're only adding a seam to the first few edges up from the bottom; this will allow the mesh to just barely split apart.

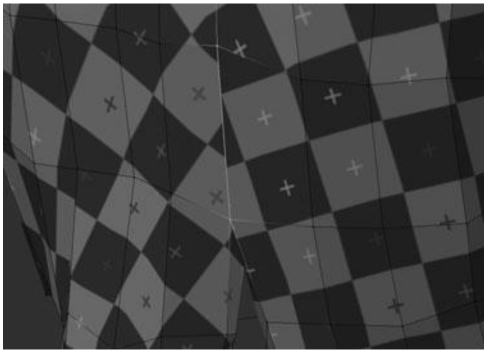

Figure 15.20
Adding a seam to the right side of the hair

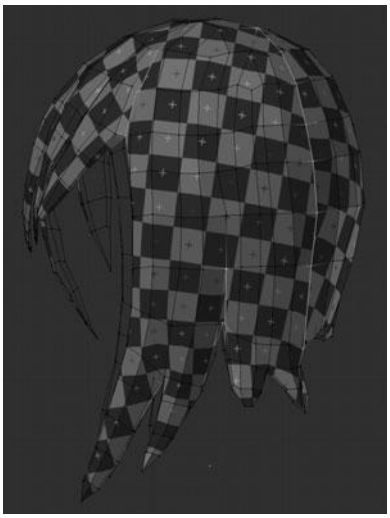

Figure 15.21
Adding a seam to the front and back on the left

Next, add two more seams to each side, one in the front and another all the way down the back. See Figures 15.21 and 15.22.

The final result from all of these seams is shown unwrapped in Figure 15.23.

This finishes the hair and so you can move on to the shirt and the coat.

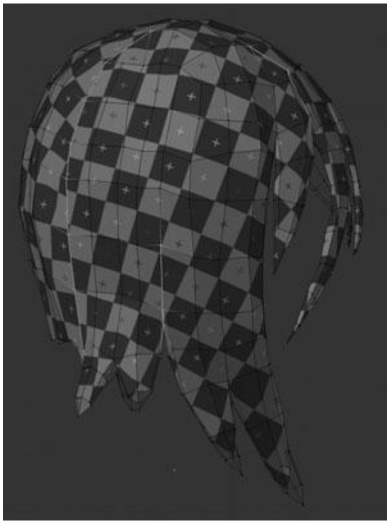

Figure 15.22
Adding a seam to the front and back on the right

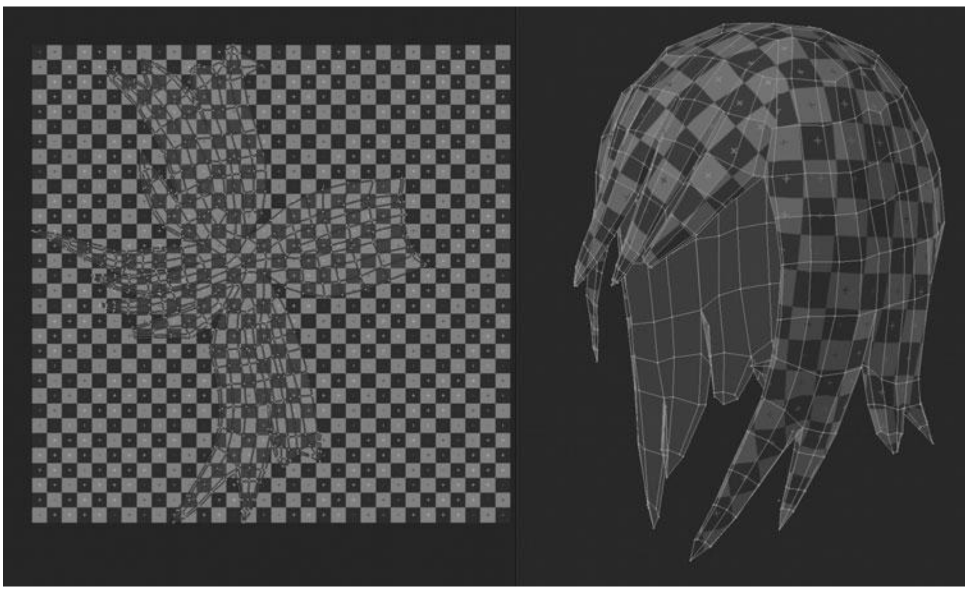

Figure 15.23
Final unwrapped result after adding seams

Unwrapping the Shirt and Coat

With both the head and the hair out of the way, the remaining pieces are quite simple. The only mesh that poses any kind of a challenge is the boots, but I will get to that in a moment.

The coat requires only a single seam on each side, right across the top of the shoulder and down the collar, as shown in Figure 15.24.

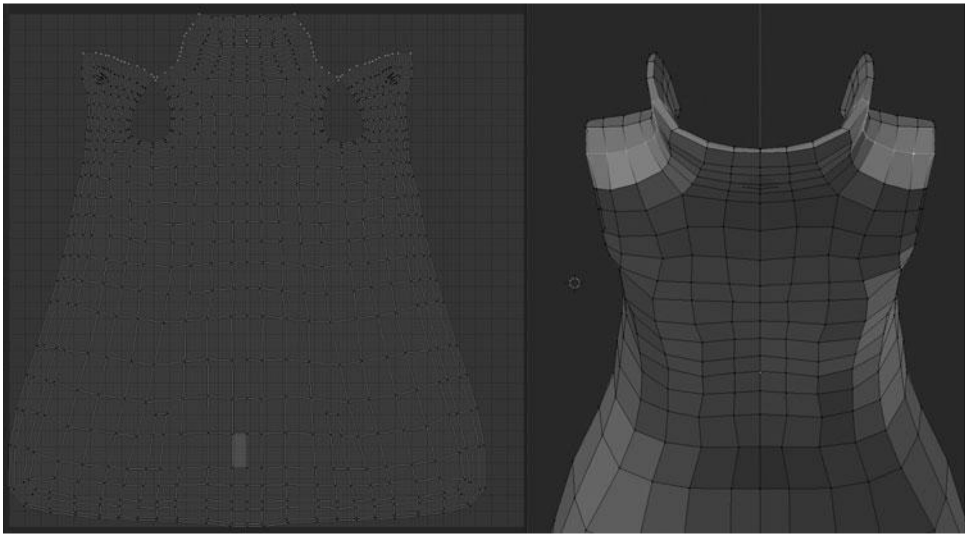

Figure 15.24
Adding a seam across the shoulder of the coat and unwrapping

The shirt is similarly simple, but requires one additional seam. You need two seams across the shoulders, and then a third seam straight down the center of the back, as shown in Figure 15.25.

That is it; very easy. It is now time for the pants and the boots.

Unwrapping the Pants and Boots

The pants are similarly quite simple; they require only a single seam down the inside of the leg, as shown in Figure 15.26. In this case, the seam could be placed anywhere around the pants, but it is best to place seams where they will be less visible. This is because sometimes artifacts are caused by the seam; these will

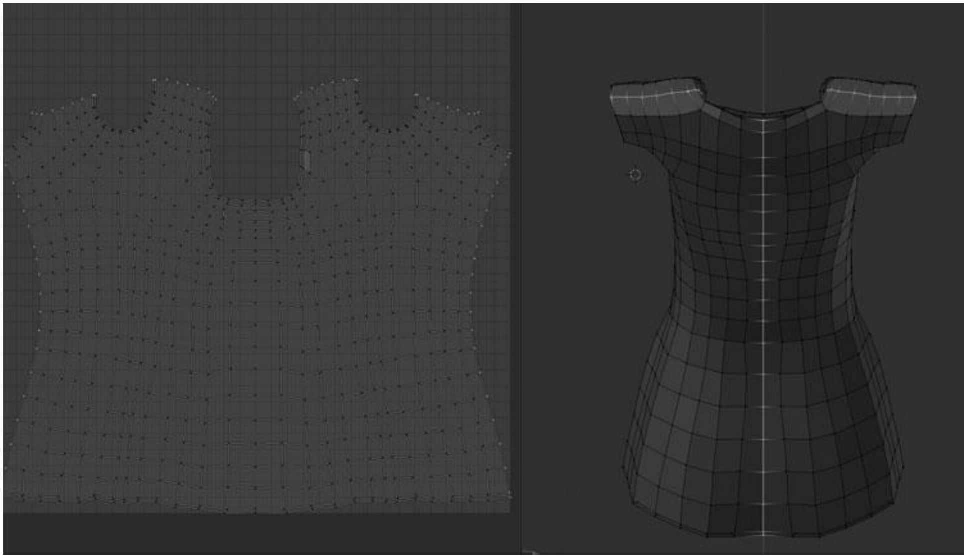

Figure 15.25
Adding seams to the shirt and unwrapping

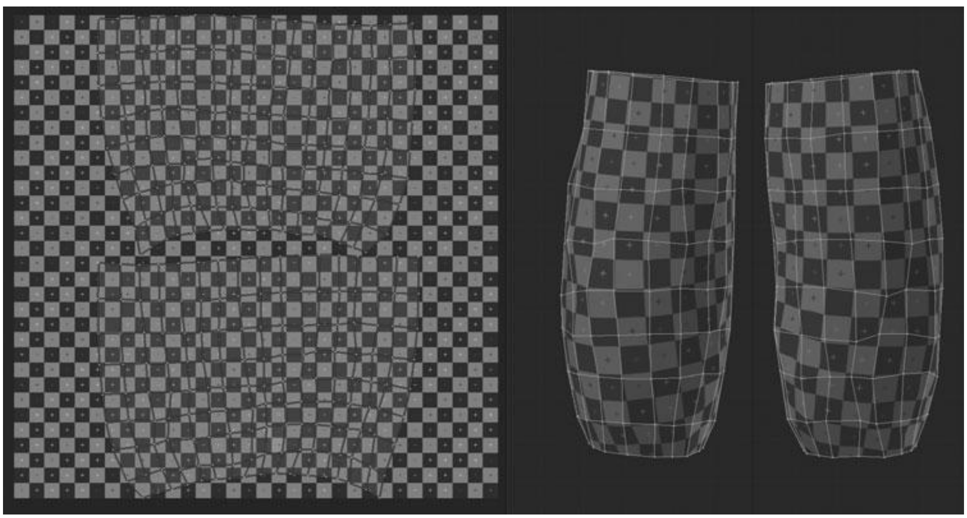

Figure 15.26
Adding a seam and unwrapping the pants

show during render time. It can also be difficult to make textures line up perfectly at seams.

