MODO ESSENTIALS

WEEKEND CRASH COURSE



PUSHING POINTS | WILLIAM VAUGHAN

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WEEKEND CRASH COURSE

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William Vaughan | Pushingpoints.com

Written for the features found in Modo 12.2

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William Vaughan is an award-winning artist, writer, and director. He has created thousands of original computer-generated characters, including Tofu the Vegan Zombie. William has trained thousands of cg artists throughout the world and authored more than one thousand tutorials and instructional videos. He has been published by major cg magazines, contributed to over twenty books, has written and directed several award-winning films, and has created digital art for many top studios, including Nickelodeon and Pixar Animation Studios.

Later in his career, William added scripting to his arsenal of tools and has created hundreds of scripts and several kits for Modo. His custom tools are used by artists and studios across the globe. Some of the more notable kits and collections are the Hatchet Collection, Polystein Kit, MOP Booleans, MOP Tubes, the Topology Scripts Collection and the Coolidge Collection.

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Ed Ferrari graduated with a BFA in Computer Animation from Miami International University of Art and Design. After college, he spent a decade in Los Angeles, working in the film and television industry. Following his stint in Hollywood, Ed landed a position with Foundry, fulfilling the role of software evangelist on the Modo team. Currently, he's living in the greater Boston area working as a 3D Production Artist at New Balance Athletics Inc. In his spare time, he writes short stories and builds worlds around the odd characters he draws on the post-it notes that cover his work area.

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"Move out of your comfort zone. You can only grow if you are willing to feel awkward and uncomfortable when you try something new." – Brian Tracy



INTRODUCTION

My first production experience using Modo was a little over a decade ago. I was fortunate to have the opportunity to work on the Pixar animated short film *Partly Cloudy*, written and directed by Peter Sohn. This beautiful film was shown in theaters before Pixar's *Up* and remains one of my all-time favorite production experiences as a digital artist. If you haven't seen this animated short film, stop reading and go watch it. I'll be waiting right here when you get back.

I was tasked with modeling the cute kitten, puppy, crocodile and other baby creatures that a lonely gray cloud named Gus would create before giving them to his delivery stork, Peck. But before I created a single polygon, I had a much larger task that I needed to tackle. I had to learn a new piece of software.

Although I had been working as a 3D artist for many years prior to working with Pixar, I had never worked with Modo. I had heard many good things about the software, but I was teaching a different 3D application at the time and hadn't gotten around to giving Modo a proper test drive.

I happily accepted the offer to work with Pixar on a Friday afternoon, with the understanding that I needed to be up and running in Modo the following Monday. As with most software I've used throughout my career, I needed to get up to speed quickly in order to be effective on day one of production.

I purchased Modo that evening after work and once installed, I found myself staring at a foreign user interface. I'd be lying if I said I didn't have concerns about the hole I had dug myself by taking on work requiring me to use software I hadn't worked with before. After a few deep breaths and some self-reassurance that I'd be ready come Monday if I just put in the time, I began a weekend crash course, diving head first into Modo.

I spent the next two days creating a couple of character models in an attempt to familiarize myself with the workspace and tools in Modo. The time I invested that weekend paid off, and though I didn't move as fast I had grown accustomed to in other software, I had the confidence needed to move forward on the project.

We've all been there before at some point. Whether it's learning a musical instrument, learning to drive, or that first step off the plane in a foreign country. Everything feels alien and uncomfortable at first. Your immediate reaction is to run back to the familiar and stay with what you already know. But to truly grow, you must accept the struggle and know that given time and practice, these new experiences will become just as familiar.

Fortunately, we live in a time where there are endless amounts of resources available when learning new skills. A quick internet search will lead to countless hours of online discussions and videos that can aid you in your journey.

The Modo community is one of the best online communities I've encountered, and there is a wealth of collective knowledge available to anyone willing to go in search of it.

While it's great to have all these resources so readily available, sometimes it can lead to information overload. Knowing where to begin, and what is most important to start producing in a new program can be challenging.

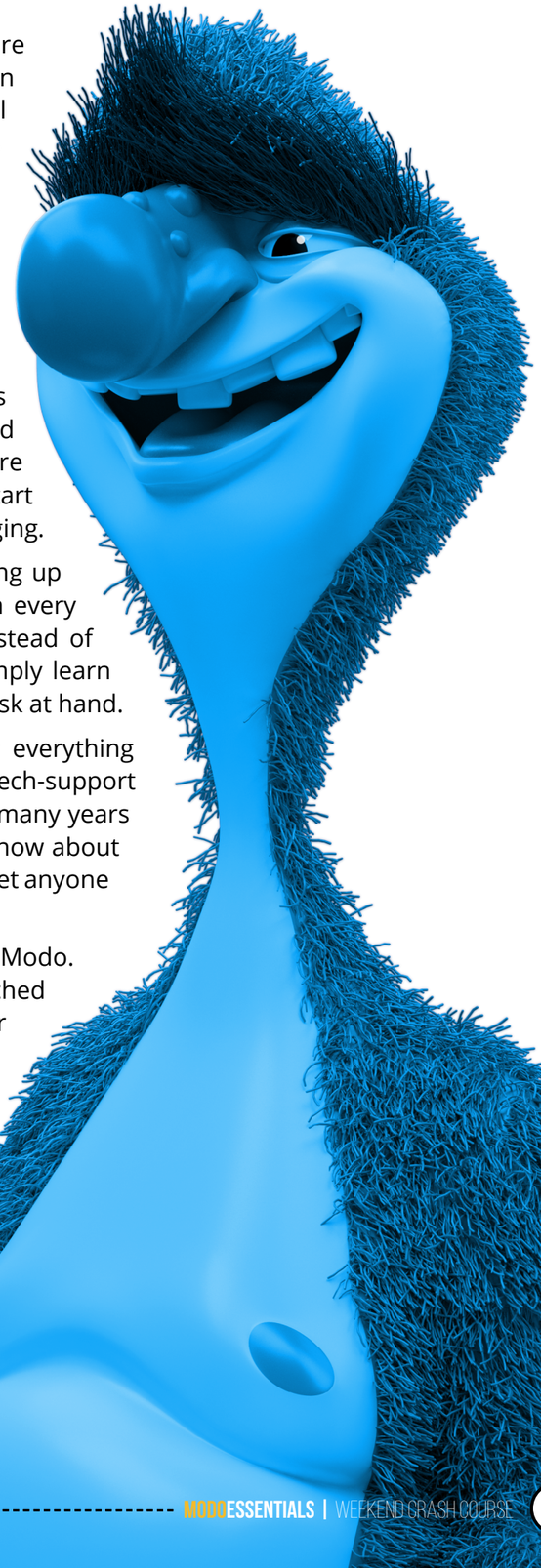
The mistake many artists make when picking up a new piece of software is to try and learn every tool and feature available. My advice is instead of learning everything about the software, simply learn what you need to know to accomplish the task at hand.

The only person who truly needs to learn everything about an application is someone working in tech-support for that software. I've been using Modo for many years and still don't know everything there is to know about it. Come to think of it, I don't think I've ever met anyone who does.

I created this book as a quick start for using Modo. It's the resource I needed when I first launched the software years ago and was looking for something to guide me through unfamiliar territory.

Whether Modo is your first 3D software or you're a seasoned professional adding Modo to your toolkit, use this guide as a primer to get up and running quickly.

If you're ready, let's get started on your own weekend crash-course with Modo.



WHO SHOULD READ THIS BOOK?

Those interested in adding modeling, sculpting, texturing, painting, animation and rendering to their arsenal of digital content creation tools — including but not limited to designers, concept artists, modelers, animators, texture artists, and technical directors — can benefit from the valuable information in this book.

Use this guide if you are

- A **professional 3D artist** wanting to add additional tools to your current toolset.
- A **designer** looking to produce faster iterations and to explore and develop your concepts.
- An **instructor** looking for new ways to introduce Modo to students.
- A **student** with the desire to broaden your portfolio of software knowledge.
- A **hobbyist** interested in having Modo feel more intuitive and to be more aware of what the software has to offer.

As with all of my books, this guide is written to be clear, not condescending, and to act as a reference to contribute to the ongoing growth of your work.

WHAT CAN I EXPECT FROM THIS BOOK?

This book was created to demystify navigating and working with the tools and features in Modo. In this guide you'll learn the fundamentals of Modo, useful hotkeys and much more.

The information I present in this book is an attempt to share what I've learned during my time using and teaching Modo. This resource would have saved me countless hours and allowed me to focus on what I love most... creating.

It's important to understand that the information you will find in this book isn't the truth. It's my truth.

My advice is to explore this resource with an open mind, leave with as many take-aways as you can and use what works best for you.

It's important to note that this resource is not intended to replace Modo's online and local documentation. This guide is designed as a primer and is meant to complement the help files to get you up and running quickly.

Once you've finished this essentials guide, go to the Modo Tutorials section of foundry.com to find additional learning resources. There is a great collection of free online training videos for you to explore as you build and refine your Modo skillset.

WHAT YOU WILL NEED

Before moving on to the first section of this book, you'll need to download and install either a copy of full Modo or Modo indie. While the information in this guide is focused on full Modo, there are very few differences between full Modo and Modo indie, making this a useful reference for all Modo users.

If you don't currently have a license of full Modo or Modo indie, take advantage of the free trial version of full Modo while exploring this book.

I'd also recommend using a three-button mouse. While this isn't a requirement, it will make for a better experience. I've seen many artists struggle to learn 3D software attempting to use their laptop's trackpad or single button mouse.

The most important things you'll need are the desire to learn and patience. Learning isn't a race. To truly increase your understanding and abilities you need to slow down. In the end, you'll get there faster.

TRY MODO FOR FREE

There are multiple options available when purchasing Modo.

Foundry offers Modo Perpetual, Modo Maintenance, Modo Subscription and Modo Multi-User. Modo indie is another option that is available on Steam.

If you already own a Modo license, congratulations!

If you don't, no worries. Foundry offers a free trial version, giving you the ability to experience Modo before you buy.

Use the link below to download and install the latest version of full Modo.

DOWNLOAD MODO

Differences between Modo indie and full Modo

- OBJ, FBX, glTF 2.0 export limited to 100k polys
- Bake and render resolution limited to 4k
- Command eval options unavailable
- Command, scripts, and command history panel results unavailable except "undo" and "history"
- Python editor, third-party scripts, and third-party plug-ins unavailable
- Can import all formats, but can only save in .lxf format
- Export formats limited to OBJ, FBX, and glTF 2.0
- Image save formats limited to .png, .jpg, .tiff, .tga and .exr
- Network Rendering is disabled
- Limited to individual use

SECTION 1: MODO'S USER INTERFACE

Using any software requires a basic understanding of its user interface (UI). I have found the more time an artist spends getting to know the UI, the more efficient they are using the software.

While this may seem obvious, many artists overlook this aspect of learning a new program and miss out on core features that would not only speed up their workflow, but would make their time using the software more enjoyable.

While Modo's UI can be fully customized to each user's needs and aesthetics, this guide will focus on the default layout.

In previous versions of Modo, I found myself customizing many aspects of the interface to speed up my workflow. Over the years, the Modo development team has put a focus on enhancing the UI, and I believe the refinements they've made recently have produced a workspace that requires little to no user customization.

MODO UI AT A GLANCE

We'll be doing a deep dive into Modo's UI, but before we do, let's take a quick bird's-eye view of the workspace.

By default, the UI provides quick access to the core tools and features you might use in a work session without needing to search throughout the menus. If you prefer working with a more streamlined minimalist UI, Modo makes it easy to hide most aspects of the interface.

If you're new to working in a 3D application, the Modo UI can be intimidating when compared to other content creation tools such as Adobe Photoshop or Illustrator.

After a brief period of working in Modo, you'll discover that its UI is more like the average content creation tool than it appears.

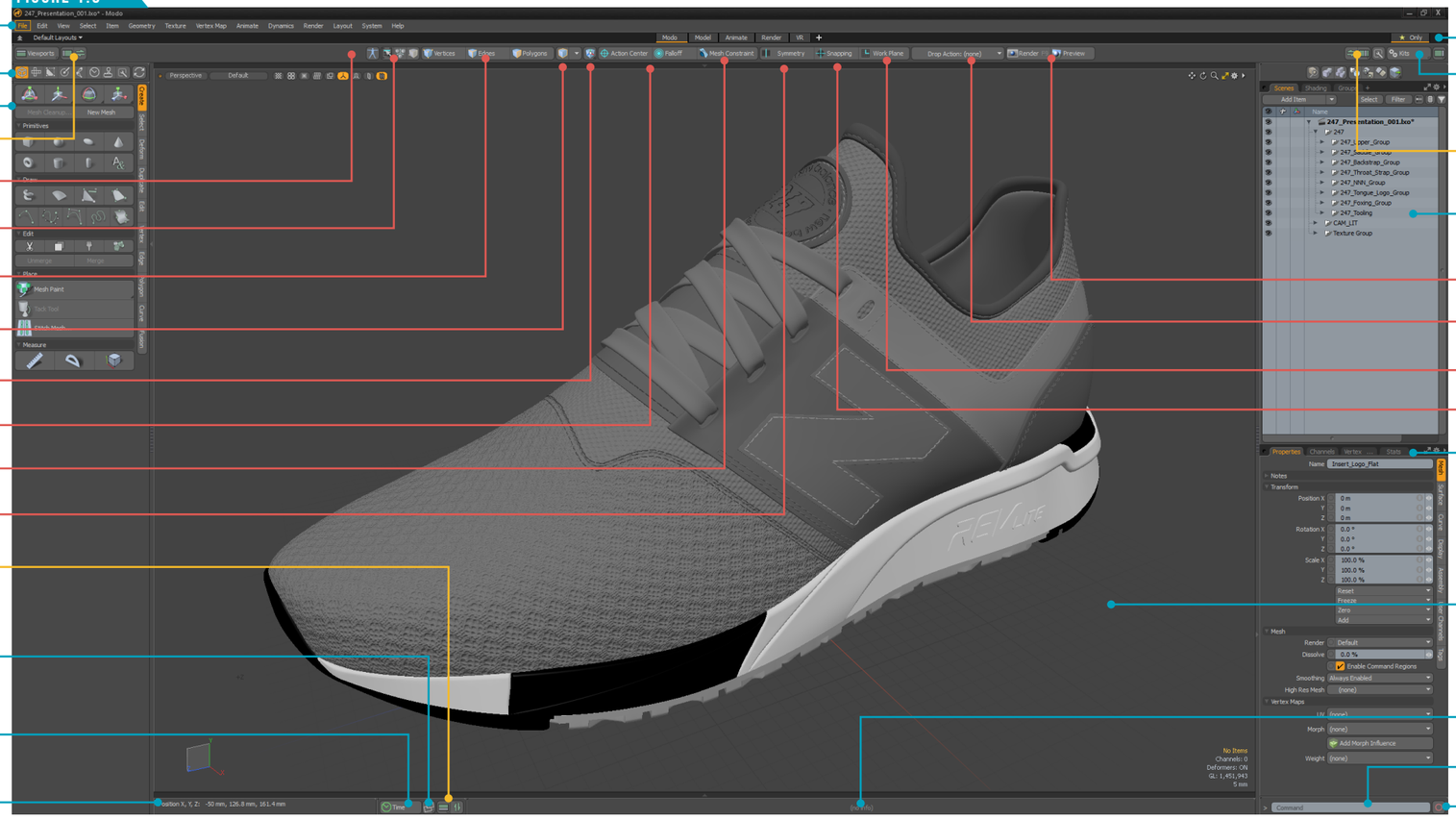
Remember, just like those other tools, you won't be using everything that is on display in an average work session.

Take a few minutes to study the general layout of Modo's default UI shown in (Figure 1.0).

AUTHOR'S NOTE

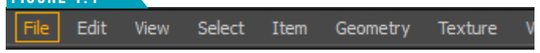
It can be tempting to customize Modo's UI to be more like software you're already familiar with, but using the default layout when you're just getting started will make it easier to not only follow along with this guide, but additional training material online.

FIGURE 1.0



APPLICATION MENU BAR

FIGURE 1.1



The Application Menu Bar (Figure 1.1) gives you access to all Modo functions. As with most software, clicking any of the menu items activates a dropdown menu with many entries and sub-categories for you to select from.

After we've explored the UI, you'll quickly discover that most of the functions found in these menus are also displayed as buttons throughout the application. When you've become more familiar with Modo, you'll most likely spend little time accessing functions from the Application Menu Bar.

With that said, if you have difficulty locating an option in the UI, this menu bar can be a handy alternative.

I'd like to point out a few UI conventions found in these menus. If a menu option name is assigned to a keyboard shortcut (hotkey), you'll find it displayed to the right of the menu item. This can be a quick way of learning keyboard shortcuts for commonly accessed functions.

Menu option names that display a dialog are followed by an ellipsis (...).

Menu option names that open sub-categories are followed by a small right triangle (▶).

Menu option names that function as a toggle will display a checkmark (✓) when the toggle is active.

Some common functions found in these menus have default keyboard shortcuts that I suggest getting familiar with to help streamline working in Modo. Any command can have a keyboard shortcut assigned to it using the Input Editor (System/Input Editor), but for now get familiar with the shortcuts shown in (Figure 1.2).

Be sure to take advantage of the Help option in the Application Menu Bar. The interactive help option (Help/Activate Help) allows you to click on interface elements to open documentation associated to that element. There are also links to additional resources that can aid in learning Modo.

Another option that you should be aware of is Reset Preferences (System/Reset Preferences).

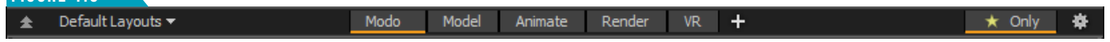
This option returns Modo to its default state, like a factory reset. If you experience unpredictable behavior, installed an update or simply want to return to the default setup, this is a good option to be aware of.

FIGURE 1.2 ***General Hotkeys***

Keystroke(s)	Action
F1	Interactive Help
Ctrl+N	New scene
Ctrl+O	Open saved scene
Ctrl+I	Open saved image
Ctrl+W	Close current scene
Ctrl+Shift+W	Close all open scenes
Ctrl+S	Save current scene
Ctrl+Shift+S	Save scene as...
Ctrl+Q	Quit Modo
Alt+F12	Config file save
Shift+F5	Run script
Ctrl+Z	Undo
Ctrl+Shift+Z	Redo
Ctrl+X	Cut
Ctrl+C	Copy
Ctrl+V	Paste
Delete	Delete
Ctrl+R	Brings up the last tool used
Alt+R	Brings up the last tool used, ignoring UI interactions and selections
Ctrl+D	Reset tool attributes

LAYOUTS MENU

FIGURE 1.3



Modo has twelve unique workspace layouts that you can access using the Layouts Menu located directly below the Application Menu Bar. (Figure 1.3)

Our focus in this guide will solely be on the Modo layout, as it's the only layout needed in recent versions of Modo. In previous versions, you would switch between layouts to access focused workspaces. This option is still available for those that prefer using a variety of layouts optimized for specific tasks.