For the boots, you should add a seam all the way down the back, and around about 70 percent of the sole, as shown in Figures 15.27 and 15.28.

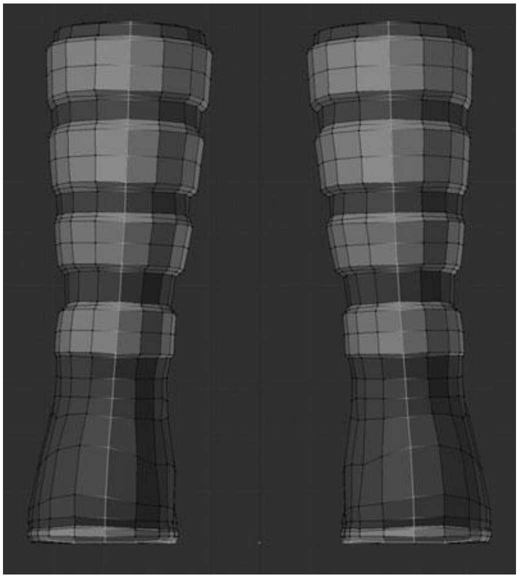

Figure 15.27
Adding a seam down the back of the boot

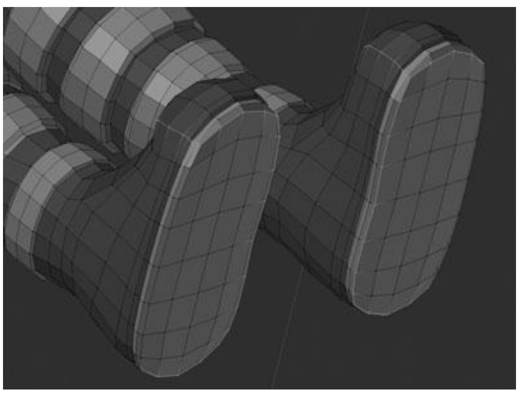

Figure 15.28
Adding a seam around the sole of the boot

Leaving a gap in the seam on the side of the sole will cause the surface of the sole to flip out nicely. You should also add a seam on each side of the toe that starts at the sole and goes up to the top of the toe. See Figure 15.29.

These seams will allow you to unwrap the boot cleanly with little distortion, as shown in Figure 15.30.

This leaves you ready to unwrap the arms, armbands, and gloves.

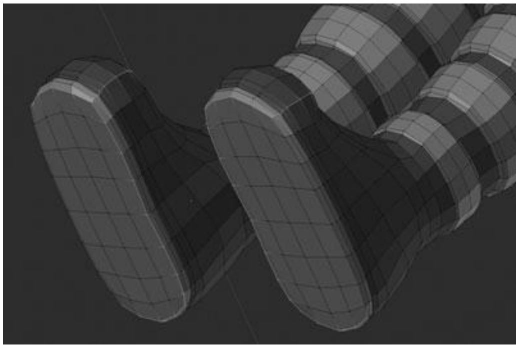

Figure 15.29
Adding seams up the toe

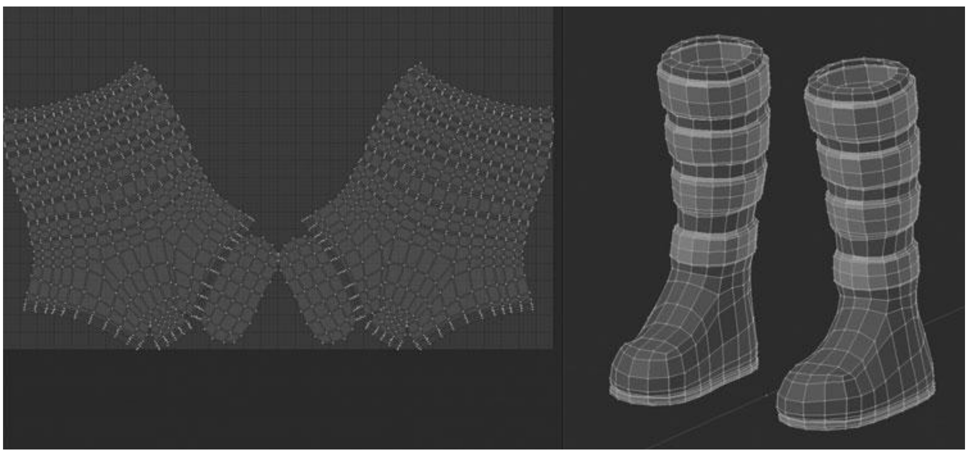

Figure 15.30
Unwrapped result for the boots

Unwrapping the Arms, Armbands, and Gloves

Just like the pants, the arms require only a single seam. This seam can be placed anywhere, but I encourage you to place it on the underside of the arm, as it is less likely to be noticed if there are any misalignments. The arm after unwrapping is shown in Figure 15.31.

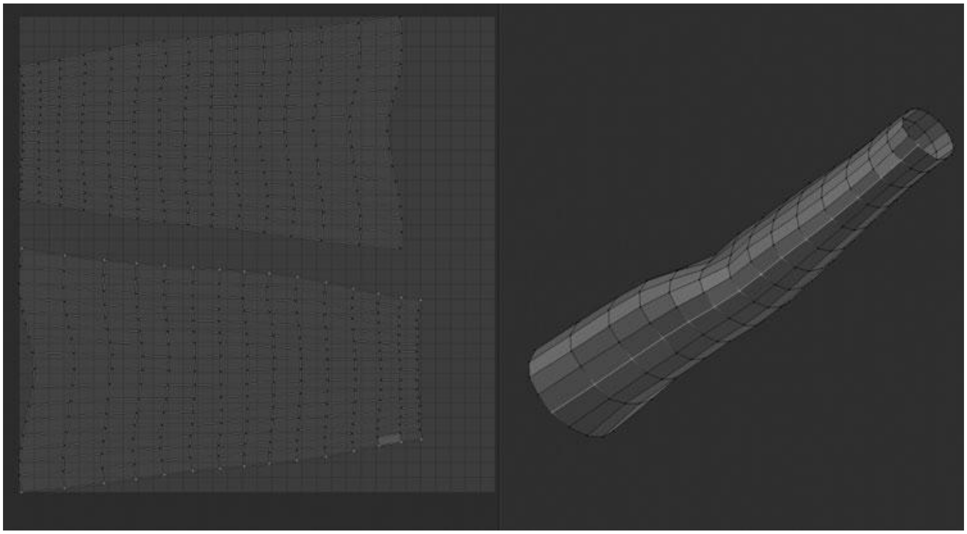

Figure 15.31
Unwrapping the arm

Next up, the armband also requires only a single seam due to the mesh only completing a full circle on the inner side. You can add the seam directly across the right side of the armband on the backside, as shown in Figure 15.32.

The gloves are similar to the sole of the boot. You leave one side of the glove whole, allowing it fold out. This gap in the seam basically acts like a hinge. Add the seam straight through the middle of the glove, parallel to the fingers, as shown in Figures 15.33 through 15.35.

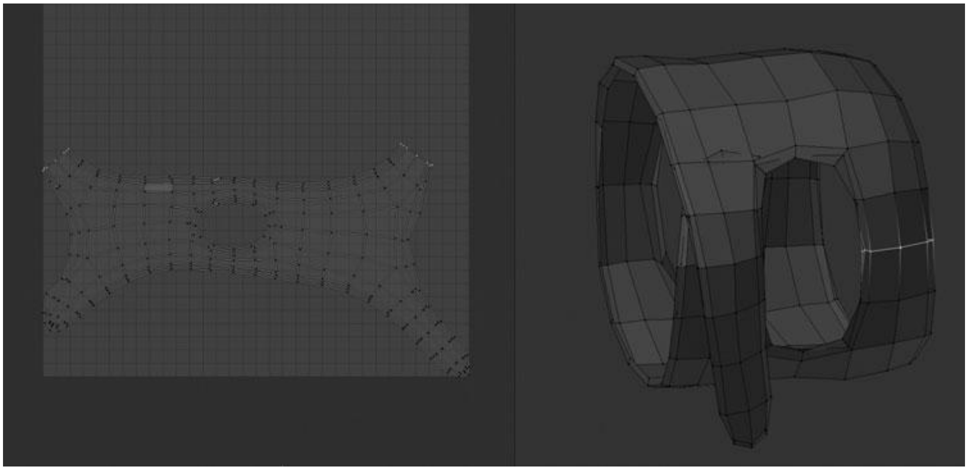

Figure 15.32
Unwrapping the armband

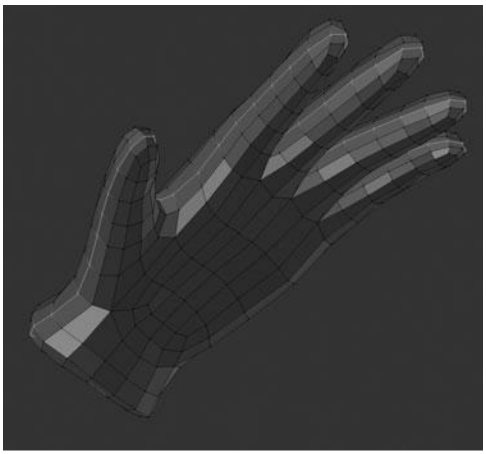

Figure 15.33
Adding a seam through the center of the glove

The unwrapping process is now finished. All that is left is to combine several of the objects and organize their UVs so they don't overlap. Doing this will also let you scale the UVs appropriately to make the test grid a roughly even scale throughout.

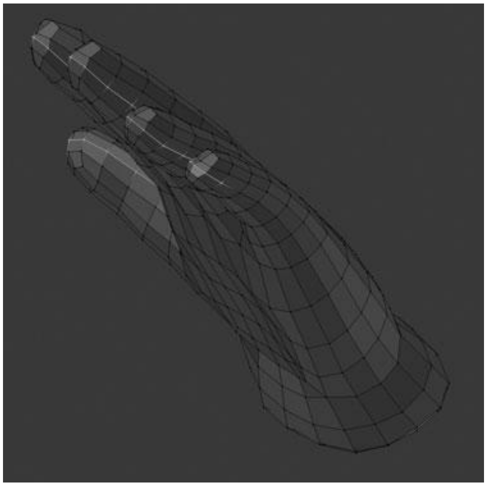

Figure 15.34
Leaving a gap in the seam for the glove

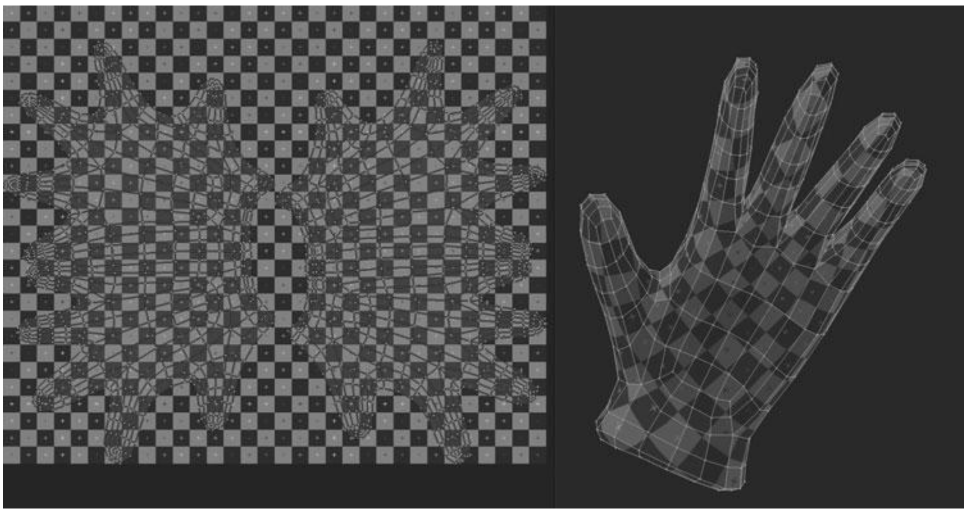

Figure 15.35
Unwrapping the glove

Combining and Organizing the UVs

As just mentioned, you need to join some of the UVs together and then organize them to fit within a single UV space. However, before you do that, you need to think about which pieces can be joined. This is determined, essentially, by which pieces touch. In order to create the normal maps accurately, without them bleeding over onto one another, you need to separate them based on their proximity to other objects. This means that the coat and shirt must be separate objects, since they overlap each other. The coat also hangs over the pants and so it should be separate from them. In the end, it's probably best to keep the coat, shirt, and head as individual objects. The remaining pieces—the boots, pants, armbands, gloves, and hair—are either distanced from each other or fit together perfectly so that you can join them together without causing problems with the normal maps.

To join these pieces, select them all in Object Mode and then press Ctrl+J or choose it from the toolbar. The pieces should go from being separated, as in Figure 15.36, to joined, as in Figure 15.37. This means that when you enter Edit Mode on them, they are all part of the same object.

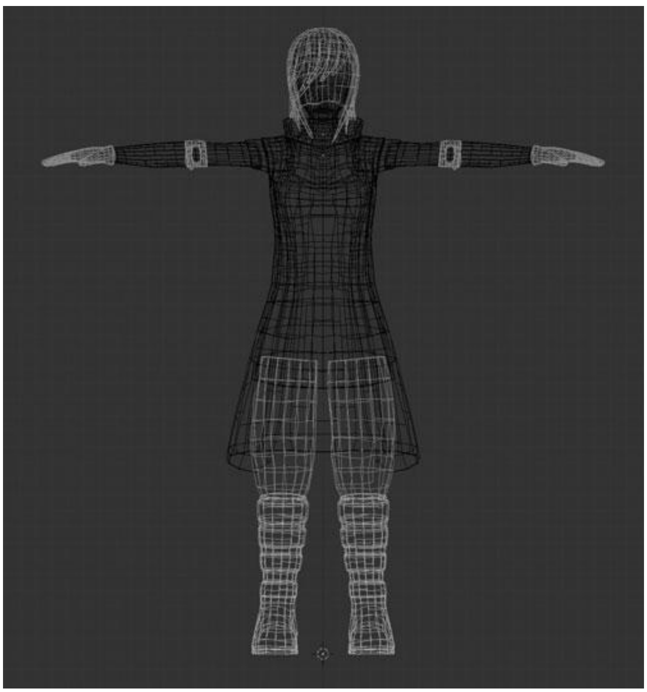

Figure 15.36
Selected pieces shown separated

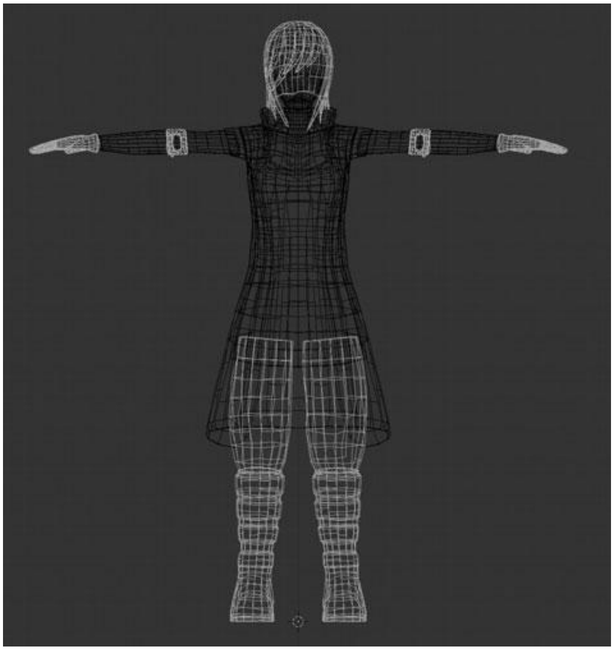

Figure 15.37
Separated pieces shown joined

This process has also combined their UVs, as shown in Figure 15.38.

Obviously, the UVs are a total mess now, but this can easily be fixed. In order to restore some sense of sanity to the UVs, you need to do three things. First, you must average out their sizes to ensure that the relative scale between the UVs and the original faces is the same across all the UV pieces, or *islands* as they are referred to. You do this by choosing UVs > Average Islands Scale. Then you need to use the UVs > Pack Islands command to fit all of the islands into the UV editor space, as shown in Figure 15.39.

After using the Pack command, you could call it done, but the UVs are still not organized very well, making it more difficult to tell what is what. It's better to have all the UVs laid out so that both boots are together, both gloves are together, and so on. You can do this by selecting an island at a time and then moving and rotating them into place. The result after doing this with each island can be seen in Figure 15.40.