By default, only five layout options are displayed (Modo, Model, Animate, Render and VR). To display all twelve options, use the Star Only button located on the right. The Star Only option enables you to suppress layout options that aren't starred. You can toggle the star on and off for each layout by clicking on the star icon next to the layout name.

You also can create a custom layout using the plus sign (+) located to the right of the layout options. Once created, an additional button is added to the right-most position of the bar.

The position in which the buttons are displayed can be reordered by left-clicking and dragging a button to a new location. The drop position is indicated by a small orange line.

If you make changes to one of the layouts and would like to reset it back to its default state, simply double-click the layout button.

The gear icon located to the far right of the Layouts Menu gives you access to options for the menu. This is a common feature that you will see throughout Modo. It contains all the available customization control options for that portion of the UI.

Since we won't be accessing any layout other than the Modo layout in this guide, you can minimize it by either clicking on the two upward facing arrows on the far left or clicking any empty space on the Layout Menu bar. To maximize it, click over the remaining small line.

WATCH OUT!

I've seen many users accidentally click on an empty portion of the Layout Menu bar causing it to minimize by accident. No worries, the menu is still there and can easily be maximized by clicking the remaining portion that will display as a small dark line.

If you like the idea of working with focused workspaces, don't let my preference hold you back. Every artist works differently so use what works best for you. If you do plan on taking advantage of the various layouts, I'd recommend adding the following two shortcut keys to your memory.

The first is (Shift+Ctrl+Tab) which will enable the layout switcher selection popup shown in (Figure 1.4).

FIGURE 1.4



LAYOUTS MENU CONTINUED

This handy option allows you to quickly switch between layouts by selecting from large graphical icons.

To use, press Shift+Ctrl and then Tab to open the selection popup. Continue to hold down Shift+Ctrl and then release and press Tab again to cycle to the next workspace highlighted by the orange outline.

The layout options are organized by the layout's most recent use. Releasing the keys opens the currently highlighted interface. This method eliminates the need to move the cursor from its current location to the top of the UI.

The second option for quickly switching between layouts is the layout switcher pie menu.

In Modo, pie menus are quick contextual pop-up menus that appear using keyboard shortcuts. These radial menu items enable you to quickly access options gesturally for a speedier workflow.

Throughout this guide I'll share hotkeys to commonly used pie menus. Using the keyboard shortcut Ctrl+~ (tilde) opens the layout switcher pie menu. (Figure 1.5)

Pie menus are limited to eight options, so four of the twelve layout options won't be displayed by default. You can specify which layouts you'd like shown and where each layout is placed in the pie menu by using the popup menu located on each of the pie menu's buttons. Press and hold Ctrl+~, then left-click on the popup option under the layout icon.

It's this level of customization that enables you to setup Modo in a way that works best for your workflow.

All three layout switching options are also available from the Application Menu Bar.

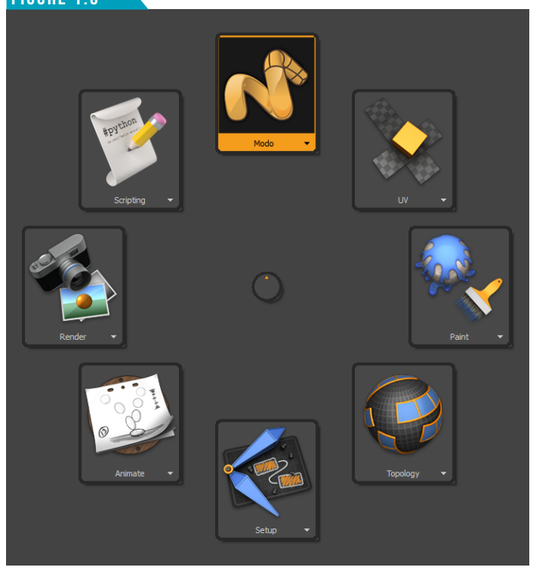
Specific layouts are accessible under Layout /Layouts. The layout switcher selection popup can be accessed under Layout/ Recent Layouts..., and the layout switcher pie menu can be launched under Layout/ Favorite Layouts....

Spend some time getting familiar with all of the options discussed in this section. It will help you determine what will work best for you if you choose to access the different layouts.

CLICK HERE FOR A QUICK VIDEO

This video demonstrates the layouts menu, the layout switcher selection popup and the layout switcher pie menu.

FIGURE 1.5



TOOLBAR MENU

The Toolbar Menu seen in (Figure 1.6) is located on the left side of the Modo UI and enables you to quickly access a wide variety of tools and commands.

Left-clicking on any of the icons will display the related options in the Toolbar (also referred to as the Toolbox) located just below the Toolbar Menu.

There are several keyboard shortcuts associated with the Toolbar Menu shown in (Figure 1.7) that are good to know. To get a broad overview of each of the toolbars available, let's look at each one.

TOOLBAR

The Model Toolbar is displayed by default. This collection of tools and commands enables you to create, select and manipulate geometry.

On the right side of the Toolbar, there are a series of Sub-tabs that organize the various tools by their function. Clicking any of the sub-tabs will change the options displayed. For example, clicking on the Select sub-tab will display the selection options available in Modo.

FIGURE 1.6

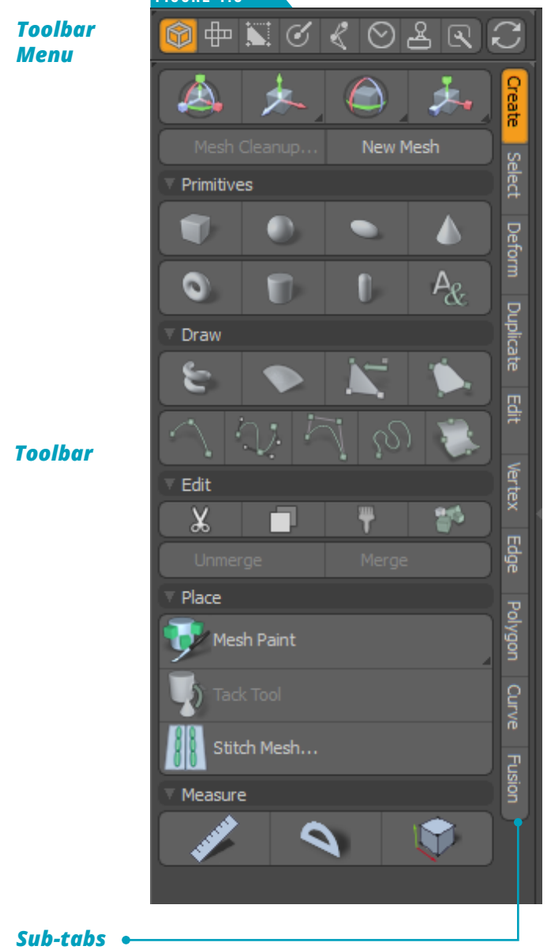


FIGURE 1.7 *Toolbar Menu Hotkeys*

Keystroke(s)	Action
Alt+Left-click Toolbar Icon	Opens toolbar as a popover. Moving the popover pins it open.
Ctrl+Shift+Home	When cursor is over toolbar, opens first toolbar (Model Toolbar)
Ctrl+Shift+End	When cursor is over toolbar, opens last toolbar (Context Toolbar)
Ctrl+Shift+Page Up	When cursor is over toolbar, opens next toolbar
Ctrl+Shift+Page Down	When cursor is over toolbar, opens previous toolbar
Ctrl+Shift+W	Closes all open scenes
F2	Opens Modeling Toolbar as a floating window
F3	Opens Painting and Sculpting Toolbar as a floating window
F4	Opens Setup Toolbar as a floating window
` (backtick)	Toggle floating window visibility

TOOLBAR CONTINUED

The UV Toolbar (Figure 1.8) consolidates tools and commands related to creating and manipulating UVs into one location. UV mapping is a method used to "wrap" a 2D image texture onto a 3D mesh.

Retopology is the process of recreating an existing mesh surface with more optimal geometry. A common use-case is creating a clean, quad-based mesh for animation from a sculpted mesh. The Topology Toolbar (Figure 1.9) consists of tools and commands designed to aid in this process.

The Painting and Sculpting Toolbar (Figure 1.10) houses the tools and commands associated with sculpting, texture painting, hair guides for use with the fur shader, vertex map painting, particle painting and sculpting as well as a collection of utilities such as image processing options.

The Setup and Rigging Toolbar (Figure 1.11) consolidates the tools and commands related to rigging, dynamics and particles. You can access options for creating joints, constraints, deformers, particle emitters and more.

Once your mesh items are rigged and ready to animate, you'll find a collection of animation related tools in the Animation Toolbar (Figure 1.12). Using these tools you can create and manage Actors, Actions, Poses and more.

If you're working with polygonal meshes and want to create smoothing groups or define hard edges using vertex maps, you'll find the tools you need in the Game Toolbar (Figure 1.13). This is also the toolbar where you'll find the Baking tools and Game Navigation options.

The Workbench Toolbar (Figure 1.14) doesn't look like much when you first access it, but it will quickly become one of your most used toolbars. This powerful toolbar enables you to group and organize tools, commands, channels, scripts and macros.

To start customizing your workbench, click the Edit Workbench button. This reveals three additional buttons (Figure 1.16). Click the Pick to Add button. This allows you to click on an element in the UI and add it to the workbench. Once you've added items to your workbench, click Edit Workbench again to end the editing session.

The Context Toolbar (Figure 1.15) changes its content based on the current component selection type and whether a 3D or UV viewport is active. Using the middle-mouse button and clicking in a viewport enables you to switch between a UV and 3D viewport without dropping a selection.

I find that I use this toolbar when I'm modeling more than any other toolbar, since the tools displayed are limited to the element mode I'm currently in. For example, if I'm in edge selection mode, only edge-based tools will be displayed.

FIGURE 1.16



CLICK HERE FOR A QUICK VIDEO

This video demonstrates switching between the various toolbars using the Toolbar Menu as well as adding elements to the Workbench Toolbar.

FIGURE 1.8

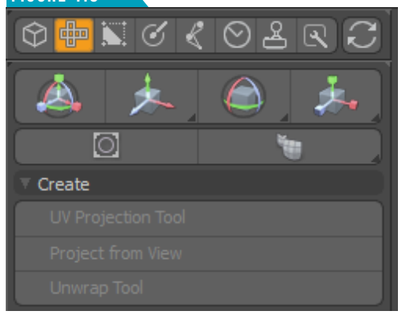


FIGURE 1.9

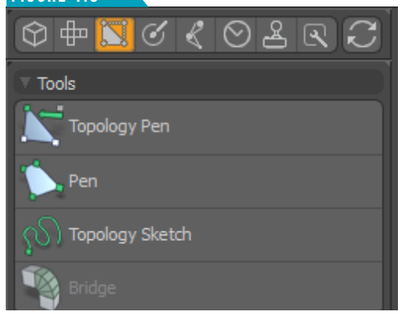


FIGURE 1.10

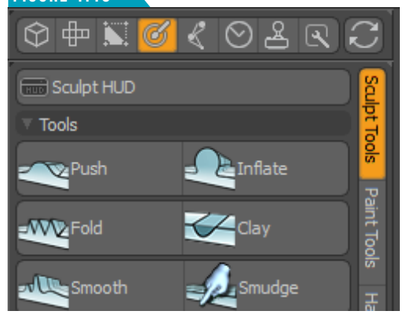
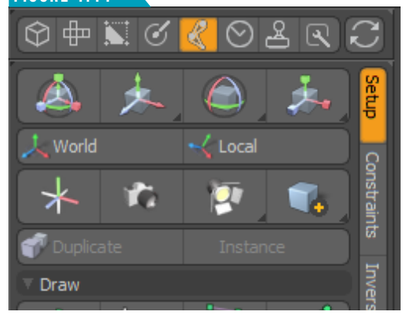


FIGURE 1.11



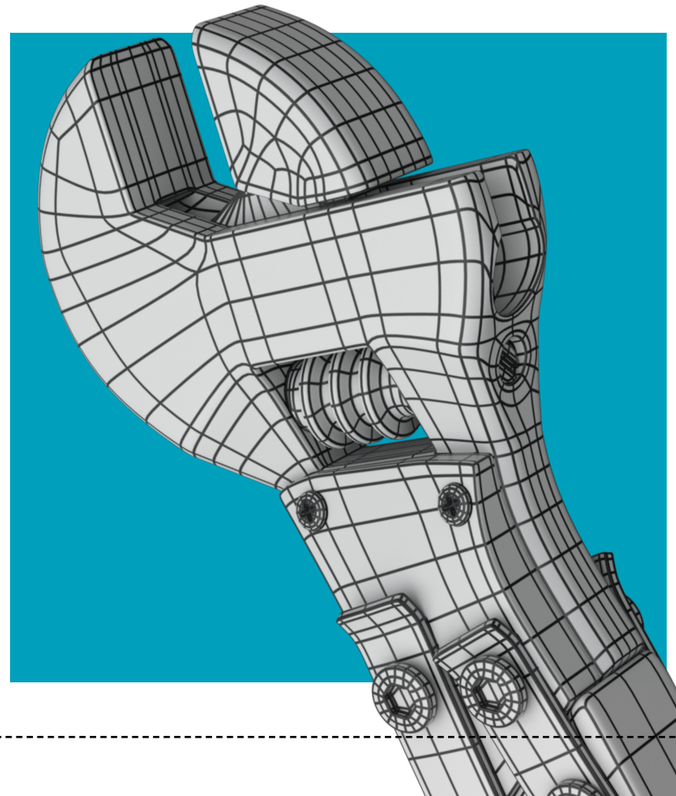


FIGURE 1.12

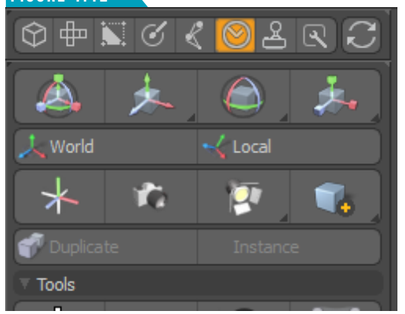


FIGURE 1.13

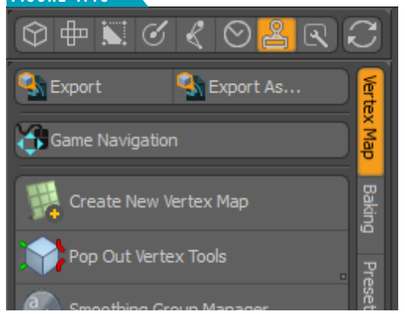
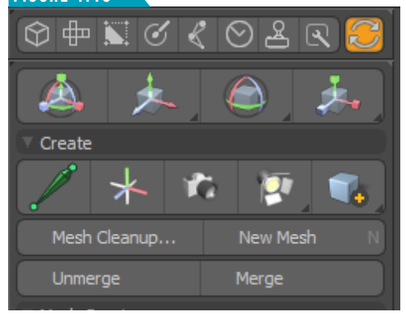


FIGURE 1.14



FIGURE 1.15



3D VIEWPORT

I know you're itching to start creating, but we still have some important areas of the UI to discuss. Most important is the 3D Viewport (Figure 1.17).

It's not just located in the center of the interface and the largest area of the workspace by accident. This is where all the magic happens. It's where you'll spend most of your time when working in Modo.

This is your virtual workshop where you'll model, sculpt, paint, rig, animate and more. If there were only one area to focus on, this would be it. You'll want to get comfortable navigating and customizing the 3D Viewport to get the most out of it.

There are many options to customize this powerful viewport, so let's dive in.

I've included a scene file for you to use if you'd like to follow along. Open (File/Open) the source file included with this guide named Gidget_and_Pepperjack_Vaughan.lxo.

(Modo_Essentials/Source/S1/Scenes)

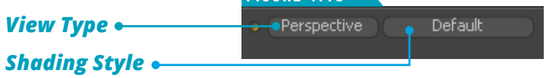
If you're using the default settings when the scene is loaded, your viewport won't match (Figure 1.17). Before we get into the details let's make one change to get a better look at the mesh items in the scene. In the top left corner of the 3D Viewport, click the icon at the end.

This is the Make Inactive Same as Active option which will display all mesh items in the scene the same, whether they are active or inactive. With that option toggled on, your viewport should match.

FIGURE 1.17



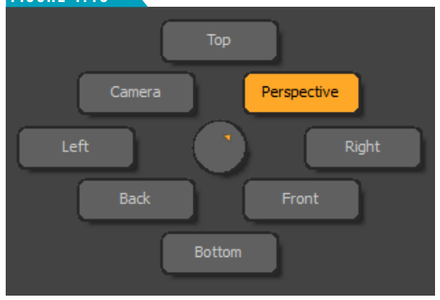
FIGURE 1.18



The View Type menu (Figure 1.18) located in the top left corner of the 3D Viewport enables you to change how the scene is viewed. It's set to Perspective by default, but clicking on the View Type menu enables you to change the view to Top, Bottom, Back, Front, Right, Left, Camera and Light.

You can bypass the View Type menu by using the keyboard shortcut (Ctrl+Spacebar). This displays the View Type pie menu (Figure 1.19). Hover your cursor over any of the options and release to select a view.

FIGURE 1.19



The Shading Style (Figure 1.18) located to the right of the View Type button in the top left corner of the 3D Viewport provides several ways to display the geometry in the scene. These are in-viewport shaders that display the geometry in specific ways, making it easier to visualize certain aspects of a model or scene.

You can also change the Shading Style of the viewport by using the keyboard shortcut (Ctrl+2). This displays the Shading Style pie menu (Figure 1.20).

Hover the cursor over the 3D viewport and use the additional hotkeys in (Figure 1.21) as an alternative way of changing the settings.

FIGURE 1.20



FIGURE 1.21 *Viewport Display Hotkeys*

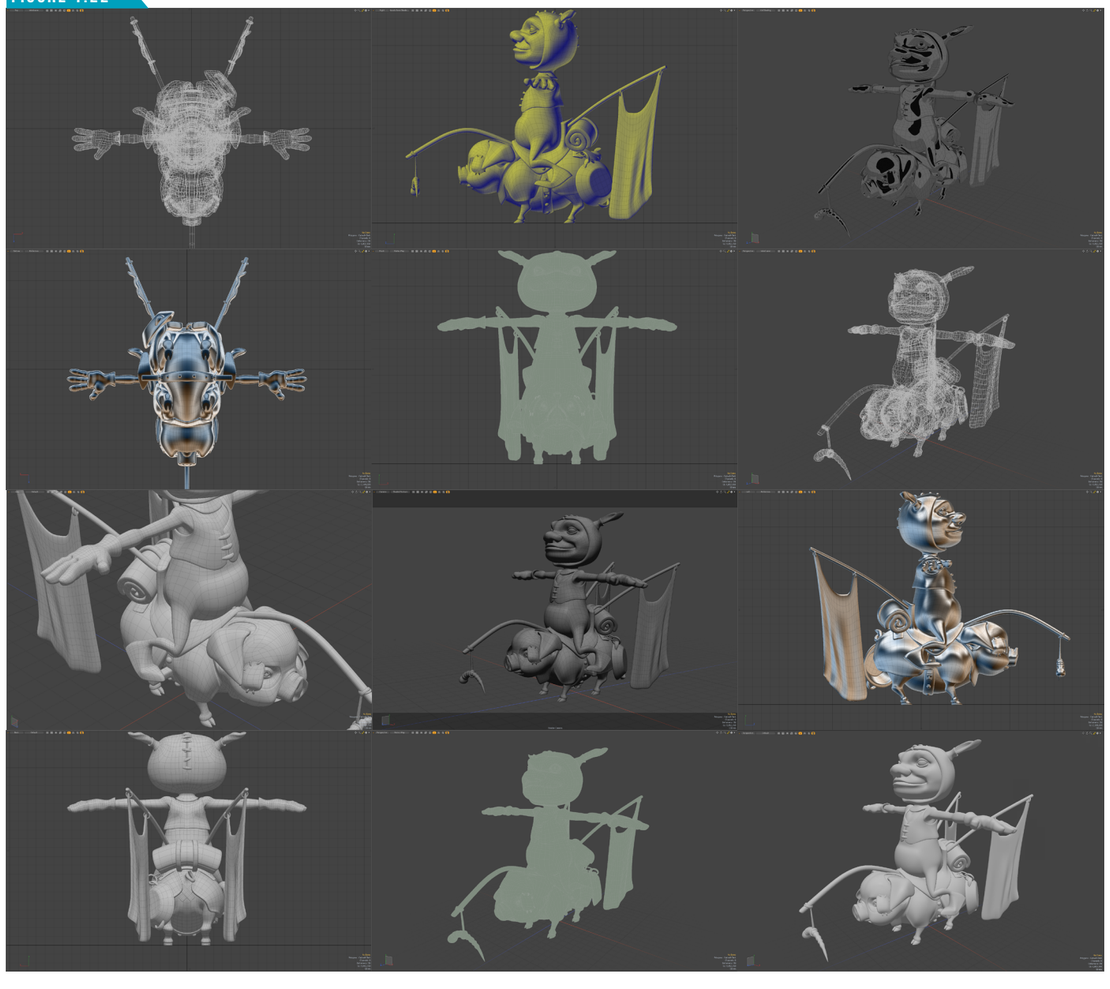
Keystroke(s)	Action
Ctrl+Spacebar	View Type Pie Menu
Ctrl+2	Shading Style Pie Menu
Numeric Keypad . (decimal)	View Type: Perspective
Numeric Keypad 1	View Type: Top (press again to toggle Top/Bottom view)
Numeric Keypad 2	View Type: Front (press again to toggle Front/Back view)
Numeric Keypad 3	View Type: Right (press again to toggle Right/Left view)
Numeric Keypad 4	Shading Style: Shaded
Numeric Keypad 5	Shading Style: Texture
Numeric Keypad 6	Shading Style: Reflection
Numeric Keypad 7	Shading Style: Wireframe
Numeric Keypad 8	Shading Style: Solid
Numeric Keypad 9	Shading Style: Vertex Map (VMap)
Numeric Keypad /	Wireframe Overlay None
Shift+Numeric Keypad /	Wireframe Overlay Uniform (Light)
Ctrl+Numeric Keypad /	Wireframe Overlay Colored (Dark)

PUT YOUR NEW SKILLS TO WORK!

Using what you've learned so far, customize the 3D Viewport to match the images shown in (Figure 1.22). Try using the View Type and Shading Style menus, Pie Menus and keyboard shortcuts. Once you've completed each of the examples, spend some time combining the various options to get a feel for what works best for you when viewing mesh items in Modo.

Note: Gidget and Pepperjack might not appear as large in your viewport as seen in the images below. No worries, we'll learn how to zoom in and out of the viewport soon. Focus on the View Type and Shading Style for now.

FIGURE 1.22



3D VIEWPORT CONTINUED

If we were limited to navigating our 3D scene with what we've learned so far, we'd have a tough time getting things done in Modo. Fortunately, there are additional functions available that make it easy to navigate the 3D Viewport.

The first three icons in the upper-right corner of the 3D Viewport (Figure 1.23) enable you to manipulate the view by panning, rotating and zooming in and out.

FIGURE 1.23



It's important to understand that these are not buttons that toggle on and off. To use them, you left-click and drag over the icons to adjust the view. Give it a try.

I'll be the first to admit that it's not the most intuitive way of navigating the view. My preferred method is taking advantage of the many hotkeys available. Take a look at (Figure 1.24) to see a list of the common hotkeys associated with navigating the 3D Viewport.

The double-arrow icon next to the zoom icon (Figure 1.23) enables you to minimize and maximize the active viewport. This will convert the 3D Viewport from a single view to a quad view as seen in (Figure 1.25).

FIGURE 1.25

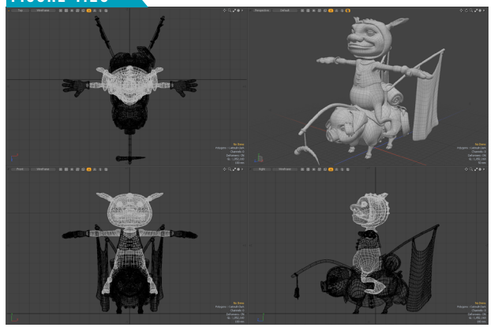


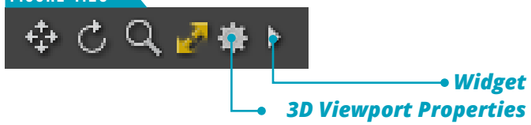
FIGURE 1.24 ***Viewport Navigation Hotkeys***

Keystroke(s)	Action
Alt+click	Rotate view
Alt+middle-click	Rotate viewport Z axis (bank) view
Alt+right-click	'Flick' rotate
Shift+Alt+left-click	Pan view
Shift+Alt+right-click	Pan up/down only
Ctrl+Alt+left-click	Zoom to mouse position
Ctrl+Alt+right-click	Box zoom
. (period)	Zoom in (only in component modes)
Shift+. (period)	Zoom in x2
, (comma)	Zoom out (only in component modes)
Shift+, (comma)	Zoom out x2
G	Center the view on the cursor's position
/	Turntable (only in component modes)
Shift+/	When turntable is running, displays upright turntable
Mouse Wheel Scroll	Zoom view in and out to mouse pointer
A	Fit (zoom to scene extents/all items)
Shift+A	Fit selected (zooms to selected elements)
Ctrl+A	Align selected (aligns view to the current selection)
Ctrl+Shift+A	Fit and align selected (zooms and aligns the view to the current selection)
0 (zero) Num Keypad	Maximize/Minimize the viewport the cursor is over (Alt+0 on Keyboard)

3D VIEWPORT CONTINUED

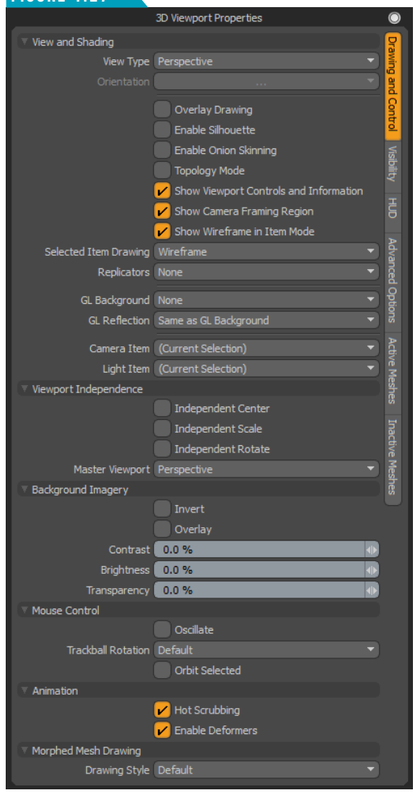
Next to the minimize and maximize icon, you'll see a gear icon (Figure 1.26). This is just like the gear we talked about for the Layouts Menu, except this contains all the available viewport customization control options for this 3D Viewport.

FIGURE 1.26



Clicking the gear icon will open the 3D Viewport Properties (Figure 1.27). You can also open it by hovering your cursor over the viewport and using the keyboard shortcut (O).

FIGURE 1.27



These options give you maximum control over every aspect of the 3D Viewport. We won't be going over all of these options in this guide, but you now know where the options are located. When you become more experienced with Modo, you can return and customize the viewport to your liking.

Some of the icons located next to the Shading Style button in the top left corner of the 3D Viewport (Figure 1.28) allow for quick access to a few of the viewport settings such as Make Inactive Same as Active, Show Weightmaps and the Replicator Drawing Options.

FIGURE 1.28



Hovering the mouse cursor over any of these icons displays a tooltip, which is a small text hint with the name of a function or tool, and keyboard equivalents if applicable.

Jumping back over to the upper-right portion of the 3D Viewport, you'll see a small arrow next to the gear icon (Figure 1.26). This arrow is called the Widget, and for now I'd recommend staying clear of this feature. The Widget Menu allows you to change the viewport to a completely different viewport, which can be useful, but for now we want to keep the default setting and have this viewport remain a 3D Viewport.

In the lower-left corner of the 3D Viewport there is an XYZ axis gizmo (Figure 1.29) that provides a visual reference to the orientation of the 3D space as well as the current Work Plane orientation. We'll discuss the Work Plane later in this guide.

To see the gizmo in action, rotate the view around. This handy feature can help keep you oriented when orbiting a mesh or navigating through a complex scene.

FIGURE 1.29



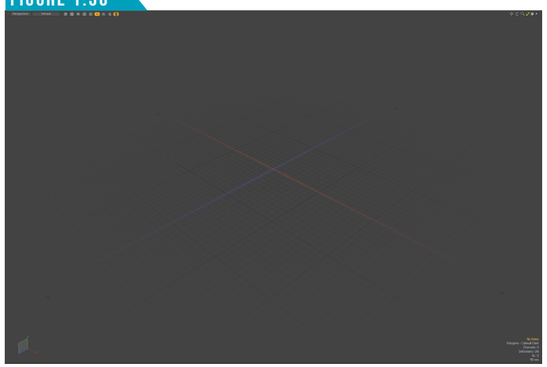
On the opposite side of the 3D Viewport in the lower-right corner (Figure 1.29), several useful bits of information are displayed.

Here you can view information that updates dynamically, showing the current number of selected items, the number of live polygons active in your viewport and more.

Last but certainly not least, the Grid that is displayed in the 3D Viewport (Figure 1.30) represents a virtual ground plane.

The Origin is located at the center of this grid, and each square represents a fixed distance. Since this grid is dynamic depending on the zoom level, the display in the lower right corner (Figure 1.29) gives you the real-world equivalent measurements for each square unit, in the case above, it is 50mm.

FIGURE 1.30



CLICK HERE FOR A QUICK VIDEO

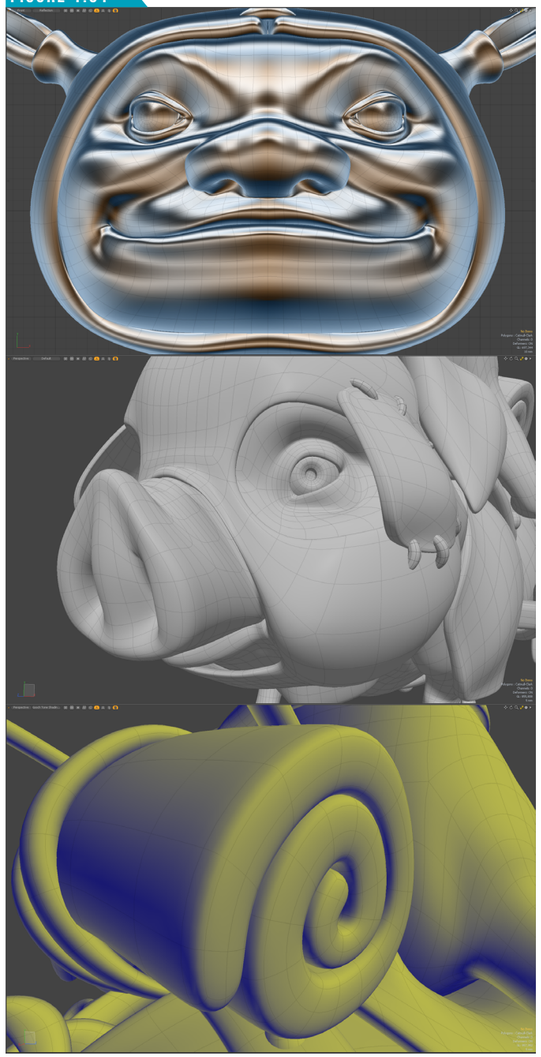
Now that we've gotten a brief overview of the 3D Viewport, use this video as a quick refresher of some of the features we've discussed.

PUT YOUR NEW SKILLS TO WORK!

We keep adding new tools to your toolkit. Let's put them to work. Just like the last exercise, recreate the viewports shown in (Figure 1.31). This will involve many aspects covered so far. If you get stuck, go back and review what has been discussed.

Being able to navigate and adjust the 3D viewport will be essential to successfully working in Modo. Spend as much time as you need to feel comfortable before moving on to the next portion of the book.

FIGURE 1.31



VIEWPORT TOGGLES AND SWITCHERS

You should now have a basic grasp of working with the 3D Viewport. Modo has additional viewports that you'll want to use when working on different aspects of a project or production, such as the UV Viewport, which shows you the two-dimensional view of UV space.

In previous versions of Modo, we would use the Layout Menu to switch to a completely separate layout to access the UV Viewport, but the Modo layout gives us easy access to all the viewports we'll need.

Just above the 3D Viewport is a thin dark strip that highlights when you mouse over it (Figure 1.32). Clicking this reveals the Viewport Switcher Bar (Figure 1.33).

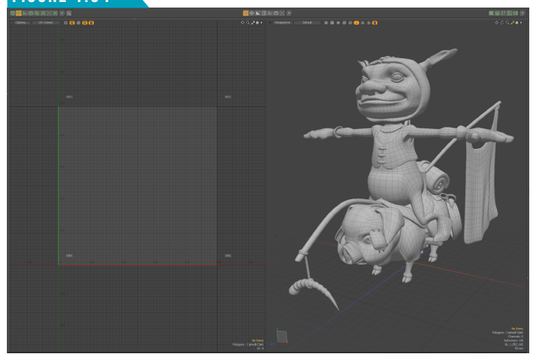
The icons in the center of the Viewport Switcher Bar enable you to quickly convert the 3D Viewport into alternate viewports such as the UV, Topology, Camera and Progressive Render Viewport.

The button with the plus sign (+) gives you access to three additional options that you can customize to your liking. Spend a minute clicking each of the center options to see how quickly you can convert the viewport to a variety of viewports. Don't worry, you wont break anything. Clicking the cube icon that is highlighted in (Figure 1.33) will return you to the default Model Viewport we've been working with.

There are many times that I want to work with multiple viewports at the same time. I personally like to have my 3D Viewport visible when working with the UV view, for example. I find it useful to select the edges that will define my UV seams.

The group of icons on both the left and right side of the Viewport Switcher Bar enables you to split the viewport workspace into multiple spaces. Give it a try. Click on the second icon from the left group to open the UV Viewport. Your workspace should look like (Figure 1.34).

FIGURE 1.34



Clicking the same button again will close the left viewport.

There is also a Lower Viewport Toggle Strip (Figure 1.35) that, when clicked, displays the Lower Viewport Switcher Bar (Figure 1.36).

Clicking the fifth icon from the right in the center group of icons displays the Schematic View in the lower viewport (Figure 1.37).

FIGURE 1.32

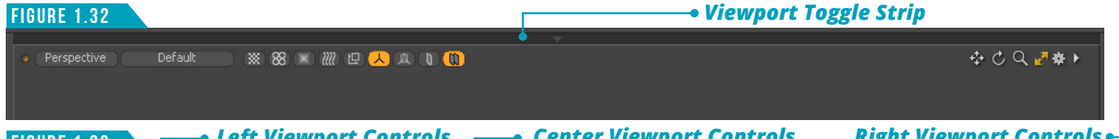


FIGURE 1.33

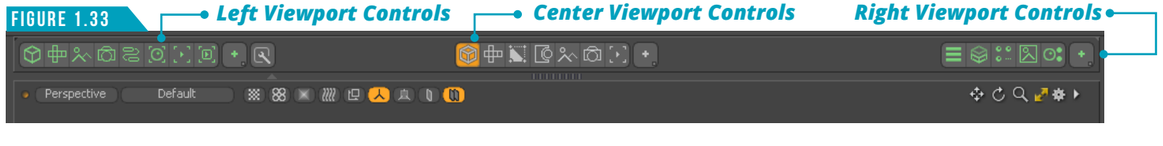


FIGURE 1.35

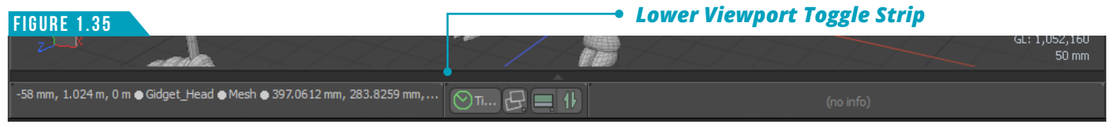
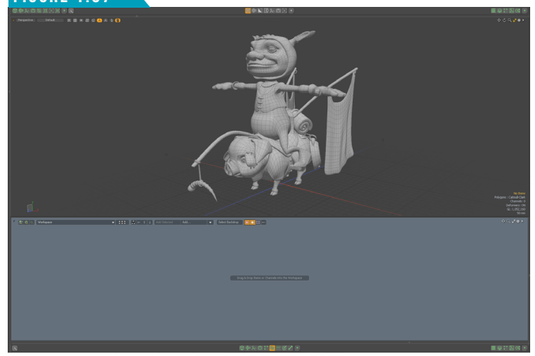


FIGURE 1.36



FIGURE 1.37



You don't need to have the center or lower viewport switcher bars visible to access these additional viewports. You can use the Viewport Toggle Controls found in the upper-left corner of the interface (Figure 1.38), upper-right corner of the interface (Figure 1.39), and the lower-left portion of the interface (Figure 1.40).

FIGURE 1.38

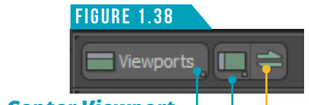


FIGURE 1.39

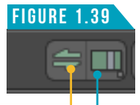


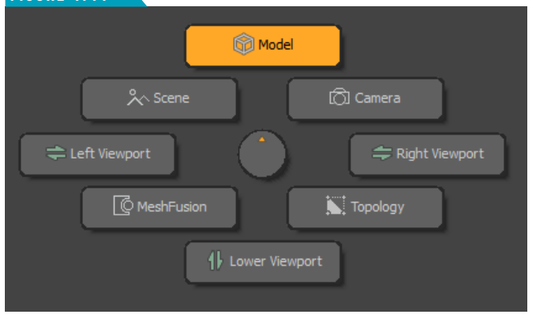
FIGURE 1.40



These controls allow you to quickly customize your workspace with multiple views. My favorite option, and the one I use the most, is the Viewport Switcher Pie Menu (Figure 1.41). To activate this handy pie menu, use the keyboard shortcut (Alt+Spacebar).