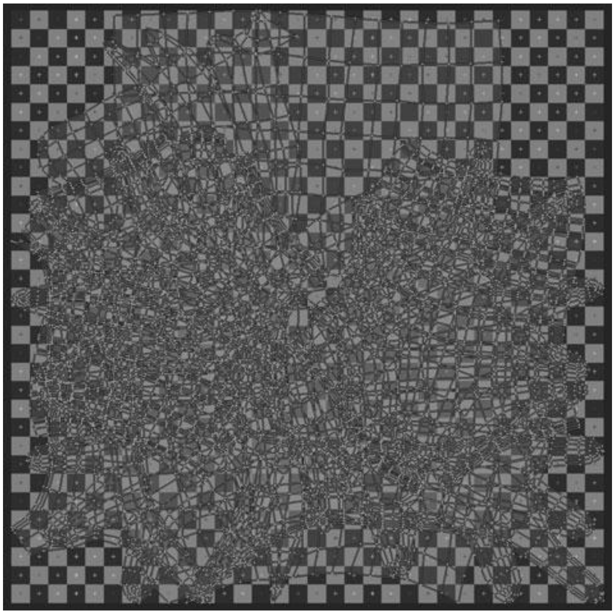

Figure 15.38
Combined UVs of the joined pieces

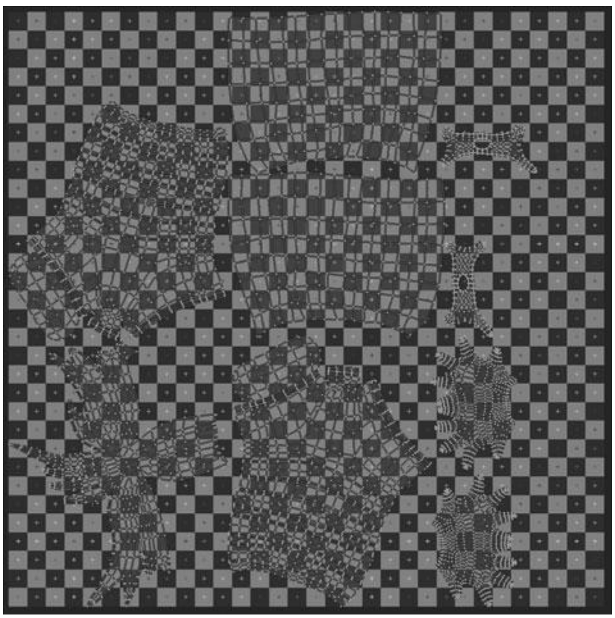

Figure 15.39
Averaging the island scale and packing the UVs

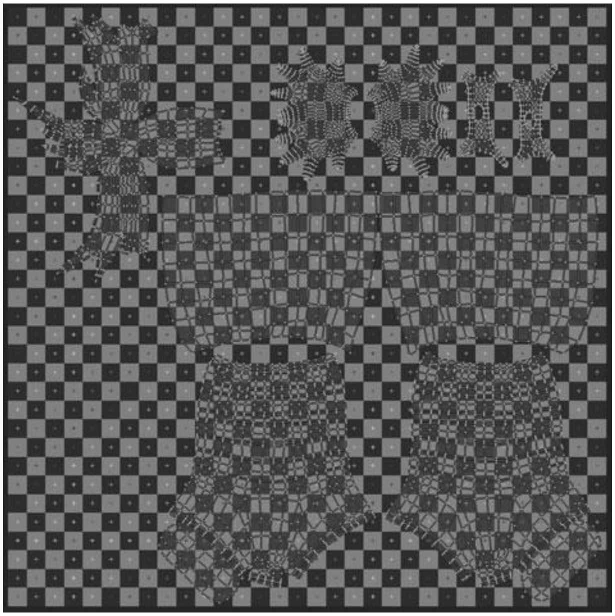

Figure 15.40
Organizing the UV islands

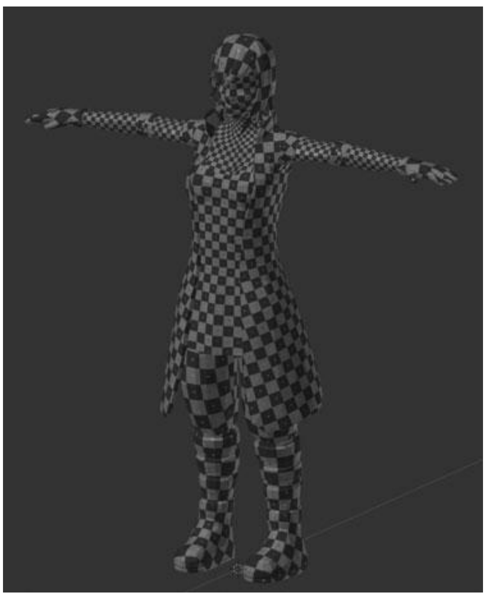

Figure 15.41
Final result after unwrapping the whole character

Summary

You are now finished with all the UV unwrapping. This chapter started by showing you the raw basics of UV Mapping, using the default cube. Using this cube, you learned how to unwrap the UVs and then use seams for extra control. After this basic intro, you learned how to apply these skills to unwrapping the character. You're now ready to move on to the next chapter to take a look at textures and normal maps.

The final character, with a test grid applied to all UVs, can be seen in Figure 15.41.

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Chapter 16

Using Normal Mapping

Recall that in Chapter 12, you spent a fair bit of time retopologizing several parts of the character in order to create lowpoly versions of the meshes. This chapter will go back to those and finish the process they are mostly used for, which is called *normal mapping*.

Normal mapping is the technique in which you can take a highpoly and lowpoly version of the same model and then project the details of the highpoly onto the lowpoly. Or more accurately, you can project the shading information of the highpoly surface onto the UVs of the lowpoly surface. This allows you to effectively fake the details in order to save render time and to make posing the character much easier with hardly any loss of detail. You can see the final result of this chapter in Figures 16.1 and 16.2. Notice that one displays a render with the original highpoly mesh and the other displays a render of the lowpoly meshes.

The way this normal mapping works is by using the Baking tools in Blender to project, or bake, the details from one mesh to the other. This chapter covers the steps necessary to bake these normal maps and then shows you how to apply them through the use of image textures. Let's start by baking the normal maps.

Figure 16.1
Render of the highpoly character

Baking the Normal Maps

The baking process is relatively easy, as long as the prerequisite steps are complete. These steps are:

- Model the highpoly mesh
- Retopologize the highpoly mesh to create the lowpoly mesh
- UV unwrap the lowpoly mesh

You have already completed these steps in the previous chapters. When doing your own normal maps, if you have not completed these steps, the baking process will be unsuccessful.

In order to bake the normal maps, you need to do two things to each of the lowpoly meshes. You need to set the shading to Smooth and to assign a new image of appropriate size to the UVs.

Figure 16.2
Render of the lowpoly character using normal maps

You'll start by working on the head to learn each of these steps.

Baking the Head

To get started on baking the normal maps for the head, you must first select the lowpoly mesh and set the shading to smooth from the toolbar. Next, enter Edit Mode and then choose Image > Add New in the UV/Image Editor. At the prompt, set the name to head_normal and then press OK, as shown in Figure 16.3. The default 1024 × 1024 is fine for this normal map, on others you should use 2048 × 2048 to better fit all the details.

Now that you have an image created and assigned, you can move on to the baking process. The first thing to do is select the highpoly mesh in Object Mode and then add the lowpoly mesh to the selection by pressing Shift+RMB. Ensure that the lowpoly is the active selection. See Figure 16.4.

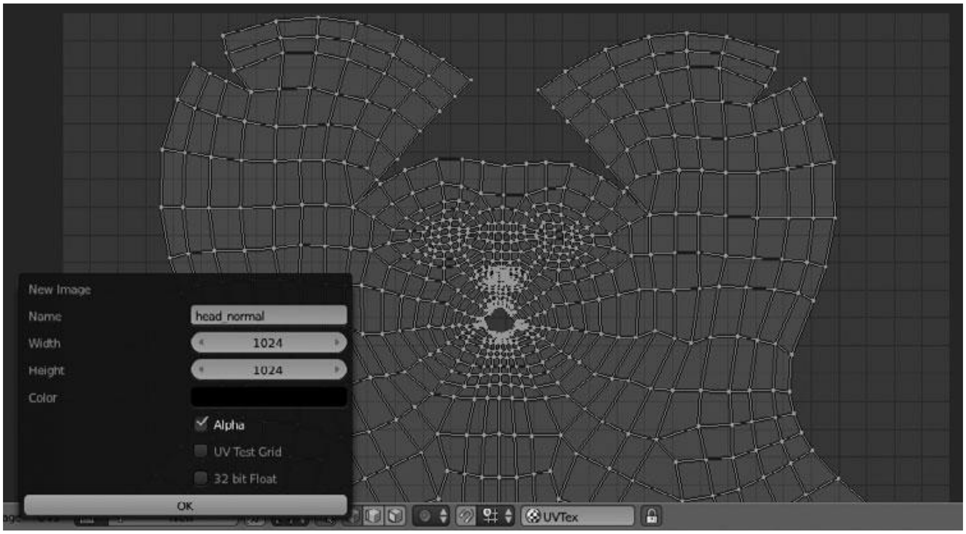

Figure 16.3
Adding a new image to the UV/Image Editor

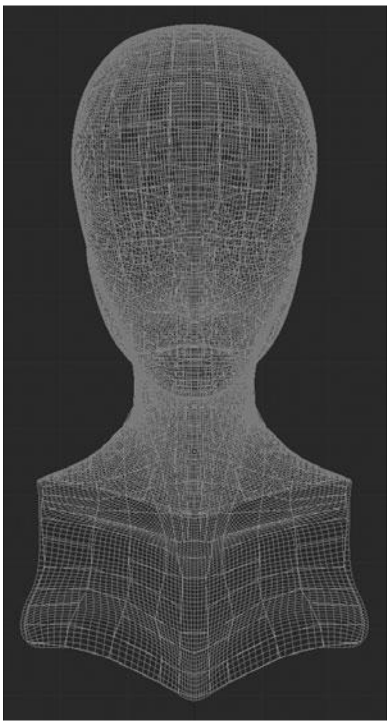

Figure 16.4
Selecting both the highpoly and lowpoly head objects

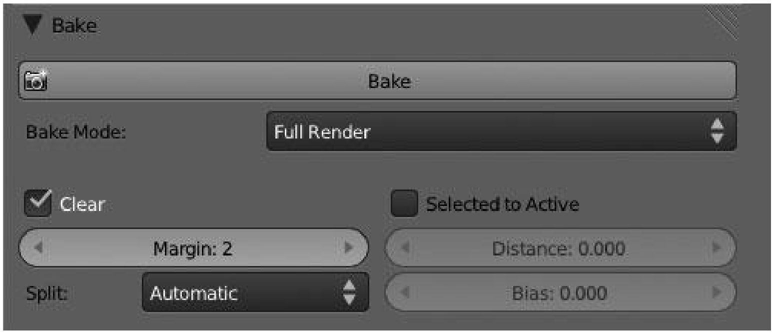

Figure 16.5
Bake panel of the Render properties

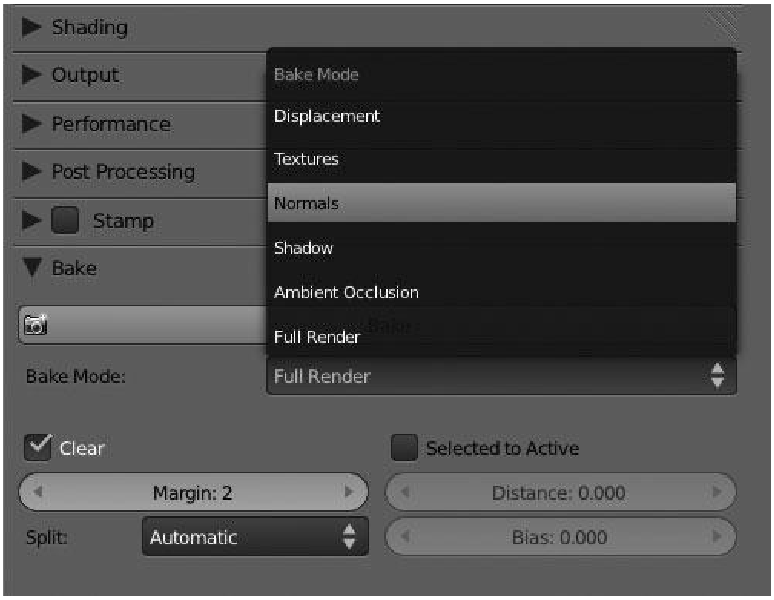

Figure 16.6
Changing the Bake Mode to Normals

Next, open the Render Properties and scroll down to the Bake tab, as shown in Figure 16.5. On this tab, change the Bake Mode to Normals, as shown in Figure 16.6, and then enable the Selected to Active option. This option tells Blender to project the details of the highpoly mesh onto the lowpoly mesh. Remember, the lowpoly mesh should always be the active, or last selected, object. Now you can just click the Bake button to start the baking process.