Viewport Switcher Pie Menu enables you to quickly toggle the left, right and lower viewports as well as switch the center viewport to five of the most common viewport options; Model, Scene, Camera, MeshFusion and Topology.

FIGURE 1.41



Using the viewport toggles and switchers will enable you to quickly customize the viewport, allowing you to stay in a single layout. It may sound trivial, but it truly does save time and allows you to work more efficiently.

Spend some time exploring these options before moving forward with this guide. Try different combinations of viewports as well as viewport types. Get comfortable using all of the methods discussed and see what works best for you. Remember, everyone works differently, so what works for me may be different than what works for you.

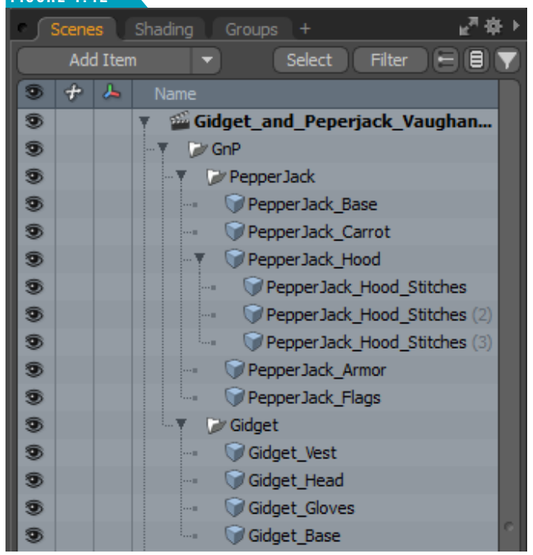
CLICK HERE FOR A QUICK VIDEO

This video demonstrates the viewport toggles and switchers, showing how to quickly customize your workspace for maximum efficiency.

LISTS VIEWPORT

The top-right portion of the interface gives you access to the Lists Viewport (Figure 1.42). This viewport is organized by a series of tabs that separate each list, allowing you to focus on a specific task.

FIGURE 1.42



The Scenes Tab displays by default and gives you access to the Items List. This important list allows you to create, edit, and organize the items that make up the scene (meshes, locators, lights cameras, etc.).

In the case of the Gidget and Pepperjack scene I had you open earlier (Modo_Essentials/ Source/ S1/ Scenes/ Gidget_and_Pepperjack_Vaughan.lxo), there are twelve mesh items, four group locators, three lights and a camera.

You can use the Items List for selection, creation, deletion, and re-ordering of items and entire scene files, creating parent and child hierarchies, setting visibility, editing item properties, and creating basic groups for general organization.

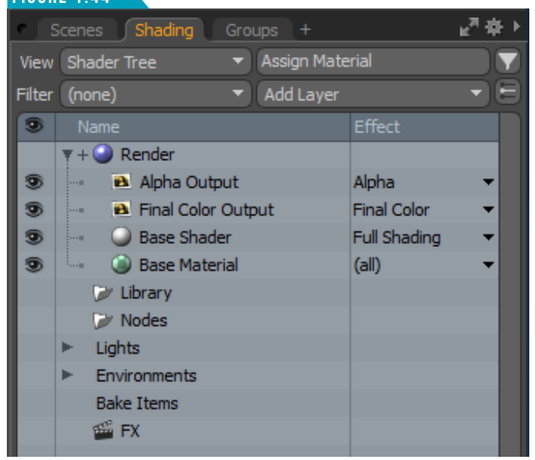
Use the hotkeys in (Figure 1.43) to speed up working in the Items List.

FIGURE 1.43 *Items List Hotkeys*

Keystroke(s)	Action
F	In Items selection mode, centers the viewport on the selected item (layer). In other modes, flips polygons.
Shift+click ▶	Expands/Closes all (also in Shader Tree)
' (apostrophe)	Swaps foreground/background layers
Ctrl+D	Duplicates selected layer(s) (only in Items mode)
Shift+D	Instances selected layer(s) (only in Items mode)
N	New Mesh Item
L	New locator item (only in Items mode)

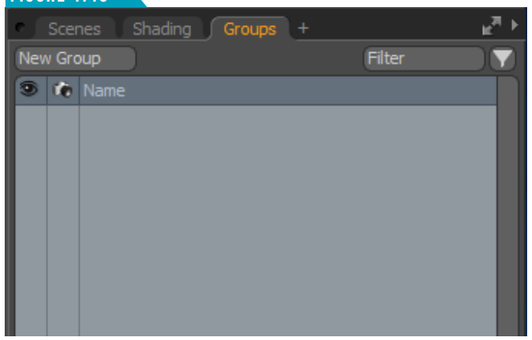
The Shading Tab gives you access to the Shader Tree (Figure 1.44). The Shader Tree controls how the final rendered image will appear for surfacing. This is where you create and organize materials, shaders, textures and more.

FIGURE 1.44



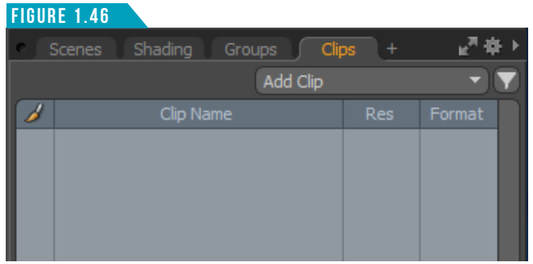
The next tab in the Lists Viewport is the Groups Tab (Figure 1.45). This houses the Groups Viewport, which is used to create groupings of items in a scene, making it easier to select and manipulate multiple items, as well as for controlling lighting (light linking), making multi-item Replicators and for working with animated scenes when setting keyframes.

FIGURE 1.45



The plus sign (+) to the right of the tabs enables you to add additional tabs to the Lists Viewport. I like having quick access to a list of all of the external images loaded in the scene, and this can easily be added by clicking the plus sign (+) and choosing (Data Lists/Clips). A new tab will be created, giving me the ability to add and manage images. (Figure 1.46).

FIGURE 1.46



Feel free to add and reorganize the tabs. To change the order of the tabs, simply left-click and drag them to the position you'd like them to be located. The drop position is indicated by a small orange line. Use the keyboard shortcuts shown in (Figure 1.47) to quickly navigate the tabs.

Spend a few minutes exploring the Lists Viewport and the hotkeys.

FIGURE 1.47 *Tabbed Viewport Hotkeys*

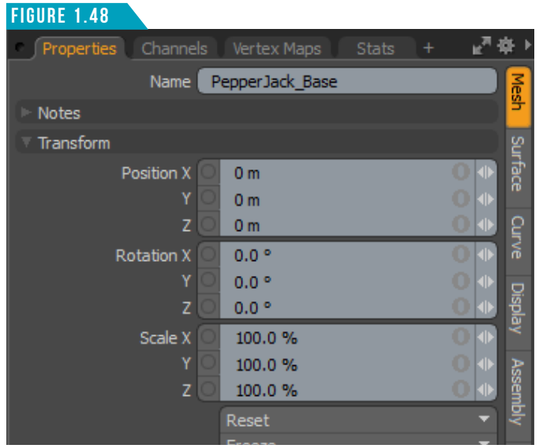
Keystroke(s)	Action
Ctrl+Shift+Home	When cursor is over List Viewport, opens the first tab.
Ctrl+Shift+End	When cursor is over List Viewport, opens the last tab.
Ctrl+Shift+Page Up	When cursor is over List Viewport, opens the next tab.
Ctrl+Shift+Page Down	When cursor is over List Viewport, opens the previous tab.

PROPERTIES/CHANNELS/VERTEX MAPS /STATISTICS

Below the Lists Viewport is an additional viewport consisting of more tabs (Figure 1.48). These tabs can be reorganized the same way as the Lists tabs and use the same hotkeys shown in (Figure 1.47) for navigating.

By default, the Properties Tab will be displayed. This is one of the most important areas of the Modo workspace. Every item in Modo has a series of attributes associated with it, and this is the viewport where you can edit them.

FIGURE 1.48



PROPERTIES/CHANNELS/VERTEX MAPS /STATISTICS CONTINUED

Selecting any item displays the item's properties, dynamically changing as different types of items are selected. Click on one of the arrows next to an item name (Figure 1.49) in the Items List to expand its hierarchy, then select one of the mesh items to see its attributes. Next, select one of the lights in the Items List to see the Properties change dynamically (Figure 1.50).

FIGURE 1.49

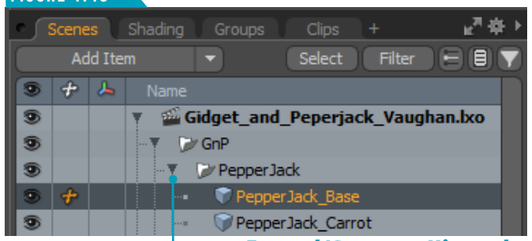
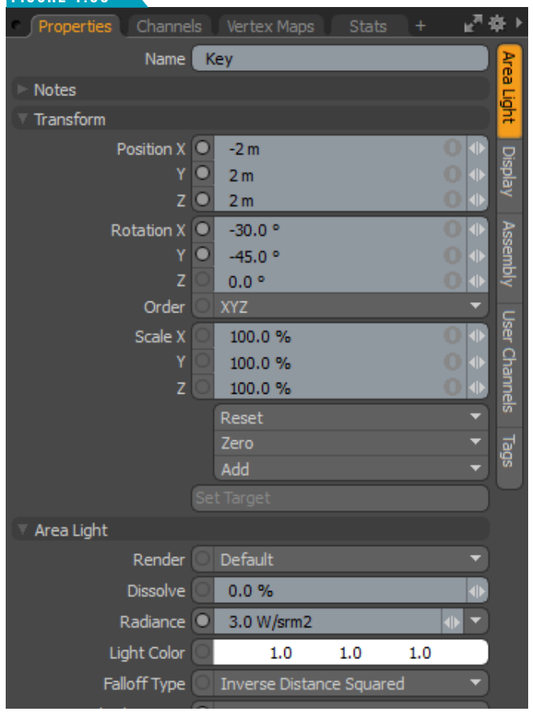
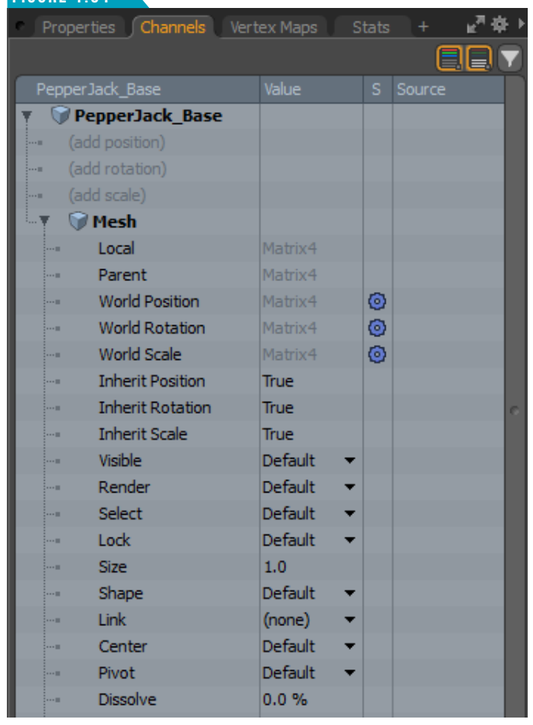


FIGURE 1.50



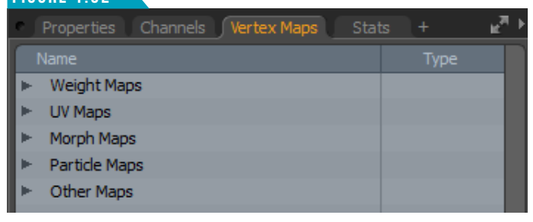
The Channels Tab lists every animatable attribute of the selected item(s) (Figure 1.51). These are the same attributes found in the properties panel and subtabs, but this view provides an alternate method for selecting channels, and creating, navigating, and managing any keyframes on those channels.

FIGURE 1.51



The Vertex Maps Tab (Figure 1.52) gives you direct access to all vertex maps associated with the selected item. Use this viewport to create, rename and delete any of the various vertex maps such as Weight, UV, Morph, Color, and Vertex Normal Maps.

FIGURE 1.52



The Stats Tab (Figure 1.53) consists of three main parts.

The Statistics Viewport displays a listing of scene statistics such as the total number of polygons, or how many of them are triangles or ngons. You can use the +/- icons preceding each line for selecting and deselecting geometry in the scene based on the specific criteria.

Clicking on the Info button will display the Info Viewport, which gives you all the information associated with a selection (Figure 1.54).

FIGURE 1.53

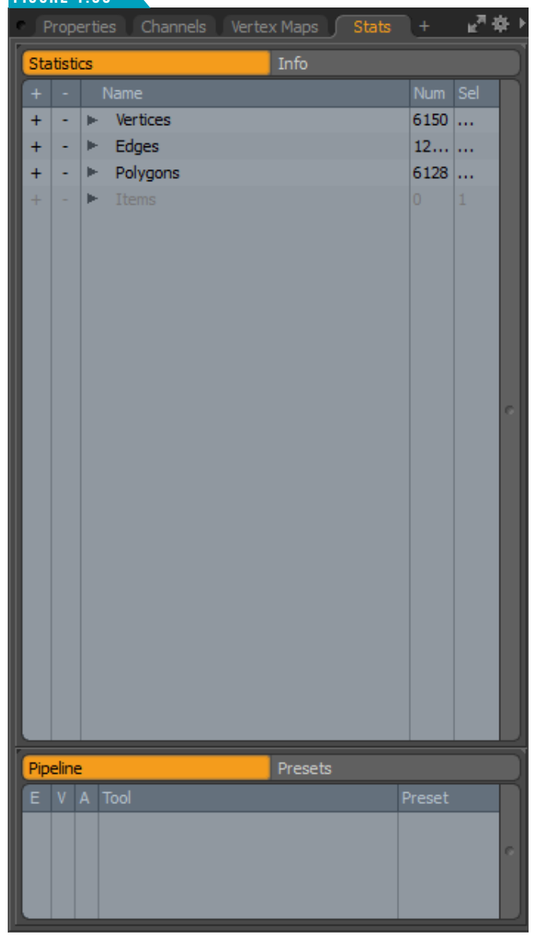
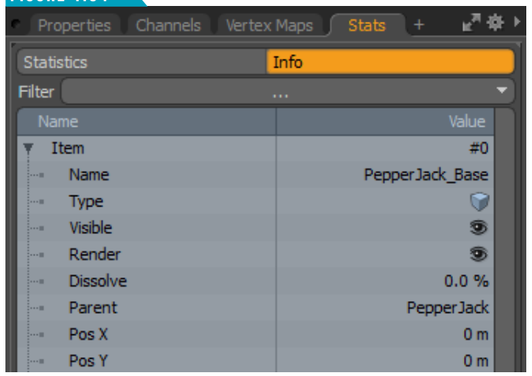


FIGURE 1.54



Selecting an item provides information on that item. Selecting some geometry provides information on all the associated vertices and map values as well as applied surfaces and selection sets associated with it.

Under the Statistics and Info Viewports is the Pipeline Viewport or Tool Pipe. It allows you to view the currently-active tool combination.

A tool can be made up from a single function like the Transform Move Tool, or it can be a combination of functions rolled together, such as the Transform Move Tool with Element falloff and Element action center, like the Element Move Tool.

You can not only see what tools and options are active, you can use the Tool Pipe to create custom tool combinations and save them as Tool Presets for later use.

Spend some time exploring these new tabs and how they dynamically update depending on what is selected in the scene. When they start to become a little more familiar, advance to the next page.

CLICK HERE FOR A QUICK VIDEO

This quick video demonstrates the Lists Viewport as well as the Properties, Channels, Vertex Maps and Statistics tabs.

COMMAND INPUT FIELD

The Command Input Field doesn't look like much at first sight, but there's definitely more than meets the eye with this portion of the Modo interface.

Located in the lower-right corner of the UI (Figure 1.55), the Command Input Field enables you to execute commands by typing them in the field and pressing enter. When you use Modo in any way, you are working with commands. For example, when you selected a mesh item in the Items List earlier, a command was fired telling Modo to select that item.

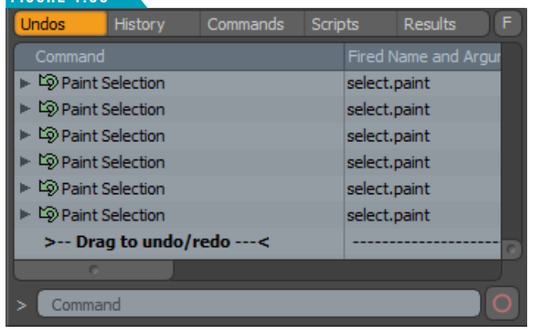
Modo keeps track of every command used during a session in the Command History viewport. To access this viewport, drag up on the small divider that is located just above the Command Input Field until the Command History Viewport is displayed. (Figure 1.56)

This view is useful for quick undo/redo operations, discovering commands, quickly assigning keyboard shortcuts to specific commands, and many other utility functions. Use the Keyboard shortcut (F5) to open a floating window of the Command History Viewport.

FIGURE 1.55



FIGURE 1.56

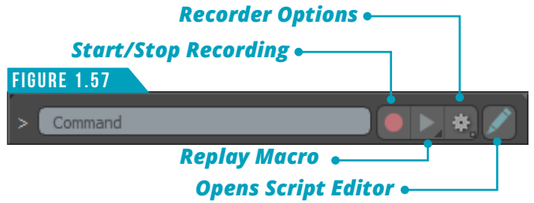


MACRO RECORDER

Macros are very simple scripts consisting of a linear list of commands that are executed in order. They are easy to create and can speed up repetitive tasks, saving you time. You can quickly record your actions and save them as a macro using the Macro Recorder located next to the Command Input Field in the lower-right corner of the workspace. (Figure 1.55)

To access the recorder's controls shown in (Figure 1.57), click on the red circle icon next to the Command Input Field.

FIGURE 1.57



To hide the Macro Recorder controls, click in the Command Input Field. This will maximize the field, allowing more space when entering commands.

3D TRACKING INFO

The 3D Tracking Info (Figure 1.58) displays valuable information but is often overlooked. This handy viewport is located in the lower-left corner of the UI and displays 3D tracking information based on the cursor's location.

Hovering over an item when in Item mode will briefly display the Item Name, Type and Size in the Status Bar. (Figure 1.59)

Hovering over a component will briefly display the Item Name, Polygon Type and component Size in the Status Bar.

Selecting a component with the cursor motionless will leave this information displayed until the cursor is moved.

FIGURE 1.58

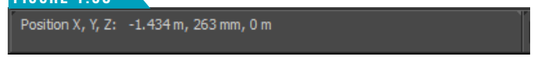
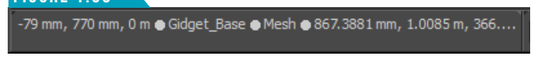


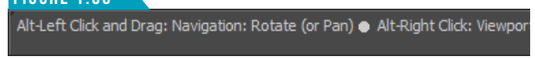
FIGURE 1.59



STATUS BAR

The Status Bar (Figure 1.60) is located on the bottom edge of the UI and by default, displays the basic rules of using the mouse. Hovering the cursor over various elements in the UI will display info about those elements.

FIGURE 1.60



TIMELINE VIEWPORT TOGGLE

Clicking the Time button at the bottom of the Layout will display Modo's Timeline (Figure 1.61).

The Timeline allows you to control time in an animation. To animate any item over time, you only need to set a specific value at a point in time (known as a keyframe) and then move to a different point in time to set a new keyframe.

This viewport also enables you to launch the Graph Editor as a floating window, and if you click on the top edge of the Time line and drag up, you can gain access to the Track View (also referred to as the Dope Sheet). (Figure 1.62)

FIGURE 1.61

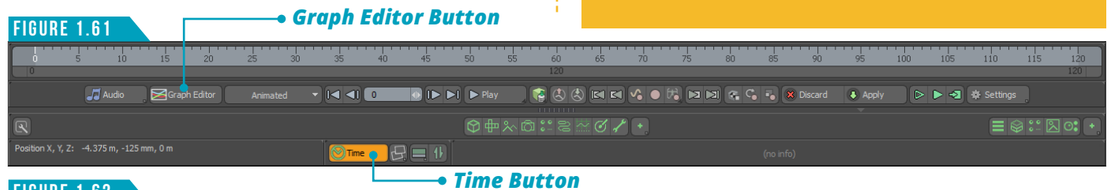
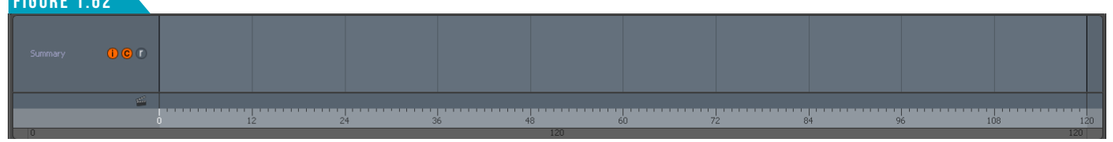


FIGURE 1.62



Both the Graph Editor and Track View provide alternate methods for creating and editing keyframes.

To speed up working with the Timeline and setting keyframes, take advantage of the keyboard shortcuts in (Figure 1.63) and (Figure 1.64).

FIGURE 1.63 *Timeline Hotkeys*

Keystroke(s)	Action
Shift+Up arrow	Go to first frame
Ctrl+Up arrow	Go to first keyframe
Ctrl+Left arrow	Go to previous keyframe
Shift+Left arrow	Go back one frame
/	Start/stop animation playback
Shift+Right arrow	Go forward one frame
Ctrl+Right arrow	Go to next keyframe
Ctrl+Down arrow	Go to last keyframe

FIGURE 1.64 *Setting Keyframes Hotkeys*

Keystroke(s)	Action
Shift+Y	Key transforms
Shift+E	Key rotations
Shift+W	Key positions
Shift+R	Key scale
S	Key selected channels
Shift+S	Key selected items

CLICK HERE FOR A QUICK VIDEO

This quick video demonstrates accessing the Command History Viewport, Macro Recorder and Timeline.

PALETTES POPOVER

The Palettes Popover (Figure 1.65) is located to the left of the Status Bar. Clicking the icon will display a popover which gives you quick access to opening common palettes such as the Graph Editor and Deformers List. For a complete list of palettes to choose from use (Layout/Palettes) from the Application Menu. You can also access eight palettes using the hotkey (Alt+`(backtick)) to open a Palettes Pie Menu (Figure 1.66).

FIGURE 1.65

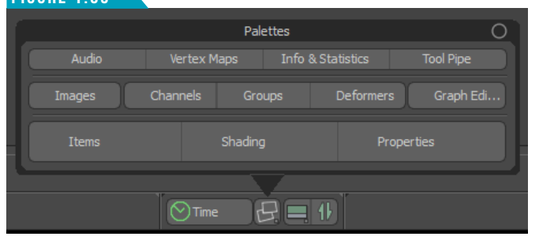
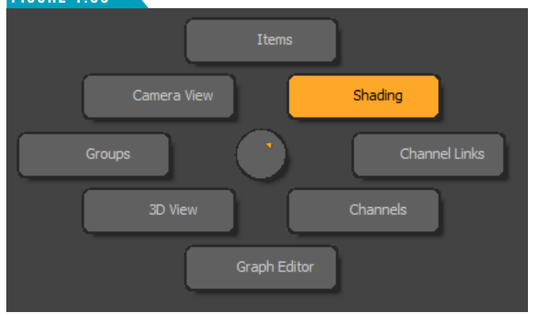


FIGURE 1.66



KITS POPOVER

Kits are additional tools that can be added to Modo to extend its functionality. Some Kits ship with Modo such as the Unreal Bridge and Sketchfab kits. Additional kits can be freely downloaded from the Foundry site such as the After Effects IO, FlexFuse, GoZ, and Makerbot kits. You can also purchase third-party kits such as MOP Booleans, Polystein and more.

The Kits Popover (Figure 1.67), located in the upper-right corner of the interface, gives you access to these add-ons.

Clicking the Kits button will display the kits you have installed and give you the ability to enable and disable kits as well as set their visibility using the Kit Manager. (Figure 1.68)

FIGURE 1.67



FIGURE 1.68



MODO MODES

The Modo Modes section of the interface is located directly below the Layouts Menu Bar. (Figure 1.69)

In early versions of Modo, it was home to a much smaller collection of options, but over time the number of items found on this bar has grown.

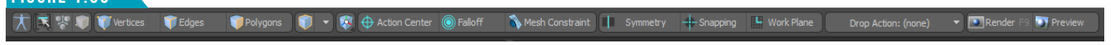
This is probably due to the fact that this area is prime real-estate. It's an ideal location for commonly used features, and that's exactly what you'll find here.

Let's do a quick run through of what this collection has to offer.

The first icon on the left allows you to enter Setup Mode (Figure 1.70). Setup Mode plays an important role in the rigging process. In order to Bind a skeleton to a mesh, set up Inverse Kinematics (IK) or define resting positions, you'll need to activate Setup Mode.

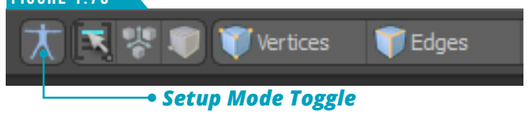
By having a specific Setup Mode, you have an easy way to get an animated or deformed model back into its resting position for

FIGURE 1.69



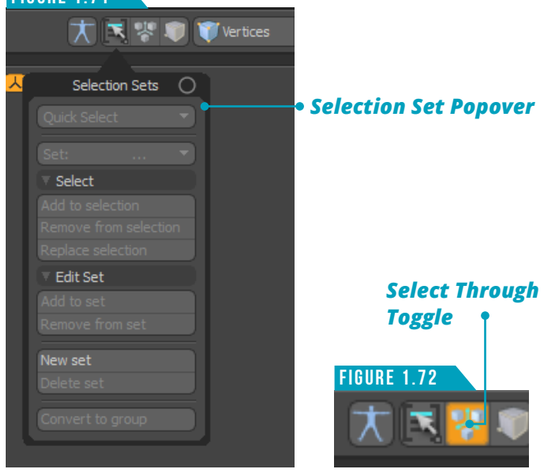
further refinement without having to remove or disable any animation already applied to the geometry.

FIGURE 1.70



To the right of the Setup Mode Toggle is the Selection Set Popover button (Figure 1.71). Selection sets enable you to save and edit component- and item-based selections to recall at a later time. Use this easy to access popover to create, edit, use and remove selection sets.

FIGURE 1.71



Select Through Toggle

FIGURE 1.72

The Select Through Toggle (Figure 1.72) will only become available when a tool is active and works on a tool by tool basis. With this toggle off, Modo uses any click away from a tool's handle to haul the primary values. If you toggle on Select Through for the currently active tool, you no longer have hauling behavior but get selection events instead. This allows you to make new selections without dropping the active tool. Use the keyboard shortcut (; (semicolon)) to toggle this option on and off.

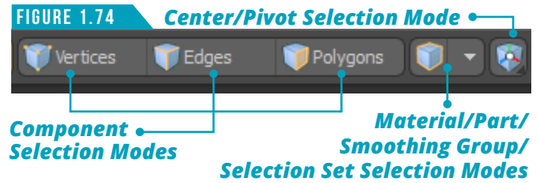
Auto Select mode (Figure 1.73) allows you to quickly change the current component selection mode used in your scene. When enabled, you can select a vertex, an edge, or a polygon to automatically activate the different selection modes. For example, if Vertices selection mode is active and there are no vertices currently selected, clicking on an edge switches to Edges selection mode automatically.

FIGURE 1.73



There are ten core selection modes in Modo, and nine of them can be enabled from the Selection Modes portion of the Modo Modes bar as seen in (Figure 1.74).

FIGURE 1.74



You can only access nine of the selection modes from the UI because by default, Item Selection Mode is enabled. When not in one of the other nine modes, Modo defaults back to Items Selection Mode.

To enable one of the component selection modes (Vertices, Edges or Polygons), simply left-click on its button.

Use the button to the right of the component mode buttons to access a pop up which gives you the option to choose between Material, Part, Smoothing Group or Selection Set Selection Modes. You can switch between Center and Pivot Selection Mode by either

MODO MODES CONTINUED

left-clicking and holding down on the Center/Pivot Button or right clicking and choosing either Center or Pivot.

We'll dive deeper into selection in the next section of this guide, but you'll want to get familiar with this portion of the Modo Modes bar since selecting plays such a major role in every aspect of production.

Use the keyboard shortcuts in (Figure 1.75) to quickly change selection modes.

FIGURE 1.75 ***Selection Mode Hotkeys***

Keystroke(s)	Action
Spacebar	Cycles the selection sequentially from vertices to edges to polygon
1	Vertices
2	Edges
3	Polygons
4	Materials/Parts/Smoothing Groups/Selection Sets
5	Items
6	Pivot
7	Center
Alt+Q	Selection mode/Transform tools Pie Menu
Shift+Spacebar	Toggle Component mode to Item mode (or last mode)

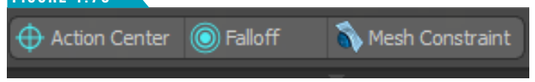
Action centers are a definable origin position for modeling and transform actions.

They allow you to easily change the positions from where the action of any tool originates, such as placing the action at the world's origin, the average position of a selection or a user definable element on a mesh item.

When no action center is selected, the Action center type is set to None and the Action Center Button (Figure 1.76) will be labeled Action Center.

When set to None, the active tool handles will be positioned to the center of the current

FIGURE 1.76



selection and oriented to the World or Work Plane axes.

Clicking on the Action Center Button will present a menu of action center options. You can also use keyboard shortcuts (Figure 1.77) to quickly enable some of the commonly used action centers.

It's important to understand that Action Centers are persistent until disabled, and work with all tools in Modo.

FIGURE 1.77 ***Action Center Hotkeys***

Keystroke(s)	Action
Alt+W	Origin
Alt+E	Pivot
Alt+A	Automatic
Alt+S	Selection
Alt+D	Selection center, auto axis
Alt+F	Screen
Alt+Z	Element
Alt+X	Local
Alt+G	Pivot center, parent axis

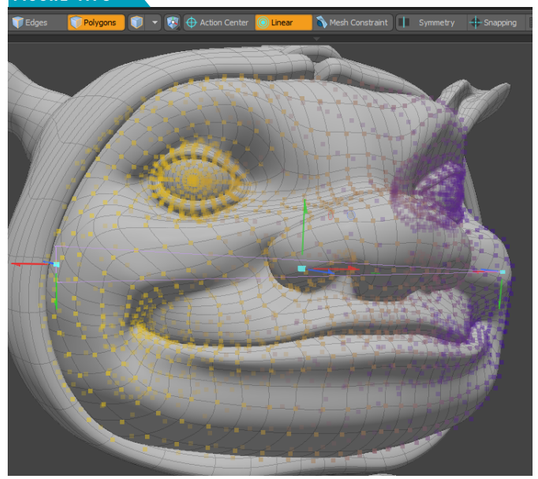
In Modo, elements are either selected or not selected. This means the effect of a tool happens at a constant rate across the selected range. Using Falloffs, you can attenuate the effect a tool has over a selection, gradually increasing or decreasing a tool's intensity across a defined range.

Using the Falloff Button (Figure 1.76), you can define a falloff by selecting it from the list. Just like Action Centers, Falloffs are persistent until disabled.

If you're new to working with Falloffs, I recommend taking advantage of the Show Falloffs display option (View/Show Falloffs).

This will give you visual feedback of how the Falloff is going to affect the selected elements. (Figure 1.78) shows an example of a Linear Falloff being used. Yellow areas are affected 100% by the current tool's actions while purple elements have no effect.

FIGURE 1.78



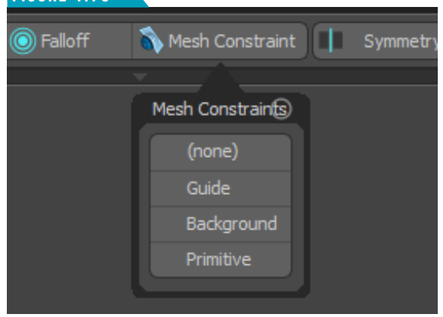
The Mesh Constraint Button (Figure 1.76) enables and disables the currently selected constraint. There are three types of mesh constraints; Guide, Background and Primitive.

These three Mesh Constraint types enable you to use meshes to assist you in aligning elements, enhance curve tool handles for better transform operations, and retopology.

By default, the Mesh Constraint type is set to Background, but you can quickly change to another type by holding the (Alt) key and clicking on the Mesh Constraint Button. (Figure 1.79)

Note: When the (Alt) key is held down, the Mesh Constraint Button will be relabeled Options.

FIGURE 1.79



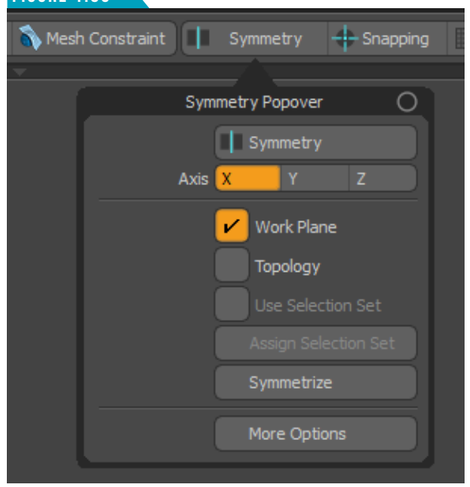
The Symmetry Button (Figure 1.80) toggles the symmetry feature on and off. Just like the Mesh Constraints Button, holding the (Alt) key and clicking will display the functions options.

The Symmetry function enables you to work on one half of a symmetrical mesh, and have the other half mirror the actions.

Once Symmetry is enabled, any operations performed in the component modes (vertices, edges, polygons), such as selecting polygons or deforming edges, are mirrored across the chosen axis to the corresponding geometry.

For best results, I recommend working with your mesh items centered at the Origin when working with the Symmetry function.

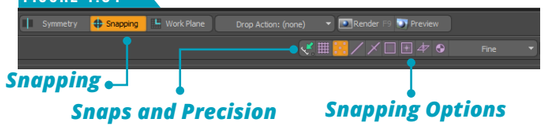
FIGURE 1.80



MODO MODES CONTINUED

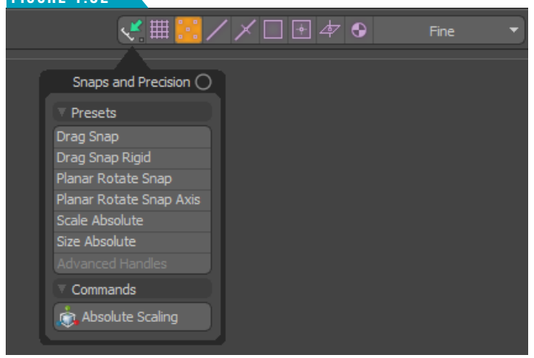
Snapping is disabled by default, but it can be quickly enabled by clicking the Snapping button (Figure 1.81). When the Snapping function is enabled, you can accurately create and align elements in relation to one another, or in relation to the grid.

FIGURE 1.81



If the Viewport Switcher Bar is active as shown in (Figure 1.81), you'll have quick access to some of the common snapping options. You'll also have access to the Snaps and Precision Palette (Figure 1.82), which includes several tool options you can use for precision transforms such as Absolute Scaling.

FIGURE 1.82



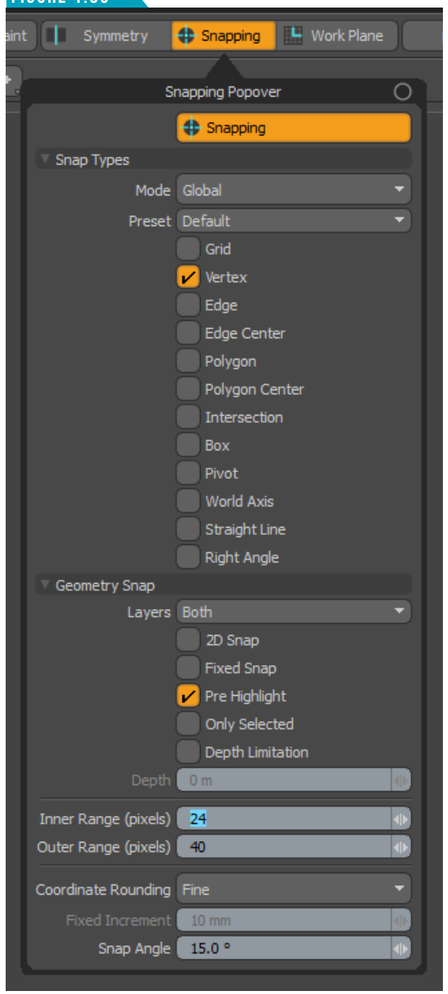
Holding down the (Alt) key and clicking on the Snapping Button will give you access to the Snapping Popover (Figure 1.83), which allows you to control what scene features respect snapping.

You can select any number of controls simultaneously as well as the Mode that determines when the snapping occurs.

WATCH OUT!

It's common for artists to forget they've enabled functions such as Symmetry, Mesh Constraints and Snapping. If you experience unexpected results when using tools, a quick look at the Modo Modes bar can tell you if any of these features are active. **Active features' buttons are highlighted in orange.**

FIGURE 1.83



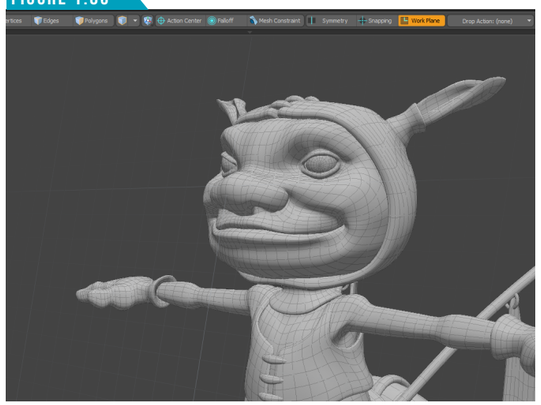
Use the keyboard shortcuts shown in (Figure 1.84) to speed up working with snapping.