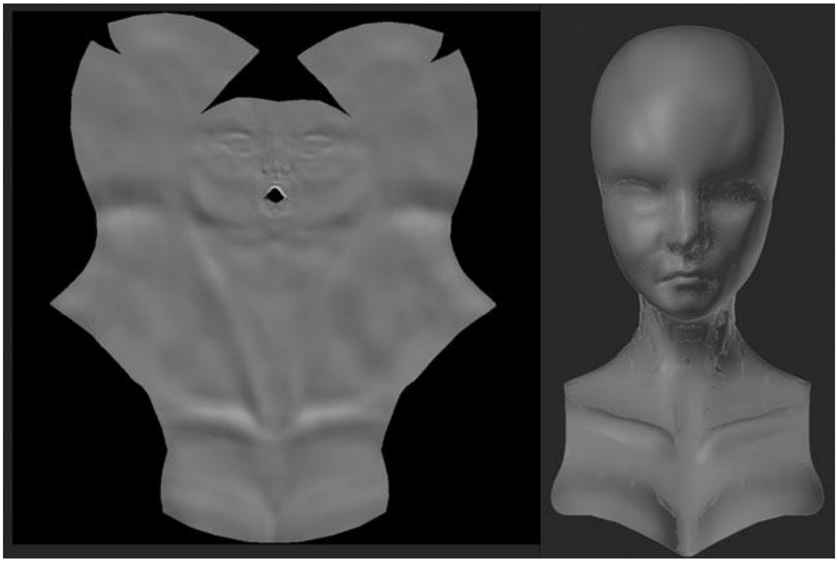

Figure 16.7
Baked normal map displayed in the UV/Image Editor

A progress bar will appear at the top of the screen. Once it's complete, the baked normal map will show up in the UV/Image Editor. See Figure 16.7.

The normal map should look like a blue and purple, flattened version of the mesh, matching the UVs. You should even be able to pick out specific details. That is it; the normal map is baked. The last step is to save the normal map to an image by choosing Image > Save Image As from the UV/Image Editor and then designating a name and location on the hard drive. If you do not save the image, the next time you open the .blend file the normal map will be gone.

You are not yet ready to render the normal map, as you still have to apply it to the model. Before you learn to do that, though, let's go on to bake the remaining maps.

Baking the Hair

In the previous chapter, you joined the hair to several of the other objects, including the pants, boots, and gloves. Unfortunately, I was slightly shortsighted and failed to test that everything would bake correctly on the normal map with all of the objects joined. However, this is a good time to remedy that. You'll learn why this is a problem in just a moment. First you need to separate the hair.

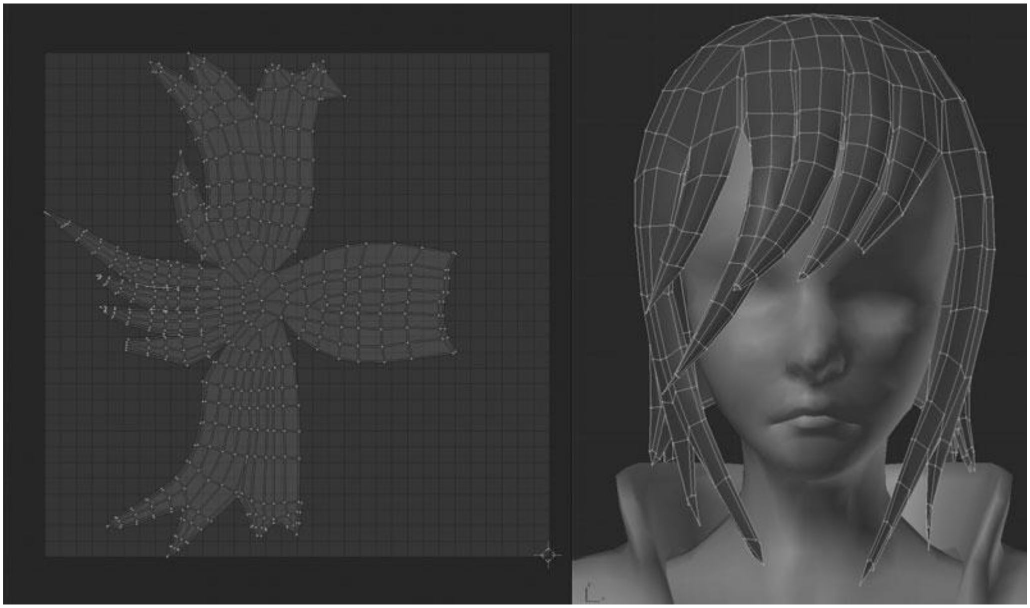

Figure 16.8
Separated and reorganized UVs for the hair

Separating the hair, as you should remember, is just a matter of selecting it in Edit Mode and then choosing P > Separate Selection. After separating the hair, it is also necessary to reorganize the UVs for the hair and the other objects, or extras as I refer to them from now on. Using the techniques from the previous chapter, your reorganized UVs for the hair and the extras can be seen in Figures 16.8 and 16.9.

Now that the hair is its own object once again, you can repeat the baking process used on the head. First, add a new image to the hair UVs and name it appropriately, then select both hair meshes in Object Mode, leaving the lowpoly hair as the active selection. Then click Bake. The resulting normal map can be seen in Figure 16.10.

As you may notice, there is a problem. Parts of the normal map seem to be inverted, showing a bright green. This means that those parts of the highpoly mesh are being projected from the opposite side of the rest of the mesh. Basically some parts of the lowpoly are receiving the inside of the highpoly mesh and some parts are receiving the outside of the highpoly mesh. However, this can be fixed by adjusting the Bias option, as shown in Figure 16.11.

As the tooltip indicates, this option provides a “Bias towards faces further away from the object (in Blender Units).” This option makes sure that all faces are projected accurately.

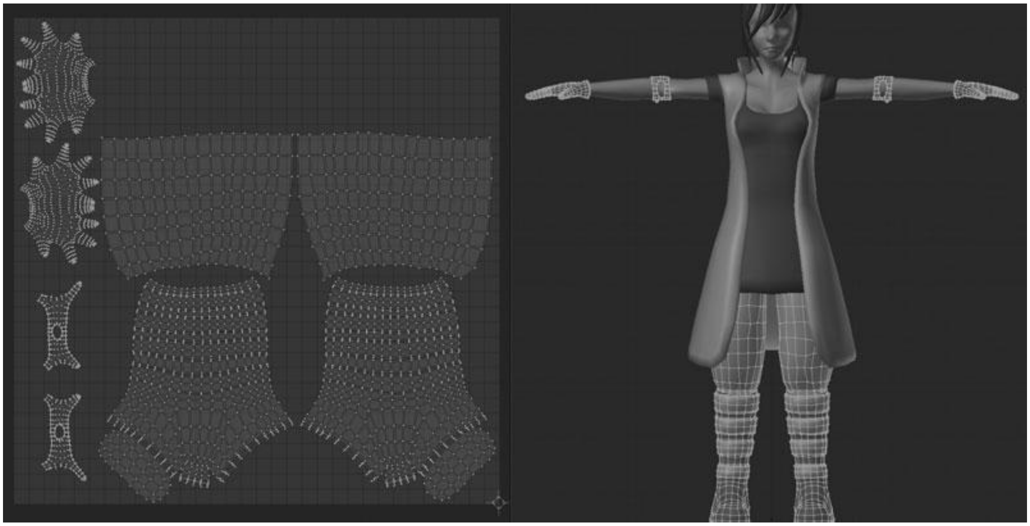

Figure 16.9
Reorganized UVs for the extras

Figure 16.10
Baked normal map for the hair with errors

In most cases, it is best to just experiment with the setting until you find a value that provides suitable results. In this case, setting the bias to 0.050 yields a clean normal map, as shown in Figure 16.12.

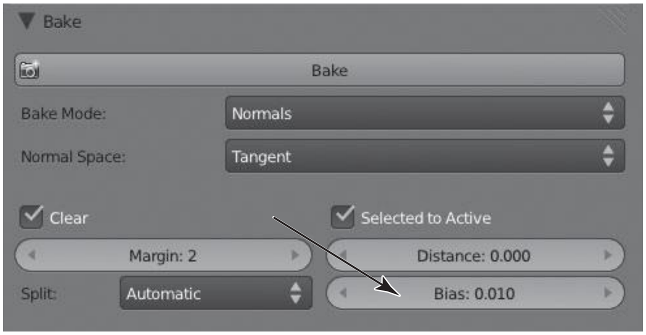

Figure 16.11
Normal map baking Bias option

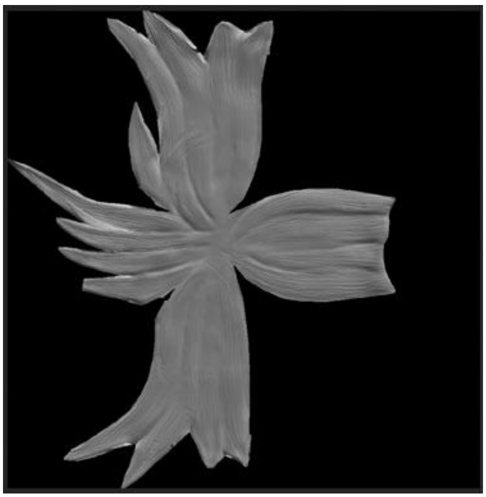

Figure 16.12
Clean normal map bake by adjusting the bias

The hair normal map is now complete, leaving you to just save it to a file and then move on to the arms.

Baking the Arms

The arms, like the head, require no tweaking of settings. You merely need to add a new image of 1024×1024, select both meshes, and then click Bake. The resulting normal map is shown in Figure 16.13.

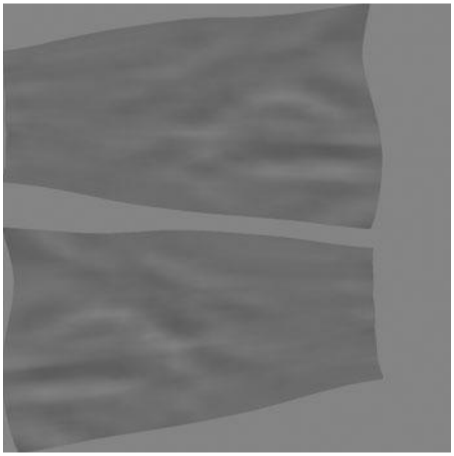

Figure 16.13
Baked normal map for the arms

Next up are the extras.

Baking the Extras

As mentioned earlier, the extras are the pants, boots, armbands, and gloves. They require only a couple of steps in order for the normal map to bake correctly. The first is to add a new image of 2048×2048, rather than the normal 1024×1024. This increased size will accommodate the smaller details of the gloves and armbands.