FIGURE 1.84 *Snapping Hotkeys*

Keystroke(s)	Action
X	Toggle snap state (hold with tool active for temporary snap)
F11	Open snapping popover
Ctrl+Shift+T	Element snap

When the Work Plane feature is enabled using the Work Plane Button, a white grid will appear in the 3D Viewport (Figure 1.85).

FIGURE 1.85



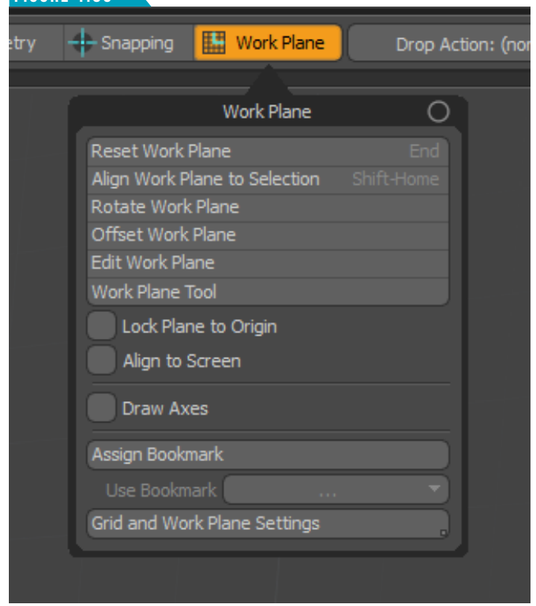
The Work Plane is an adaptive modeling aid that automatically adjusts itself to match the two major axes most closely aligned to your current screen axis. When you rotate the Perspective viewport, the Work Plane snaps to one of the dominant planes: XY, XZ, or ZY.

The Work Plane can also be locked and used as a construction plane. When applied as such, the Work Plane effectively positions the entire Modo universe to that fixed angle and position.

Holding the (Alt) key and clicking the Work Plane Button will display the Work Plane Popover (Figure 1.86), which will give you access to the Work Plane options.

The Work Plane allows you to do most, if not all, of your modeling in a single perspective viewport, so you'll want to get familiar with it over time.

FIGURE 1.86



Use the time-saving keyboard shortcuts shown in (Figure 1.87) to enhance your experience when using the Work Plane.

FIGURE 1.87 *Work Plane Hotkeys*

Keystroke(s)	Action
Home	Align to geometry under cursor
Shift+Home	Align to selection (average of all selected)
Ctrl+Home	Align to viewport
End	Reset the Work Plane
Shift+End	Open Work Plane pop-over
Page Up	Offsets the Work Plane incrementally in the positive direction
Page Down	Offsets the Work Plane incrementally in the negative direction
Numeric Keypad * (asterisk)	Toggle visibility
Alt+O	Offset Work Plane to geometry position under cursor

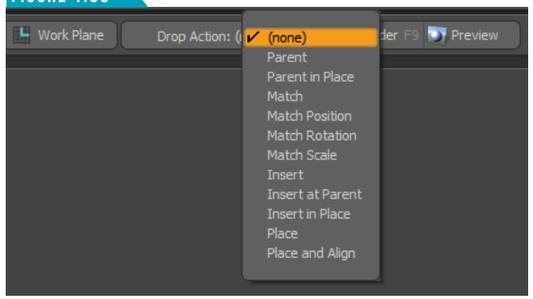
MODO MODES CONTINUED

To the right of the Work Plane button is access to an often overlooked feature set called Drop Actions. The Drop Action Menu (Figure 1.88) defines what action happens when you drag one item onto another.

To set one of the drop actions, simply click the Drop Action Menu and select an action. Now, when you drag an item (the Source item) onto another item (the Destination), Modo implements the specified action.

It's important to remember that you must be in Items Selection Mode with no active tools for the actions to work.

FIGURE 1.88

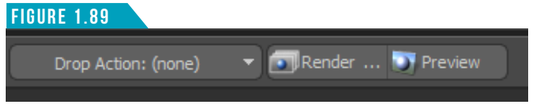


Rendering is the process of converting all the elements that make up a scene into a two-dimensional image. The Render Button (Figure 1.89) gives you quick access to the most common render command in Modo.

While it's handy to have it available on the UI for new users, the average user takes advantage of the keyboard shortcut (F9).

Clicking the Render Button or using the keyboard shortcut (F9) will open the Render Display Window (Figure 1.90) and start the rendering process.

FIGURE 1.89

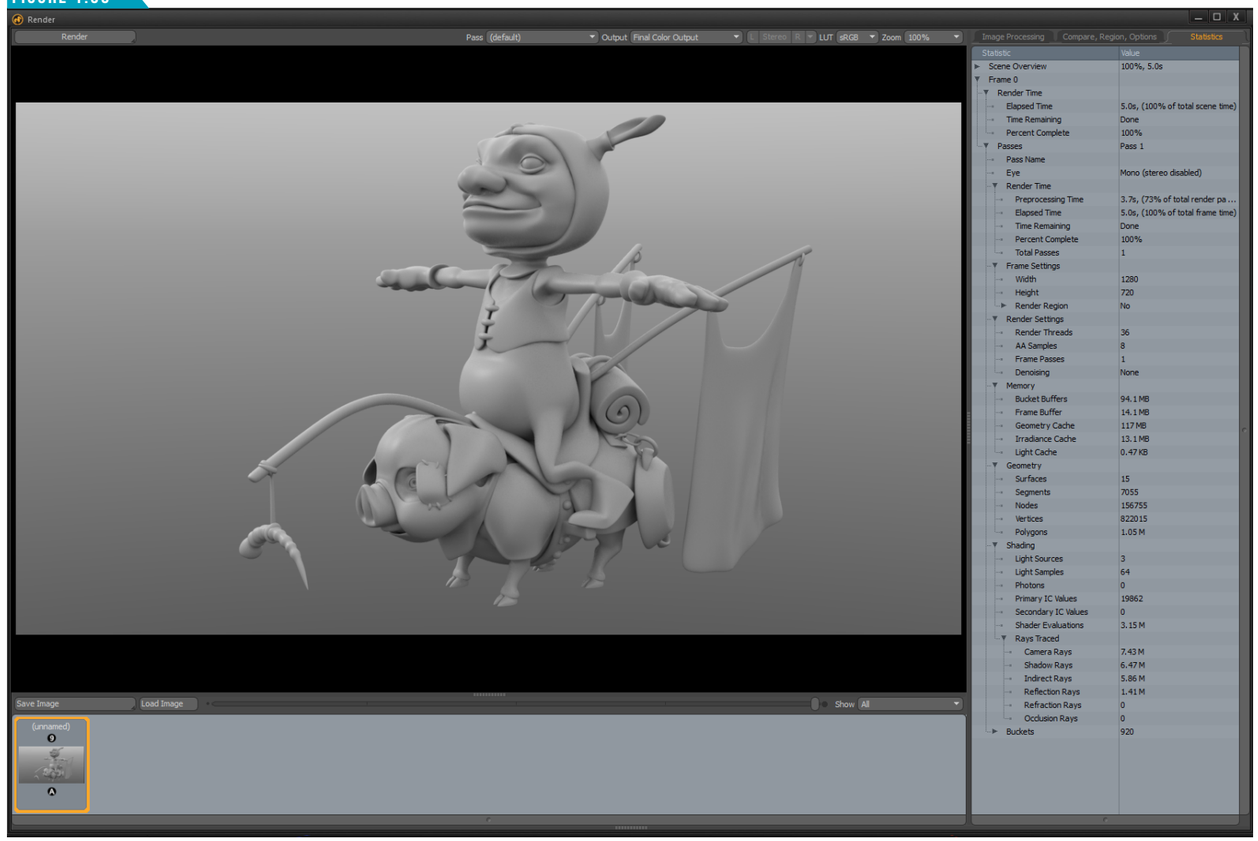


There are additional keyboard shortcuts that are good to have on hand shown in (Figure 1.91).

FIGURE 1.91 *Render Hotkeys*

Keystroke(s)	Action
F9	Render
Ctrl+F9	Render visible
Shift+F9	Render selected
F10	Render current view
Alt+Shift+F9	Open render display window

FIGURE 1.90



The Preview Button (Figure 1.89) to the right of the Render Button opens the Preview Viewport (Progressive Render Viewport).

This powerful viewport uses the Modo render engine in a progressive refinement mode that allows you to see all changes in a scene as a fully rendered image.

While having a floating preview window can be useful, I tend to convert either my center or lower viewports to the Preview as shown in (Figure 1.92).

Take advantage of the keyboard shortcuts in (Figure 1.93) when working with the Preview Viewport.

FIGURE 1.92



FIGURE 1.93 *Preview Viewport Hotkeys*

Keystroke(s)	Action
Ctrl+F	Focus under cursor
Shift+Mouse Wheel	Preview zoom
Middle-click+drag	Pan the preview (only when zoomed in)

The main advantages to using the Preview Viewport is the fast display of the rendered scene and the ability to Navigate the camera around just like any other 3D Viewport set to camera.

You can also zoom in for a closer look without affecting the camera's position with a middle scroll wheel mouse (Shift+Mouse Wheel).

That wraps up our brief tour of the Modo layout. Before moving on, be sure to get comfortable with all of the buttons on the Modo Modes bar.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at some of the key options found in the Modo Modes.

MODO USER INTERFACE WRAP-UP

You've successfully made it to the end of Section 1 and are well on your journey through this weekend crash course.

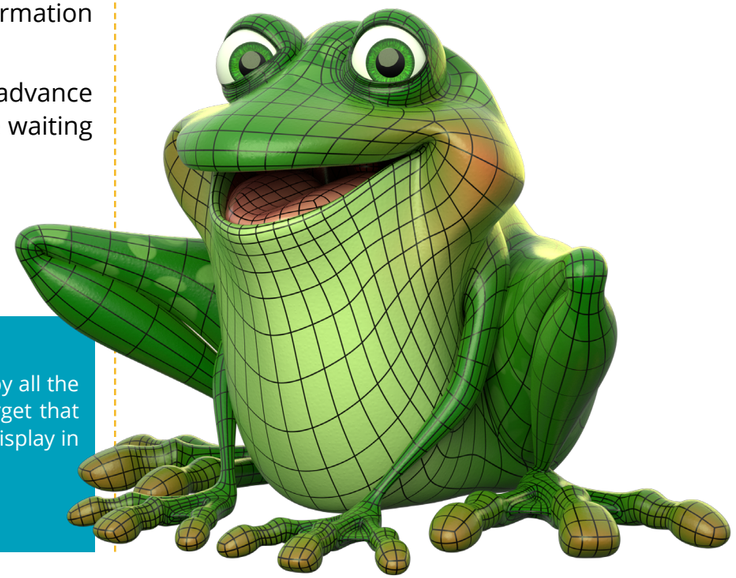
I've included the breakdown of the Modo Layout below (Figure 1.94), so you can review what we've covered throughout the first section of the book. If one of the labeled elements of the UI doesn't sound familiar, jump back to that portion of Section 1 for a refresher. You can also return to this section at any time to reference keyboard shortcuts, which will take some time to store into memory.

Keep in mind that you don't have to be capable of using all the features discussed so far. At this point, it's more important that you are aware of the options that are available, so you can navigate the Modo workspace and have features on display be familiar.

There are many aspects to working in Modo, but I have found the two most common operations needed in any given work session are navigating the user interface and selecting. We've explored the first of these two and in the next section we'll tackle selection.

I'm pretty sure you're excited to keep moving forward, but before you do, take a short break. If you're anything like me, you've been glued to this guide and could use a stretch and a little time for all this new information to sink in.

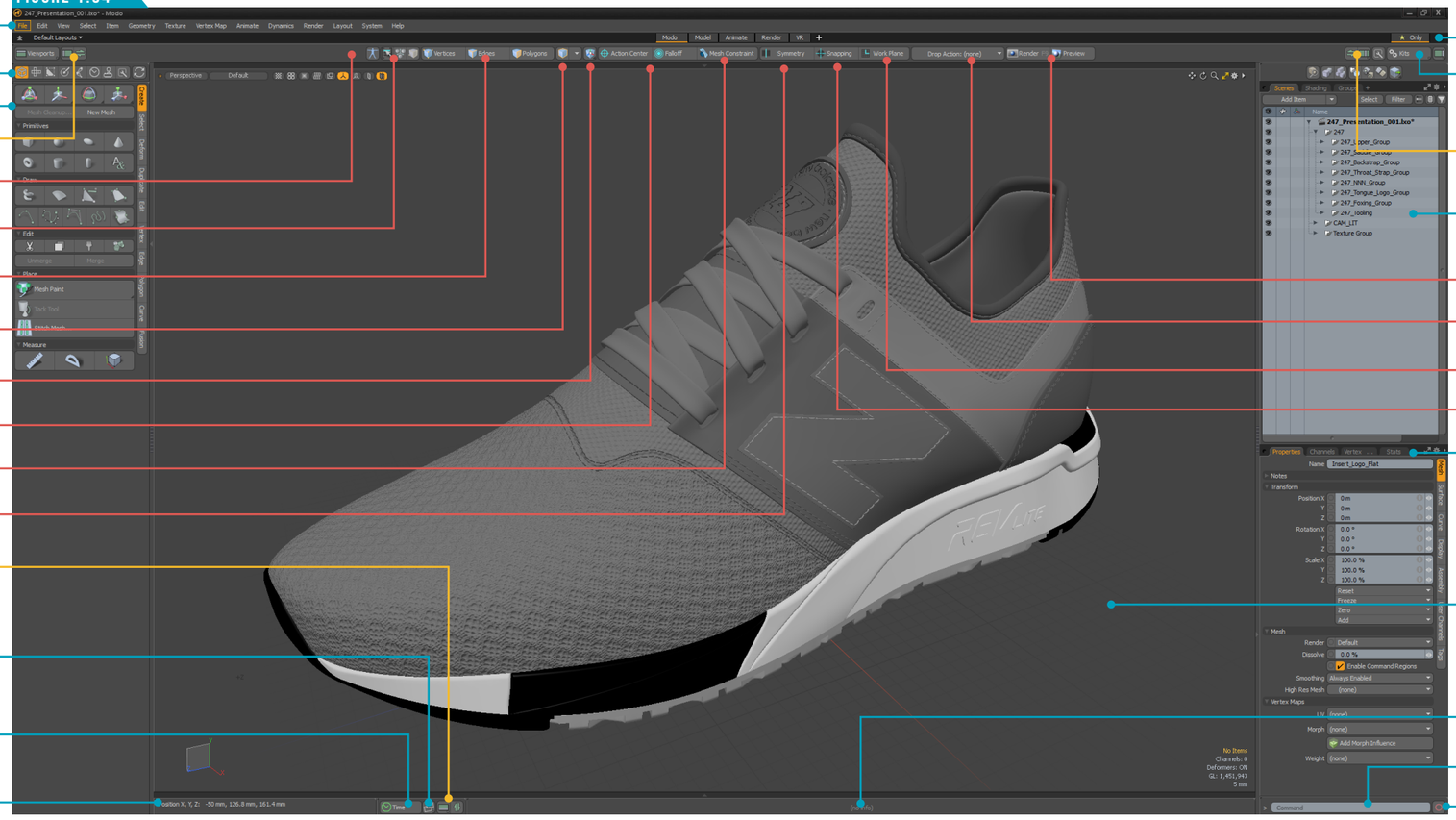
Come back refreshed and ready to advance your Modo skillset. The guide will be waiting for you when you return.



AUTHOR'S NOTE

If you're feeling a little overwhelmed by all the features we've discussed so far, don't forget that you won't be using everything that is on display in an average work session.

FIGURE 1.94



SECTION 2: SELECTION

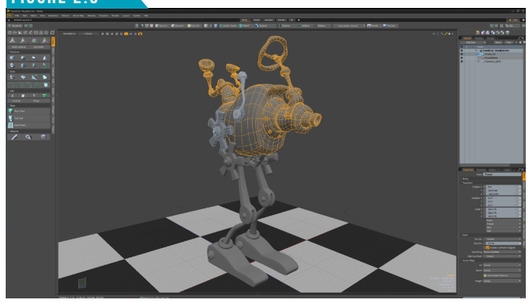
Throughout any given work session in Modo, you'll need to make selections in order to manipulate items (Meshes, Lights, Camera, etc.) and components (vertices, edges and polygons).

In this section we'll take a brief look at the different selection modes, making selections, and useful selection features available in Modo.

I've included another scene file for you to use if you'd like to follow along. Open (File/Open) the source file included with this guide named CrunkCar_Vaughan.lxo. (Figure 2.0)

(Modo_Essentials/Source/S2/Scenes)

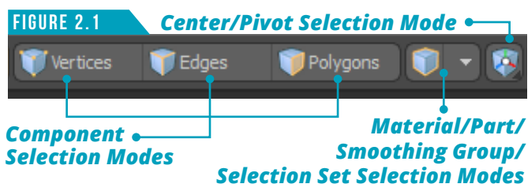
FIGURE 2.0



SELECTION MODES

As we learned in the previous section, there are ten core selection modes in Modo, and nine of them can be enabled from the Selection Modes portion of the Modo Modes bar as seen in (Figure 2.1).

FIGURE 2.1



You can only access nine of the selection modes from the UI because by default, Item Selection Mode is enabled, and when not in one of the other nine modes, Modo defaults back to Items Selection Mode.

Try and take advantage of the shortcut keys shown in (Figure 2.2) when possible to speed up switching between selection modes.

FIGURE 2.2 *Selection Mode Hotkeys*

Keystroke(s)	Action
Spacebar	Cycles the selection sequentially from vertices to edges to polygons
1	Vertices
2	Edges
3	Polygons
4	Materials/Parts/Smoothing Groups/Selection Sets
5	Items
6	Pivot
7	Center
Alt+Q	Selection mode/Transform tools Pie Menu
Shift+Spacebar	Toggle Component mode to Item mode (or last mode)

Since we are already in Item Selection Mode, let's look at selecting items.

Selecting Items

Modo scenes are made up of a collection of items: meshes, cameras, lights, locators, and so on. Items are also referred to as layers. You can tell Modo what items (Layers) you'd like to edit by selecting them.

One option for selecting items is to use the Items List in the Lists Viewport. (Figure 2.3)

If you hold down the (Shift) key and left-click on the small arrow next to the item named Crunk Car, the entire hierarchy of items will expand. (Figure 2.4)

Left-clicking on any item in the Items List will select it. Give it a try. Left click on the mesh item named Right_Foot. The item will become selected and highlighted in both the Items List and the 3D Viewport. (Figure 2.5)

As you can see, this can be a quick way to select items in your scene

AUTHOR'S NOTE

It's always a good idea to give each item in your scene a unique name to be able to identify it quickly. To change an item's name simply right click on it in the item's list and choose Rename. It will save you time and frustration if everything in your scene is named properly.