The next tweak is to adjust the Bias setting to 0.004. Note that when baking these extras, it is necessary to select each of the individual highpoly counterparts and then select the joined lowpoly meshes. The extras normal map after baking can be seen in Figure 16.14.

Baking the Shirt

The shirt also requires no tweaking, resulting in the normal map shown in Figure 16.15.

Baking the Coat

The coat also needs no changes. The normal map for the coat can be seen in Figure 16.16.

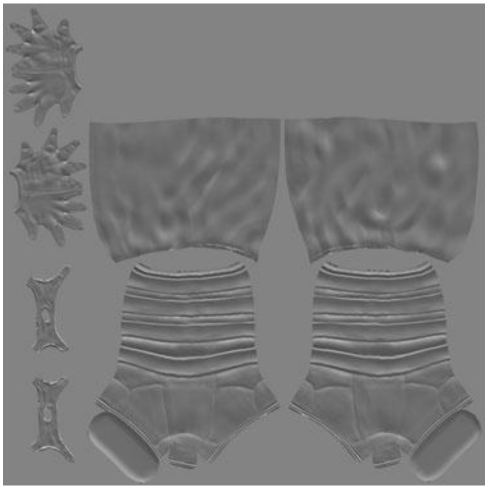

Figure 16.14
Baked normal map for the extras

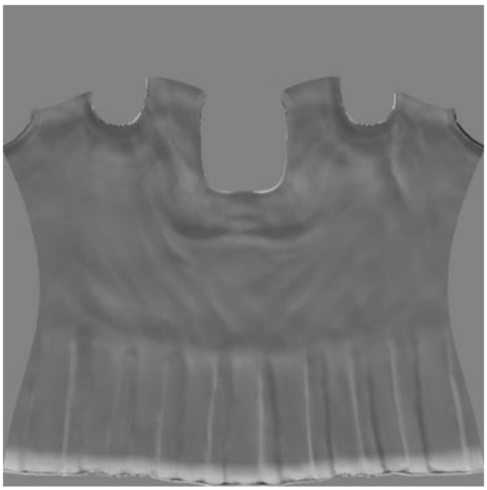

Figure 16.15
Baked normal map for the shirt

With the coat complete, all the normal maps are baked and you can see each of these normal maps in Figure 16.17. You can see them mapped to the character in the Viewport in Figure 16.18.

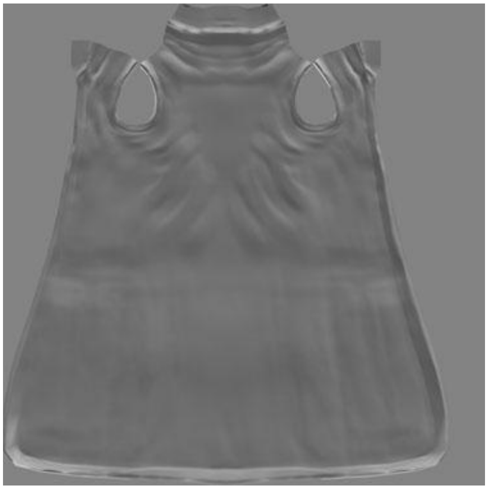

Figure 16.16
Baked normal map for the coat

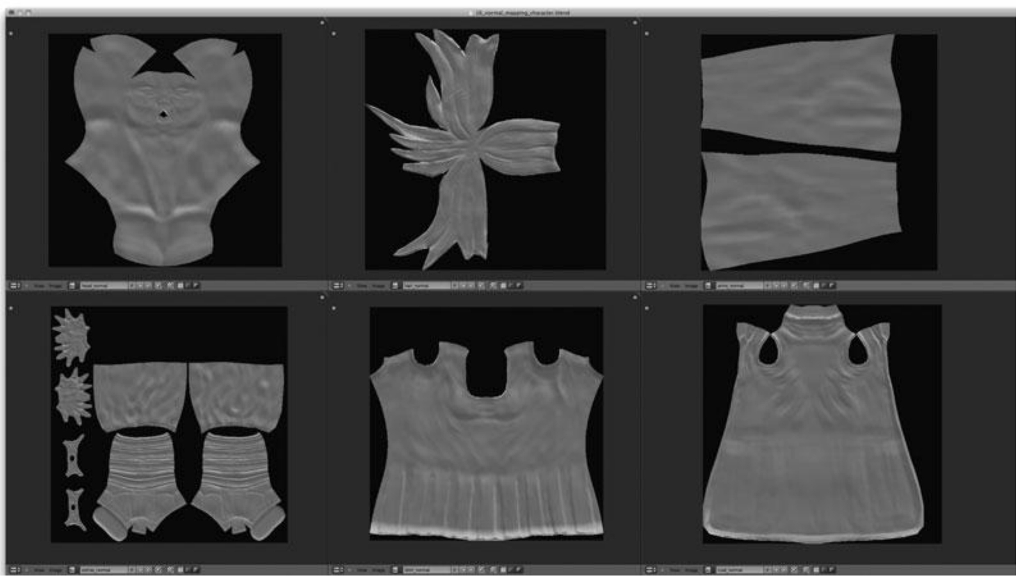

Figure 16.17
All final normal maps

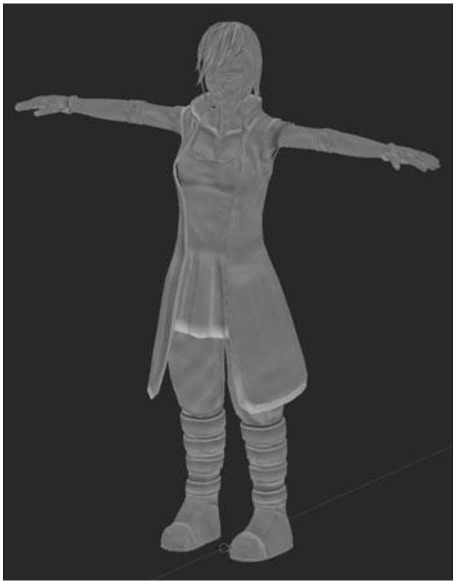

Figure 16.18
All normal maps shown in the Viewport mapped to the character's UVs

Note

I have hidden everything but the lowpoly meshes.

However, using the normal maps in this way does not do any good. If you were to render the character right now they would not be shown, or used in any way. In order to use the normal maps at render time, it is necessary to apply them as part of a material, through a texture.

Applying and Rendering the Normal Maps

As mentioned, in order to use the normal maps at render time, it is necessary to add a texture channel to each of the materials on the objects. A *texture channel* is an additional input to the material system that lets you add anything from procedurally generated patterns to images to the material. This section focuses only on adding images, as this is what applies to normal mapping.

The way this will work is by adding an image texture to the appropriate material, pointing that image texture to the correct normal map, and then adjusting a few

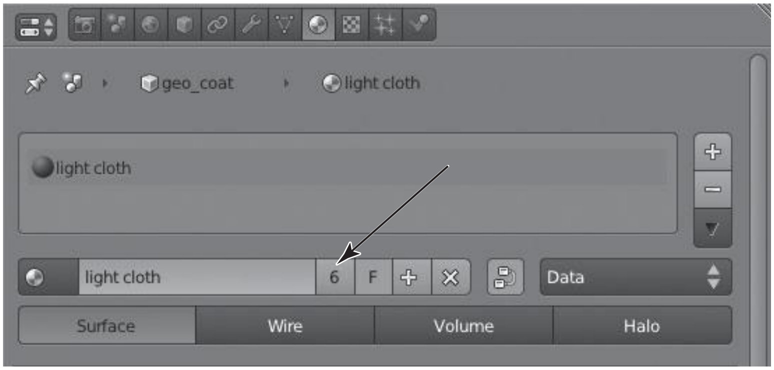

Figure 16.19
Making a single-user button for materials

settings to prepare for rendering. However, before you do this, you need to ensure that each lowpoly object has a unique material. This is not strictly necessary, but it will make it much easier to avoid normal maps being applied to the wrong objects.

In order to make the material of each lowpoly object unique, you should select one lowpoly object at a time, go to the material properties, and then press the small numeral button immediately to the right of the material name. See Figure 16.19. This button displays the number of objects, or users, that are referencing that material data. Pressing it will duplicate the material to the selected object, making it a single user.

After making the material single user for the lowpoly object, rename the material to something more descriptive, such as hair_normal. You need to do this for each of the lowpoly objects, which includes the head, hair, arm, coat, shirt, and extras. When you're done, you should be left with a unique material for each normal map you previously baked out.

Note

Be aware on the extras that two materials are necessary in order to maintain the two different colors. In this case, there is dark_extras_normal and light_extras_normal. Each of these materials will receive an identical texture in the next couple of steps.

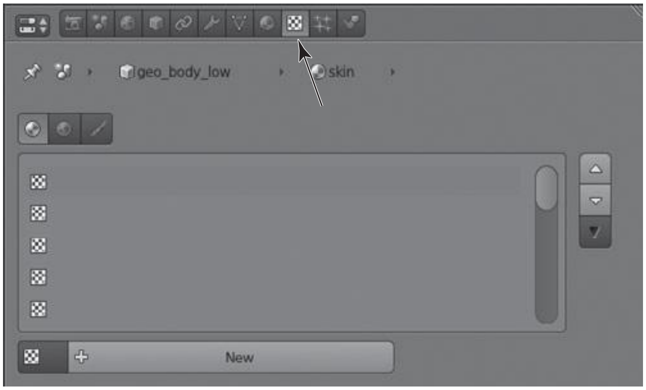

Figure 16.20
Texture properties

Now that all the materials are unique to their lowpoly owners, you can begin adding the normal maps to the materials through the use of an *image texture*. You'll add the image texture by going to the Texture properties, shown in Figure 16.20 and pressing New. You can then change the type to Image or Movie, as shown in Figure 16.21. Choose the appropriate normal map as the image by going to the Image tab and selecting it from the drop-down menu, as shown in Figure 16.22.

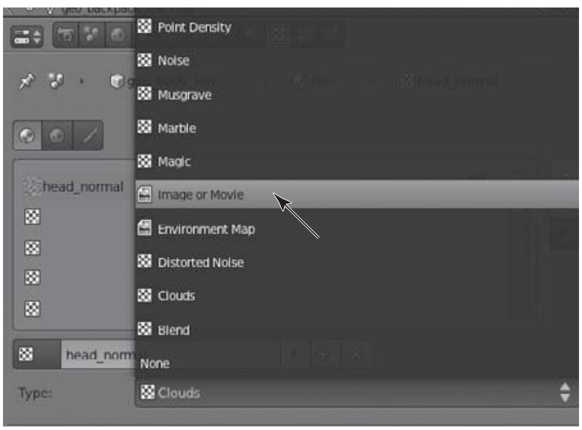

Figure 16.21
Choosing the Image or Movie texture type

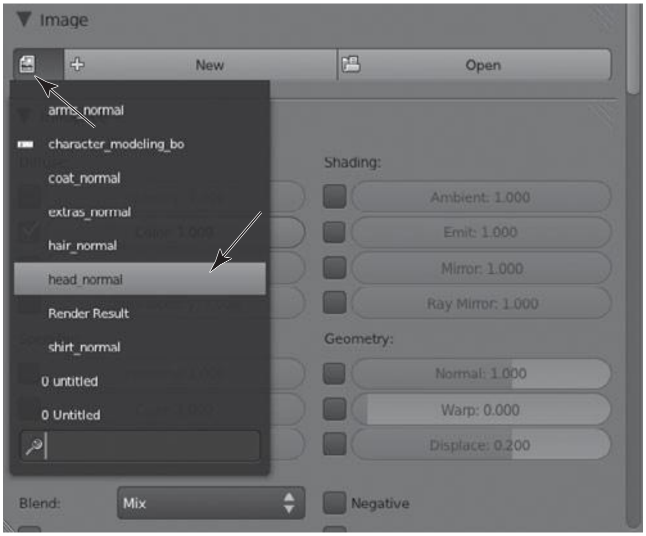

Figure 16.22
Choosing the correct normal map from the drop-down menu

At this point, if you were to render the character, with only the lowpoly objects set to render, you would find the normal map to be mapped oddly to the character and not working. The normal map needs to be mapped to the UVs and it should not affect the color of the material at all, only the shading. To fix these problems, you need to do a couple of things. First, move to the Mapping tab and change the Coordinates from Generated to UV, as shown in Figure 16.23.

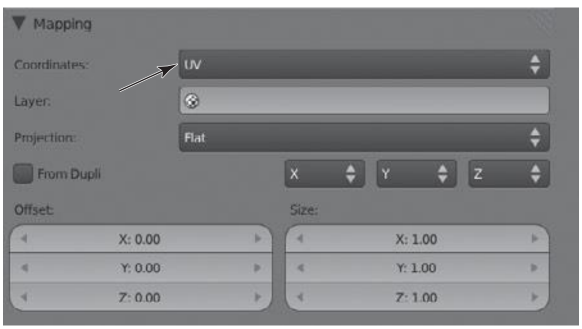

Figure 16.23
Changing the mapping coordinates to the UV

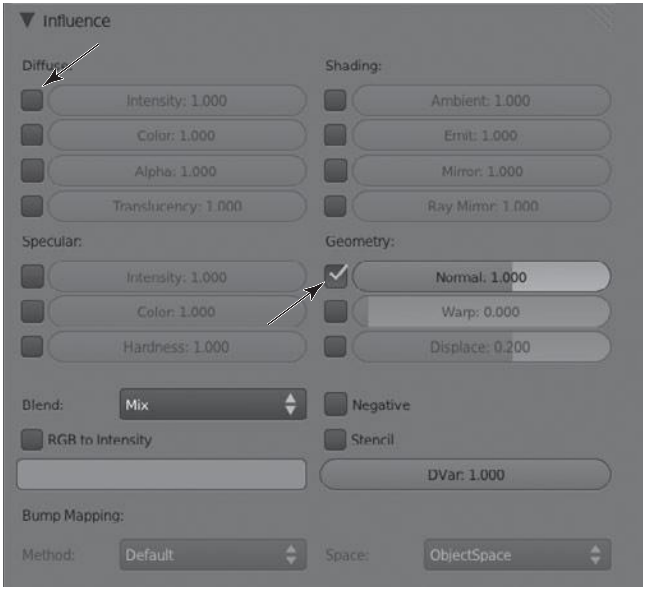

Figure 16.24
Setting the correct Color and Normal options from the Influence panel

The normal map will then be mapped to the character based on the UV coordinates of the object the material is applied to.

Next, you can fix the color and the shading by disabling Color and enabling Normal from the Influence panel, shown in Figure 16.24. The last thing you need to do is tell Blender that the image inputted a normal map, and thus should be treated differently. Enabling the Normal Map option from the Image Sampling panel will do this, as shown in Figure 16.25. The default option for the normal map type is Tangent, which is what you want. The normal map is now ready to go and you can render the scene, although be sure to disable the renderability of all the highpoly versions through the Outliner. In these last few steps, you should apply a normal map to the hair. You can see the rendered result in Figure 16.26.

Notice that the hair has a lot more detail to it now than it did without the normal map. In fact, it should look almost like the highpoly version, except for one thing. If you look closely at that last render, you will see that the hair is not very smooth. You can see where the low number of polygons is not providing

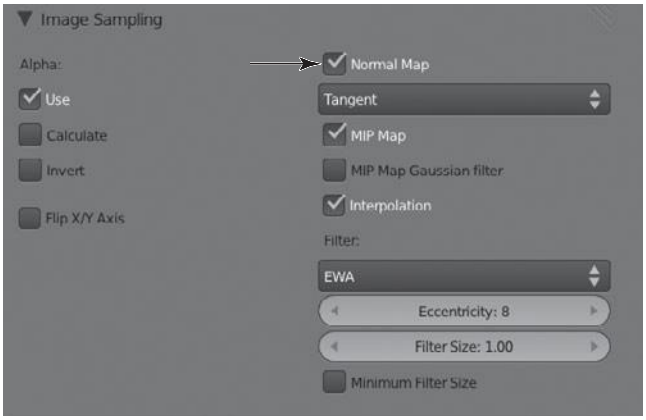

Figure 16.25
Enabling the Normal Map option

Figure 16.26
Render of the lowpoly hair with a normal map

smooth curves. However, this can be fixed simply by adding a Subsurf Modifier to the lowpoly hair and re-rendering it, as shown in Figure 16.27.

The hair is now ready to go, normal map and all. You can now repeat that whole process for each of the lowpoly objects. After doing so, the rendered result can be seen in Figure 16.28.

Figure 16.27
Adding a Subsurf Modifier to the hair fixes the rough edges

Figure 16.28
Final rendering of the lowpoly character with all normal maps applied

Summary

With that last render, this chapter is complete. This chapter gave you a rundown on how to bake normal maps from a high-resolution model to a low-resolution model in Blender. It then went on to show you how to apply those normal maps to the low-resolution model for rendering. Using these techniques and those shown throughout the retopology chapter, you can greatly reduce the render times, ease animation, and make the texturing process much more simple.

This chapter brings this book to a close. From here, there are many more subjects you can dive into and lots of things to learn. The character—even though it is completely modeled, UV unwrapped and normal mapped—is far from done. Moving forward, the character could be fully textured, rigged, and animated. Each of these tasks could fill a book of its own as each is a very vast topic that needs lots of study.

In this book I attempted to introduce the complete process needed to model a character from scratch in such a way as to leave the path open for future advancements. I covered the blocking process needed to build the foundation of the character model, I gave you a walk-through of all the steps needed to model a solid base mesh from the blocking, and I took you through the entire sculpting process. I introduced retopology to create a low-resolution version of the character and discussed how you can then unwrap the UVs of the lowpoly version to facilitate the creation of normal maps. Lastly, I showed you how to take those normal maps and apply them to the character for rendering.

I truly hope that this book offered valuable insights and was perhaps even enjoyable. Blender offers a very powerful toolset for the 3D modeling and animation enthusiast or professional; it was my goal to show you some of that toolset.

Appendix A

Using the DVD and Other Resources

Now that the character is done and the book is complete, you may be asking where you should go from here. The answer to this, of course, varies depending on what you want to accomplish. You could go on to the texture or animate the character. You could implement her into a game, or you could do something else entirely. In order to help with this next step, I have included a series of resources on the DVD that is packaged with this book. I have also listed a series of online resources that are great places to get further involved with Blender, receive help, take part in the community, or even gain inspiration and exposure.

What's Included on the DVD

In an effort to assist you beyond this book with Blender, I have included all the character source files and a series of video tutorials that go in more depth on specific topics than I was able to in the previous chapters. I also introduce several new topics that were not covered in the book. Additionally, you will find a copy of Blender 2.57 for each operating system.

Blender 2.57

As of this writing, Blender 2.57b is the latest official release of Blender from the Blender Foundation, as shown in Figure A.1. This version represents the culmination of many years of redesign and development work.

Figure A.1
The latest version, Blender 2.57b

You can find the copy of Blender for your operating system in the /Blender 2.57/ directory on the DVD.

Staying Up to Date with Blender

Blender, by the nature of being Open Source software, is frequently updated. On average, a new version is released every two to three months. This new version generally contains numerous bug fixes and a few new features. In general, these releases are not huge and do not have any impact on older files, so content is relevant longer. Nearly all .blend files are cross-compatible with past and future versions of Blender.

However, I encourage you to always download the latest version when available. You may download the newest version by visiting http://blender.org.

You can also download the latest development version to test out any new features that have recently been added if they are of interest to you. You can download these development versions by choosing the appropriate version for your operating system at this URL: http://builder.blender.org/download/.

Source Files for the Character

On the DVD you will find all the source files used or created throughout this book. This includes each and every .blend file, saved out at stages by chapter or section, the character modeling sheets and concept art, and the alpha texture used for sculpting the hair. You can find all of these in the /Source Files/ directory on the DVD.

In-Depth Video Tutorials for Character Creation

Throughout this book, I attempted to cover the topics thoroughly and in good detail. However, due to the nature of 3D modeling there are many, many aspects that I was either unable to cover or unable to explore as in depth as I would have liked. For that reason, I have included several video tutorials on the DVD that go into detail on specific topics. The following sections list the tutorials included on the DVD, and include brief descriptions of each of these tutorials.

Box Modeling a Basic Character Base Mesh

In this tutorial I take you through each of the steps of modeling a character base mesh, as shown in Figure A.2. This tutorial uses the box modeling technique to create a basic character mesh in a relatively short time.