FIGURE 2.3

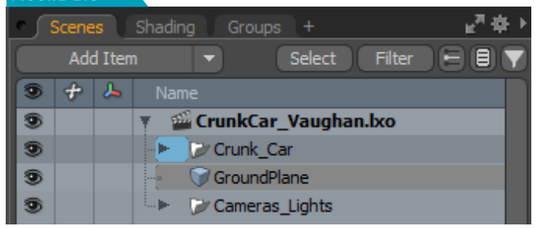


FIGURE 2.4

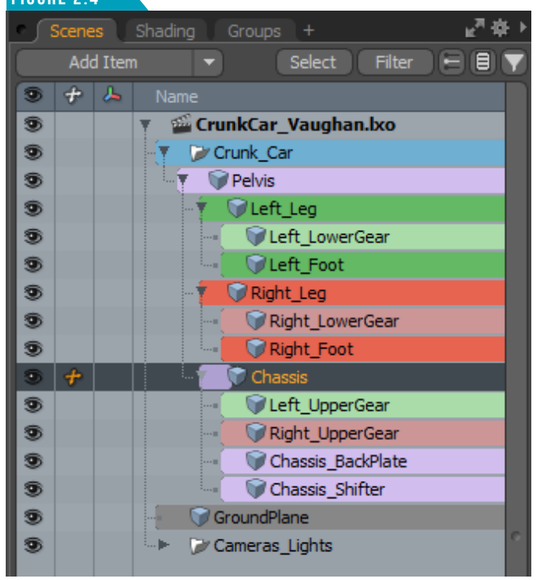
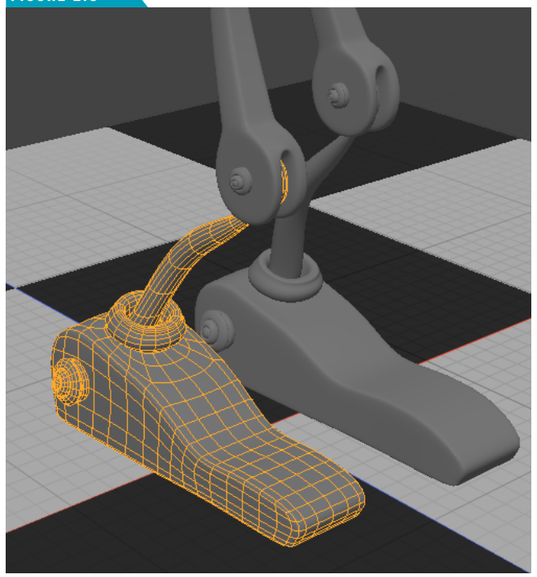


FIGURE 2.5



Selected items will appear darker than non-selected items in the Items List, and the item name text becomes orange. Selected items are considered active or foreground layers. Items that are visible, but not selected, are considered inactive or background layers. Background layer name text appears as plain black text.

It's important to remember these naming conventions because Modo uses both in different parts of the software. For example, the Boolean operation uses the Foreground/Background convention while the 3D Viewport Properties uses the Active/Inactive convention. This can be confusing so be sure to take note.

To select multiple items at once, use the standard Ctrl and Shift key modifiers. Ctrl clicking on a selected item will deselect it without deselecting other selected items.

Spend a moment selecting the different items that make up the Crunk Car by selecting them in the Items List.

SELECTION MODES CONTINUED

It would be incredibly limiting if we could only make selections from the Items List. Fortunately, we can make selections directly in the 3D Viewport.

There are two main selection styles in Modo: **Paint** and **Lasso**.

You can simply left-click on an item in the 3D Viewport to select it, or you can use the **Paint Selection** style by left-clicking and dragging over items in the 3D Viewport.

Give it a try. Start by left-clicking away from any items in the viewport and then left-click and drag over the items that make up the Crunk Car.

Modo selects all items under the cursor as you move the cursor on the screen. In this manner, you can quickly **"paint"** a selection by dragging over a desired component.

Pressing and holding the **Shift** key as you select items will add them to the selection. You can either **Shift-click** individual items or **Shift-drag** across multiple items to add them to your selection. **Ctrl-clicking** will remove items from the selection.

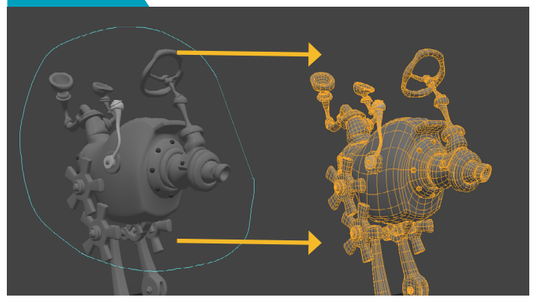
The easiest way to deselect (Drop Selection) the current selection is to click any empty area in the 3D viewport or press the **Esc** key.

It's good to know that making selections is an undo-able action. You can easily undo (**Ctrl+Z**) a selection state if you accidentally clear a selection.

The **Lasso Selection** style can be performed by right-clicking and dragging to enclose the items within a lasso as seen in **(Figure 2.6)**.

There are four different **Lasso Styles** you can work with: **Lasso**, **Rectangle**, **Circle** and **Ellipse**.

FIGURE 2.6



To change the Lasso style, go to (**Select/Lasso Style**) in the **Application Menu**. You can also access these options by right-clicking in the 3D Viewport and choosing **Lasso Style** from the contextual menu.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at selecting items in the Items List and 3D Viewport.

Selecting Components:

Vertices, Edges and Polygons

It's important to understand that the component selection modes only apply specifically to Mesh Items. Other items such as Lights, Texture Locators, Replicators or Cameras can only be edited while in Items Selection Mode.

Components (Vertices, Edges, Polygons) are the elements that make up a mesh item. Think of a Mesh Item (Layer) as a container that holds the elements. In order to select these elements, the mesh item needs to be selected.

Selecting Vertices

To be able to select vertices on the Chassis of the Crunk Car, start by selecting the **Chassis** mesh item either in the 3D Viewport or the Items List. Next, click on the **Vertices Selection Mode button** in the Modo Modes Bar **(Figure 2.7)**.

FIGURE 2.7



WATCH OUT!

When nothing is selected while in component mode, Modo considers everything selected for active mesh items.

Didn't mean to scare you with the warning above, but it's something you'll always want to keep in mind. Again, when nothing is selected while in component mode, Modo considers everything selected for active mesh items.

One benefit of this setup is that dropping your selection is a quick way to select everything.

A **Vertex** is a single point that represents a position in 3D space. Using the same selection options that we used for selecting items (**Paint/Lasso**), select some vertices on the **Chassis**.

In **(Figure 2.8)** I used the Lasso Selection method to select some verts.

Modo provides a wide array of selection options to use while in component selection mode such as the **Loop Select**, **Invert Selection**, **Select Connected** and **Select More/Less** functions. You can access these options from the **Application Menu (Select)** or from the **Model Toolbar** as seen in **(Figure 2.9)**.

Spend a few minutes exploring the Selection options and selecting different vertices in the Chassis before continuing. Remember, the more hands on practice you get now, the more familiar it will be during production.

FIGURE 2.8

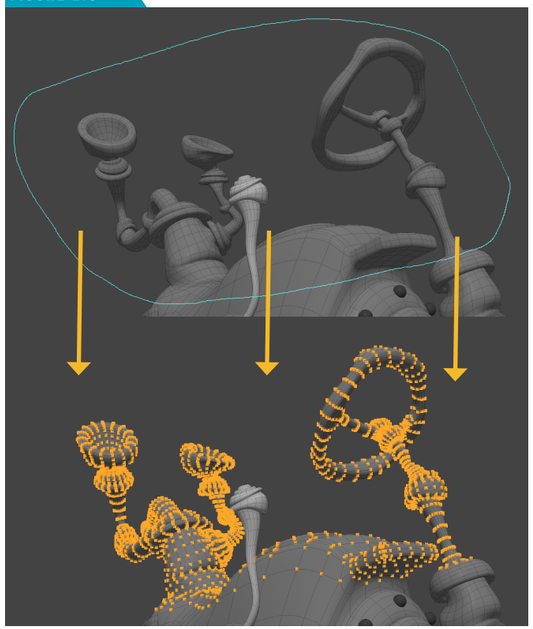
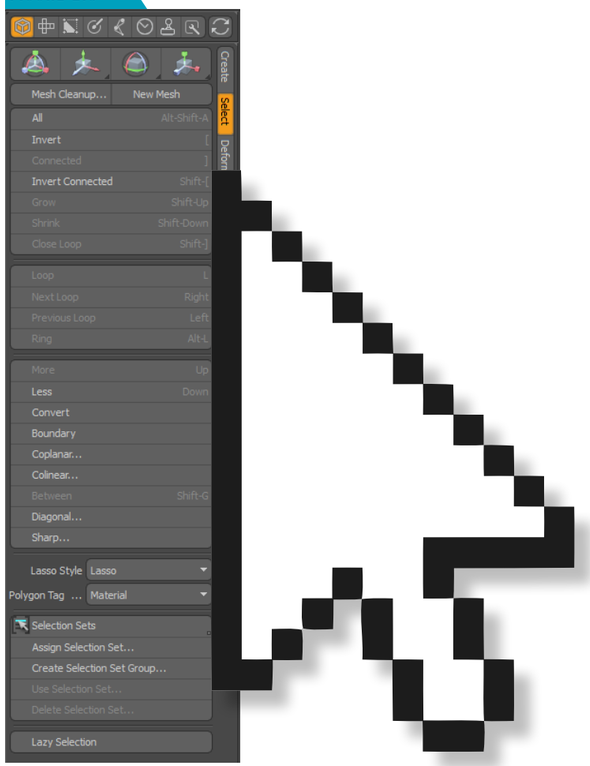


FIGURE 2.9



SELECTION MODES CONTINUED

If you want to speed up the selection process, use the Selection keyboard shortcuts shown in (Figure 2.10) to explore some of these useful selection options.

Use these shortcuts while in Vertices, Edges and Polygons Selection Mode.

FIGURE 2.10 ***Selection Hotkeys***

Keystroke(s)	Action
Alt+Shift+A	Select all
Up arrow	More (select next plausible element in loop)
Shift+Up arrow	Select expand
Down arrow	Less (deselect last element)
Shift+Down arrow	Shrink
Left arrow	Select previous loop
Shift+Left arrow	Select previous loop add
Right arrow	Select next loop
Shift+Right arrow	Select next loop add
L	Select loop
Alt+L	Select ring
]	Connected
[	Invert selection
Shift+]	Close loop
Shift+G	Select between
Alt+1	Convert selection to vertices
Alt+2	Convert selection to edges
Alt+3	Convert selection to polygons
; (semicolon)	Select through toggle

AUTHOR'S NOTE

I know I keep throwing lots of keyboard shortcuts at you throughout this guide. Don't feel like you must memorize all of them. I certainly don't have all of them memorized, but I have enough that it makes me a more efficient Modo artist.

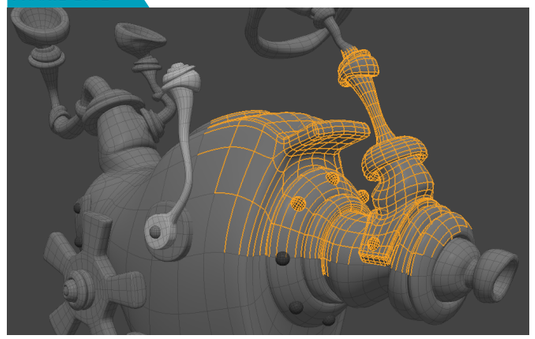
Selecting Edges

The line between two vertices (verts) is an edge. When in Edges Selection Mode (Figure 2.11), you can use the same paint and lasso selection methods to quickly select one or more edges of the active mesh item(s). Modo indicates selected edges with an **orange** color to distinguish them from unselected edges. (Figure 2.12)

FIGURE 2.11



FIGURE 2.12



Selecting Polygons

A polygon is a closed plane that is created from three or more edges to create the surface that is shaded and rendered.

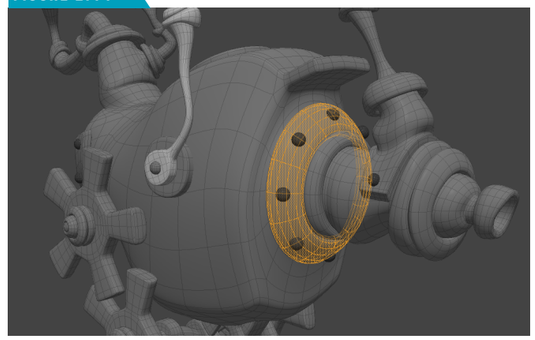
You can also use the same paint and lasso selection methods you've been using. Click the Polygons button to switch to Polygons Selection Mode (Figure 2.13).

Just like vertices and edges, Modo indicates selected polygons with an **orange** color to distinguish them from unselected polygons (Figure 2.14).

FIGURE 2.13



FIGURE 2.14



Using the Spacebar hotkey, toggle through the three component selection modes. As you can see, all your selections remain. This can be incredibly useful when working on mesh items.

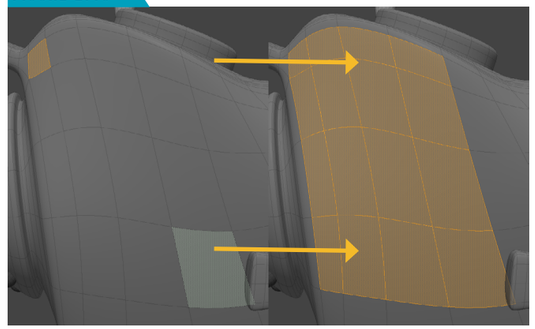
Another handy selection option is the double-click shortcut. If you double-click on a vertex or polygon it will be the same as using the (]) hotkey to Select Connected. Try it on one of the rivets that are in the Chassis mesh item.

Double-clicking on an edge will perform an edge-loop selection (L).

Making a selection, hovering the cursor over another element and then Shift+Right-Clicking will perform a Select Between (Shift+G) operation as seen in (Figure 2.15).

You'll find yourself doing a lot of selecting while working in Modo, so the more you can incorporate these shortcuts into your workflow, the quicker you'll be at accomplishing tasks.

FIGURE 2.15

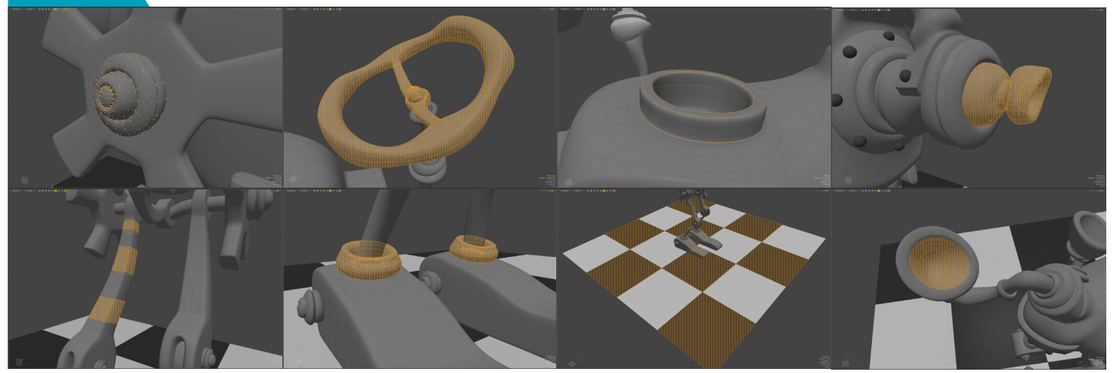


PUT YOUR NEW SKILLS TO WORK!

Let's put your new selection skills to the test and select some components. Using any selection methods you've learned so far, match the selections shown in (Figure 2.16).

This will also let you take advantage of your viewport navigation abilities.

FIGURE 2.16



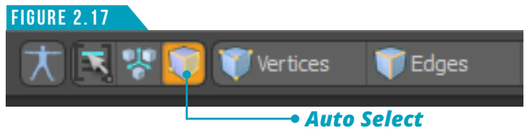
SELECTION MODES CONTINUED

Even though we covered it in the Modo Modes portion of Section 1, I want to remind you about Auto Select Mode.

Auto Select mode (Figure 2.17) allows you to quickly change the current component selection mode used in your scene. When enabled, you can select a vertex, an edge, or a polygon to automatically activate the different selection modes.

For example, if Vertices selection mode is active and there are no vertices currently selected, clicking on an edge will switch to Edges selection mode automatically.

FIGURE 2.17



Implicit Selections for Component Modes

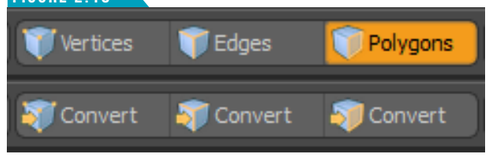
In all modes, if you don't select anything directly, Modo implicitly selects all vertices, polygons, or edges.

If you make a direct selection of vertices, only vertices are selected. If you select Edges, vertices of the selected edges and the edges are selected. The vertices won't appear as being selected in the viewport, but you will be able to perform vertex operations on them.

When polygons are selected, the vertices of those polygons will be implicitly selected as well as the contour edges of those polygons. Again, you won't see them selected in the viewport, but you'll be able to perform vert and edge operations while in polygons selection mode.

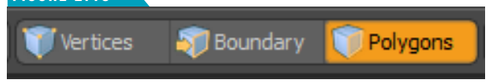
When pressing the (Alt) key and clicking on the component selection mode buttons, you can convert implicit selections to actual selections. (Figure 2.18) shows how the component buttons will change their display while the (Alt) key is held down.

FIGURE 2.18



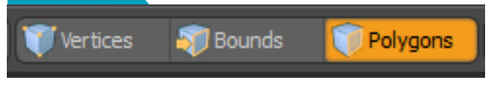
Pressing (Ctrl) changes the Edge Selection Mode button to a Boundary button (Figure 2.19), enabling you to convert the current polygon selection to a boundary-edge selection.

FIGURE 2.19



Pressing (Shift) changes the Edge Selection Mode button to a Bounds button (Figure 2.20), enabling you to convert the current polygon selection to a boundary-edge selection without losing any edges that are already selected. So Bounds is an additive conversion while Boundary isn't.

FIGURE 2.20



Spend some time exploring these implicit selection conversion options. They are incredibly useful, and I find myself using them on a regular basis. While you have either the Alt, Ctrl or Shift key pressed, have a look around the UI to see how other buttons take advantage of hidden options using key modifiers.

Selecting Materials

We haven't discussed materials yet, but I have some predefined materials on the Crunk Car we can use to explore material selection.

Materials are defined by selecting polygons and assigning a Material Tag. These tags produce a Material Group Item in the Shader Tree that represents the tagged polygons for masking. We'll go into further detail about this later in the guide.

When Material Selection Mode is enabled (Figure 2.21), you can directly select the geometry based on the Material Tag.