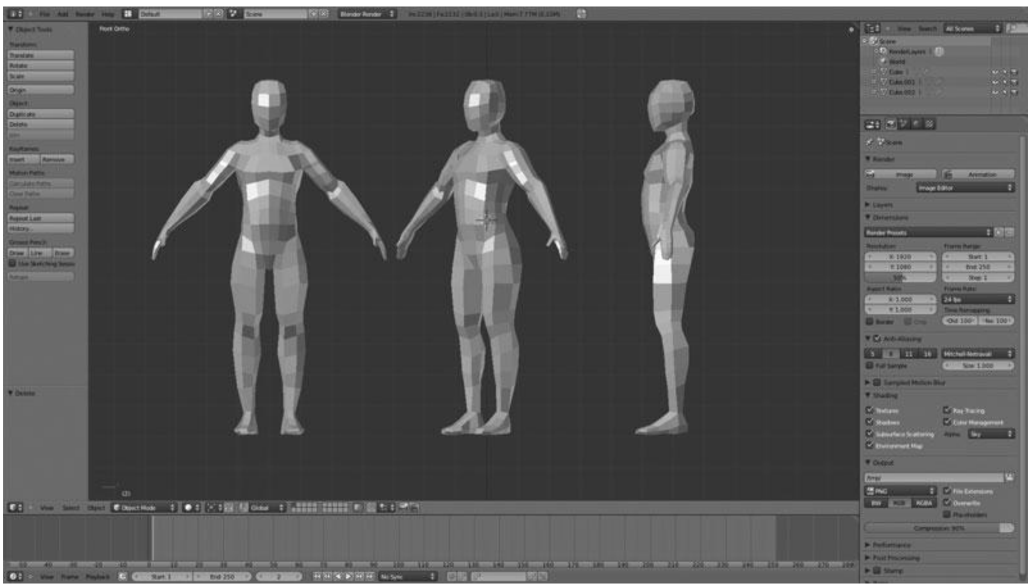

Figure A.2
Tutorial on box modeling a basic character base mesh

Figure A.3
Tutorial that introduces Blender's sculpting system

Introduction to Sculpting in Blender

Using the same techniques introduced in Chapter 6 and those demoed in Chapter 10, this tutorial introduces you to the workflow of Blender's sculpting system, as shown in Figure A.3.

Retopologizing a Head

This tutorial takes you through the process needed to retopologize a highpoly, sculpted head model, as shown in Figure A.4.

Baking Normal Maps

This quick tutorial shows you how to bake a normal map from the highpoly and lowpoly heads from the tutorial on retopology. See Figure A.5.

Using GLSL Shading in the Viewport

This quick tutorial shows how to set up real-time lighting in the Viewport with GLSL shading, which is useful for previewing textures and normal maps. See Figure A.6.

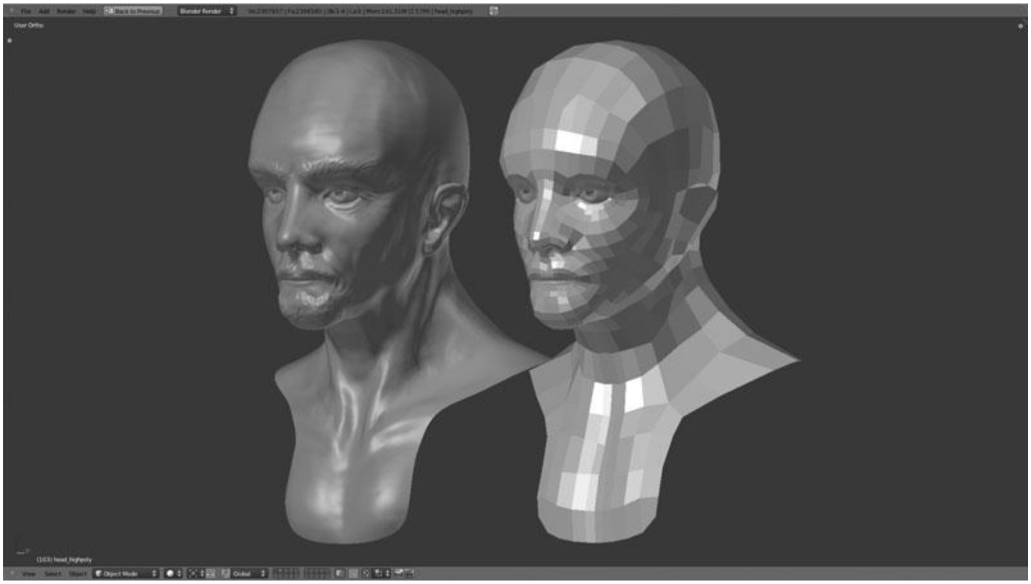

Figure A.4
Tutorial on retopologizing a head

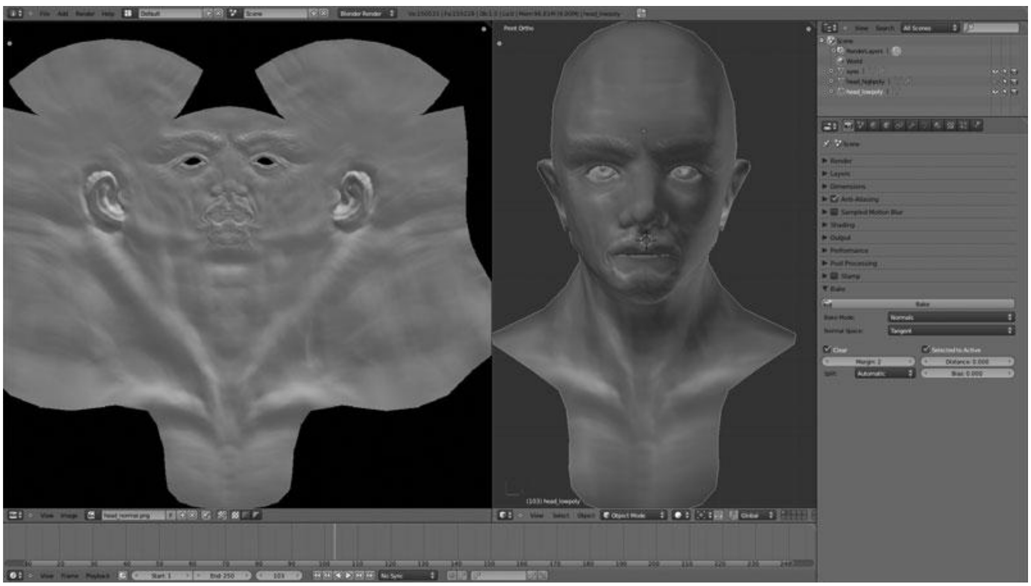

Figure A.5
Tutorial on baking normal maps

Figure A.6
Tutorial on using GLSL shading in the Viewport

Posing a Character with a Simple Rig

In this tutorial, you take the character from the *Box Modeling a Basic Character Base Mesh* tutorial and apply a very simple rig that can be used for posing her, rather than keeping the static T-pose. See Figure A.7.

Additional Online Resources for Troubleshooting

Even though I attempted to provide a wealth of information in this book, I was unable to cover everything. It is likely that you will run into problems at some point that this book is unable to answer. Or perhaps you simply need a place to receive critiques on your work or meet other Blender artists. There are many great websites out there that provide various resources; the following sections list just a handful.

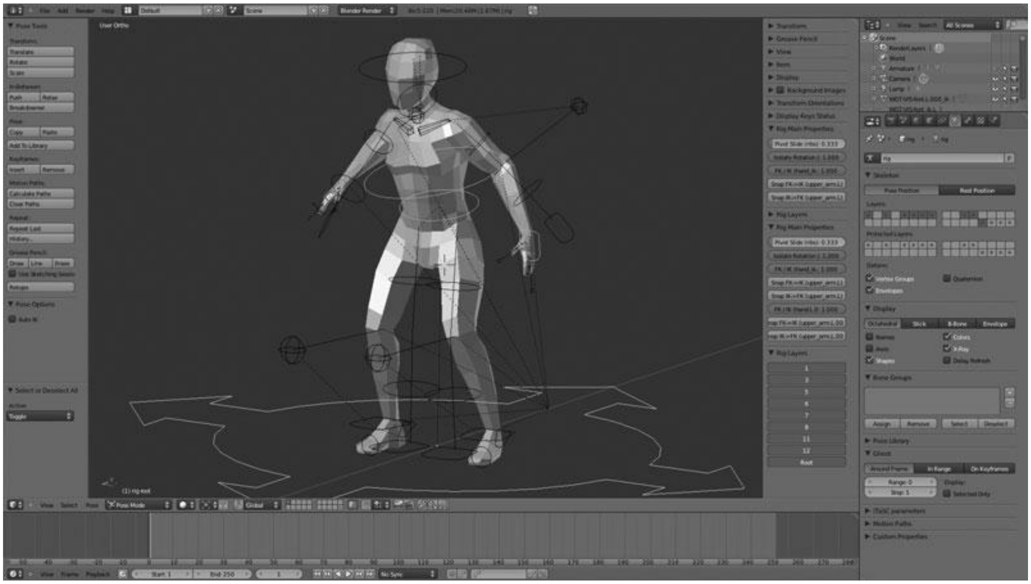

Figure A.7
Tutorial on posing the character with a simple rig

Blender.org

http://blender.org

This is the official site of Blender and the Blender Foundation. On this site, you will find download links to the latest version, access to Certified Trainers, tutorial links, and information for those interested in getting involved with the development of Blender. You will also find an e-shop that sends all proceeds to support Blender and the projects of the Blender Foundation.

Blender Cookie

http://blendercookie.com

This site contains what is, perhaps, the largest collection of recent Blender video tutorials covering everything from modeling to texturing, animation to rendering, and compositing to the game engine. It also includes several commercial training DVDs.

Blender Artists

http://blenderartists.org

These are the accepted official forums for Blender users. Hosting over 80,000 members, this forum has the largest user base of any Blender site and is the place to go for Blender discussions, posting your work for critiques, asking support questions, and meeting other Blender artists.

Blender Nation

http://blendernation.com

This is the main Blender news hub for any news or announcement that is related to Blender.

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