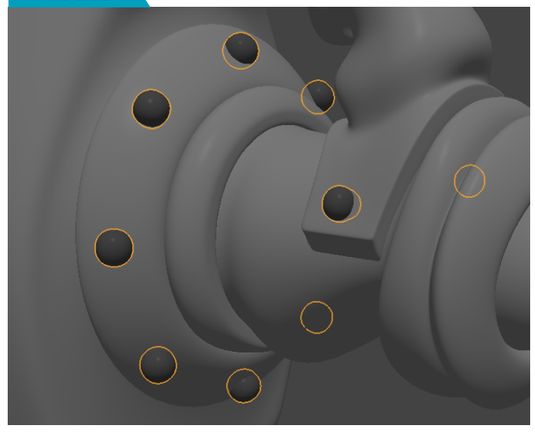
FIGURE 2.21



Modo indicates material selections as orange outlines surrounding the area defined by the tags. (Figure 2.22)

You can either use the selection to edit the geometry or adjust the surfacing within the Shader Tree.

FIGURE 2.22

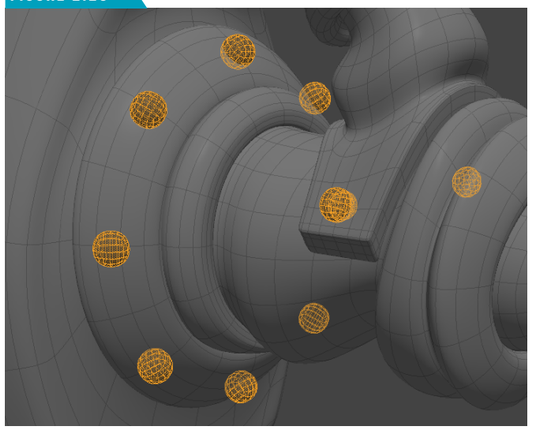


I use material selections to quickly convert to polygon selections. Give it a try.

Select the Rivets material on the Chassis mesh item using Material Selection Mode and convert the selection to a polygon selection. You should end up with all the rivets on the Chassis mesh item selected. (Figure 2.23)

That's a much faster way of selecting all those polygons than Shift+Double-Clicking them.

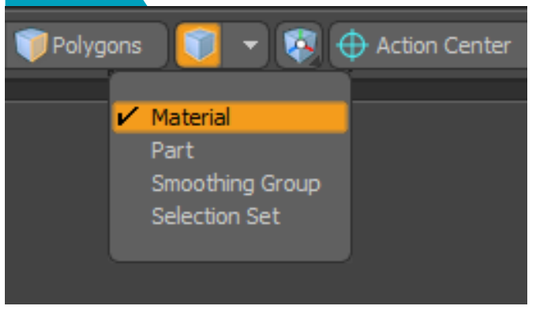
FIGURE 2.23



The Material Selection Mode isn't limited to selecting Material Tags. You can specify the Materials selection mode to be based on Material, Part, Smoothing Group or Selection Set tags.

Simply choose which tag type you'd like to select from the menu as seen in (Figure 2.24).

FIGURE 2.24



This is an often overlooked selection feature so be sure to keep it in mind for future use!

I didn't discover this was even an option until five years of working with Modo, and I'm finding that many Modo artists are unaware of it as well. It's a reminder that there are always new things to discover when working with software.

SELECTION MODES CONTINUED

Selecting Centers

The **Center** element represents the center location of a Mesh Item. Each Mesh Item in the **Items List** has its own center position. Modo uses this as the origin for all Position, Scale and Rotate transforms for that Mesh Item (layer).

By default, the **Center** is located at the **World Position Origin** of **0,0,0** for all mesh items. In the case of the items that make up the Crunk Car, all centers have been repositioned to enable the parts to rotate from the correct location for animation.

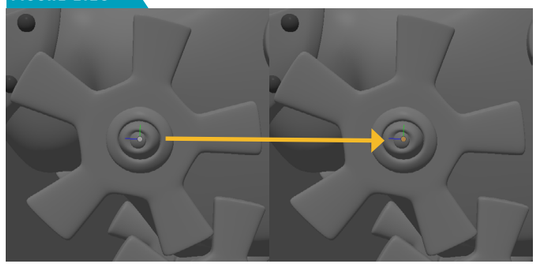
When **Centers Selection Mode** is enabled **(Figure 2.25)**, you can select an Item's center by clicking the center icon in the 3D Viewport.

FIGURE 2.25



Modo indicates a Center is selected by changing the white filled circle to an orange filled circle icon as seen in **(Figure 2.26)**.

FIGURE 2.26



WATCH OUT!

Modo's Cenetrs are often called "Pivots" in other software. I've seen this cause confusion with artists coming over from other software.

Selecting Pivots

As mentioned in the **Watch Out!** box below, Modo's Centers are often called "Pivots" in other software.

In Modo, a **Pivot** is a secondary center-like element that is offset from the center. If you modify the pivot's position, then that pivot position becomes the animation origin and overrides the center position.

The key difference of pivots and centers is that you can use a keyframe to animate a pivot position, but you can't animate a center.

Pivot Selection Mode (Figure 2.27) can be enabled by right-clicking on the Center Selection Mode icon and choosing Pivot.

FIGURE 2.27



SELECTION SETS

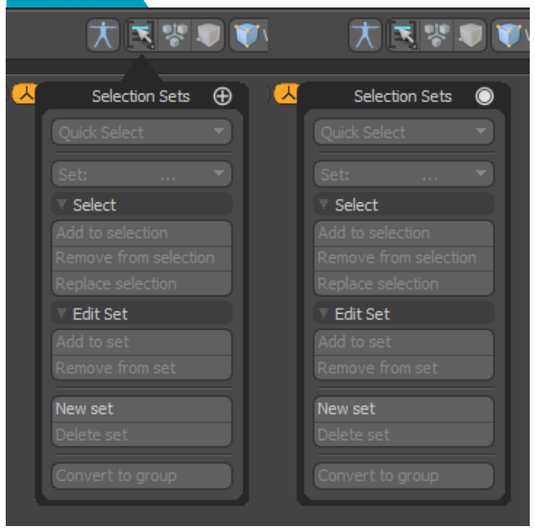
If you made all the component selections a few pages back in **(Figure 2.16)**, then you have an idea of how some selections will take time even with the use of selection modifiers and hotkeys.

Modo enables you to save component- and item-based selections to recall later, using Selection Sets.

There are a few places to access the **Selection Sets Panel**, but since you are familiar with where it's at on the **Modo Modes Bar**, you can click the **Selection Sets button**.

With the panel open, click the small circle in the top right corner to pin the panel so that it stays open **(Figure 2.28)**. When you're ready to close the panel, simply click the circle again.

FIGURE 2.28



To create a new selection set, start by selecting some verts, edges or polygons and then click **New Set** on the **Selection Sets Panel**. Give your selection set a unique name and then click OK.

Drop your selection.

To recall a selection set, simply select it from the **Quick Select** menu. How easy is that?

This powerful feature set also enables you to add and remove elements from a selection set. Take some time to explore all the features available on this panel. Working with selection sets is key to working efficiently in Modo, so the more familiar you are with these options, the easier it will be for you to put them to use.

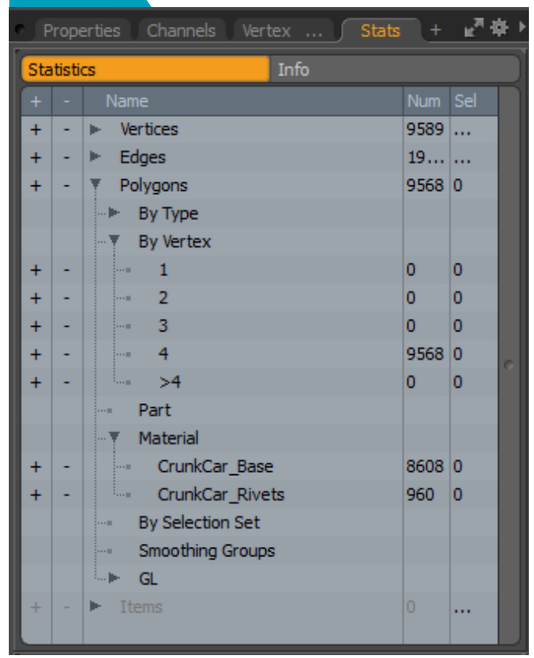
SELECTING WITH STATISTICS

An often overlooked method for selecting is the use of the **Statistics Vewport**.

As discussed in Section 1, the **Statistics Viewport (Figure 2.29)** displays a listing of scene statistics such as the total number of polygons, or how many of them are triangles or ngons.

You can use the **+/-** icons preceding each line for selecting and deselecting geometry in the scene based on the specific criteria.

FIGURE 2.29



You should now be armed to the teeth with selection options, ready to tackle any selection needs that may arise. It's key that you take the time to get comfortable making selections in order for you to work efficiently in Modo.

Spend some time putting what you've learned into practice before moving forward. I know it's tempting to breeze through this guide, but I promise it's in your best interest to slow down and get some hands-on experience.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at selecting components and working with selection sets.

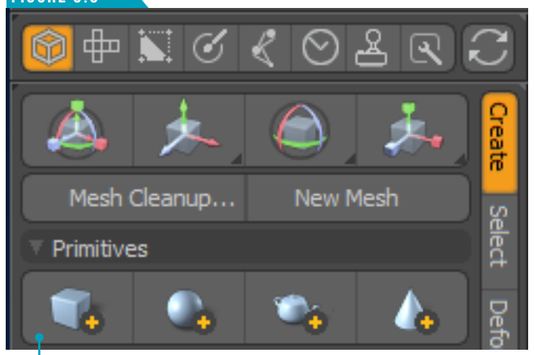
SECTION 3: WORKING WITH TOOLS

Having successfully made it to Section 3 of this guide, you are now ready to perform actions on your selections. Modo offers an array of one-shot commands and interactive tools that enable you to create and manipulate geometry.

Let's start by taking a quick look at the difference between one-shot commands and tools. Use the keyboard shortcut (Ctrl+Shift+W) to Close All open scenes.

You will be left with a default scene consisting of an empty Mesh Item, a Camera and a Directional Light. Hold down the Shift Key and click on the Cube Primitive Button in the Model Toolbar (Figure 3.0).

FIGURE 3.0

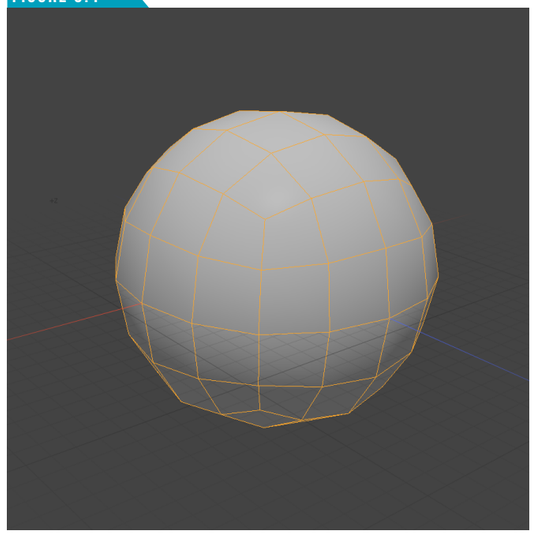


Cube Primitive

This creates a 1 Meter cube in a new Mesh Item named Cube, located at the Origin. Note that we were given no options for the scale or placement of the Cube. Press the keyboard shortcut (d) twice to Subdivide the cube (Figure 3.1).

Use the Keyboard shortcut (Ctrl+Z) to Undo the last Subdivide command.

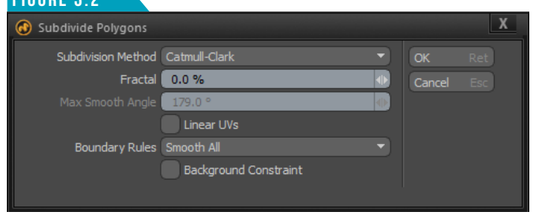
FIGURE 3.1



Everything you've done since the start of this section used one-shot commands. There are many features in Modo that are one-shot commands that when executed, perform their function such as creating geometry or undoing actions as you've just experienced. Some one-shot commands may display a dialog, allowing you to define attributes of the command.

For example, switch to Polygon Selection Mode, and then use the keyboard shortcut (Shift+D). This brings up the Subdivide Polygons dialog (Figure 3.2).

FIGURE 3.2



Select Catmull-Clark as the Subdivision Method and click OK.

The result should be the same as before you performed the Undo command. One-shot commands offer no real interactivity. You simply click the button to produce a result.

Clicking on an interactive tool's button makes the tool active but then waits for you to provide further instructions. Let's see this in action.

Click the Move Tool Button (Figure 3.3) to activate the Move Tool.

FIGURE 3.3



Move Tool

The Move Tool is a standard transform tool that you'll frequently use in all aspects of Modo. From here on out, I'd recommend using the keyboard shortcut (W) to save time. Use the shortcuts shown in (Figure 3.4) for additional transform tool hotkeys.

FIGURE 3.4 *Transform Tool Hotkeys*

Keystroke(s)	Action
W	Move
E	Rotate
Alt+Shift+E	Axis Rotate
R	Scale
Shift+R	Uniform Scale
Y	Transform
Alt+Q	Transform Tools Pie Menu

When interactive tools are activated, you have a couple options for how to interact with them. The first option is modifying the tool's attributes using the Tool Properties Panel. To do this, we need access to the panel.

Use the keyboard shortcut (K) or click the Tool Properties Button at the bottom of the Toolbar (Figure 3.5). I'm sure by now you can guess which method I prefer.

Using either method will display the Tools Properties Panel (Figure 3.6).

FIGURE 3.5

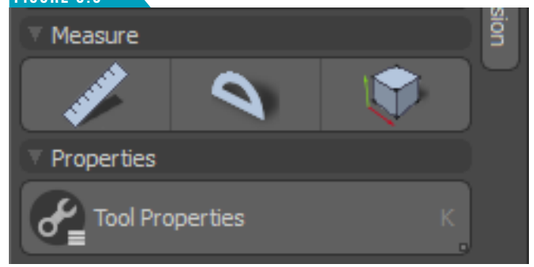
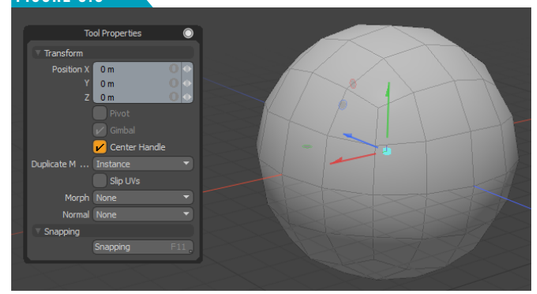


FIGURE 3.6



You might have noticed a colorful red, green and blue handle appear in the 3D Viewport. We'll get to that in a moment, so disregard that for now.

Numeric attributes can be edited by simply clicking directly on the value and then entering a new value with the keyboard. When you're happy with the value, press Enter to accept. Let's give it a try.

Give the Position X attribute a value of 1 and press Enter. This moves the entire subdivided cube 1 meter in the positive X axis.

You can also modify numeric values interactively using the mini-sliders (small white arrows) that appear on the far-right hand side of most numeric entry fields (Figure 3.7).

By clicking and dragging on the mini-sliders, you can quickly increase (dragging right) or decrease (dragging left) the current value in the field.

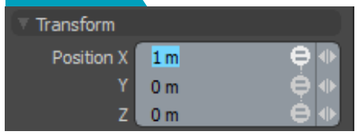
FIGURE 3.7



If you'd like to edit all three values, you can use the gang edit options by clicking the icon to the left of the mini-sliders.

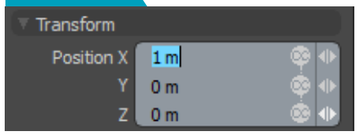
The first click will change the icon to an equal sign (=) (Figure 3.8), which will apply identical values to all three attributes (Copy).

FIGURE 3.8



The second click will change the icon to a proportional symbol (α) (Figure 3.9), causing all value changes to be applied proportionally (Proportional).

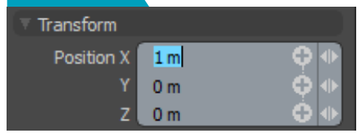
FIGURE 3.9



The third click will change the icon to a plus sign (+) (Figure 3.10), and the value will be added to the attributes (Relative).

Clicking a fourth time will return the icon back to it's original state, and all attributes will be edited independently.

FIGURE 3.10



I prefer using the keyboard shortcuts shown in (Figure 3.11) when using these options.

FIGURE 3.11 *Gang Edit Hotkeys*

Keystroke(s)	Action
Enter	Independent Values
Ctrl+Alt+Enter	Copy (=)
Ctrl+Enter	Proportional (α)
Alt+Enter	Relative (+)

MODO CALCULATOR

Numeric input fields can be used as tiny little calculators. They allow you to enter simple equations, and the value is computed automatically.

For example, you could enter 2+4*8/2 and Modo would calculate the result of 18 Meters.

Accepted symbols: (/) divide, (*) multiply, (-) subtract, and (+) add.

When you're happy with the values you've entered, press the keyboard shortcut (Q) to Drop the Active Tool.

You could also click the Move Tool Button again to drop the tool, but save yourself the time and use Modo's universal shortcut key that will work with all tools without having to click the button again.

Take advantage of the additional tool-related keyboard shortcuts shown in (Figure 3.12).

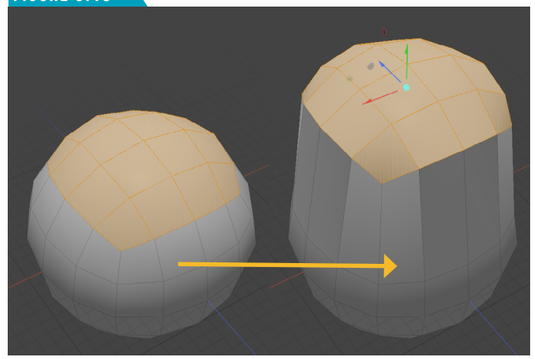
Let's look at working with the Move Tool in the 3D Viewport.

FIGURE 3.12 *Tool Hotkeys*

Keystroke(s)	Action
Q	Drop Active Tool
Ctrl+Tab	Toggle the Tool HUD
K	Tool properties pop-over
Esc	Escape current operation/drop active selection
= (Equals)	Tool handles larger
- (Minus)	Tool handles smaller
0	Toggles Tool Handle Style (Basic/Advanced)
Ctrl+D	Reset tool attributes
Ctrl+R	Fire Last Command

This time, instead of manipulating the entire subdivided cube, select the top polygons. Activate the Move Tool (W), left-click on the Y Axis Handle (Green Arrow) and drag up as seen in (Figure 3.13).

FIGURE 3.13



As you can see, we can change values by clicking and dragging on any of the available tool handles (handles change to a yellow color to show they can be adjusted), constraining the action to a specific axis.

Press (Q) to drop the Move Tool.

By Selecting the top polygons, we limited the movement to only those specific elements. This is how we can manipulate geometry into custom shapes. You can also limit the effect a tool has on a mesh item using the Hide and Lock features.

Modo enables you to modify the visibility of items in the Items List Viewport by clicking on the Visibility Toggle (Eye Icon). You can also hide portions of a mesh item by using the keyboard shortcuts shown in (Figure 3.14).

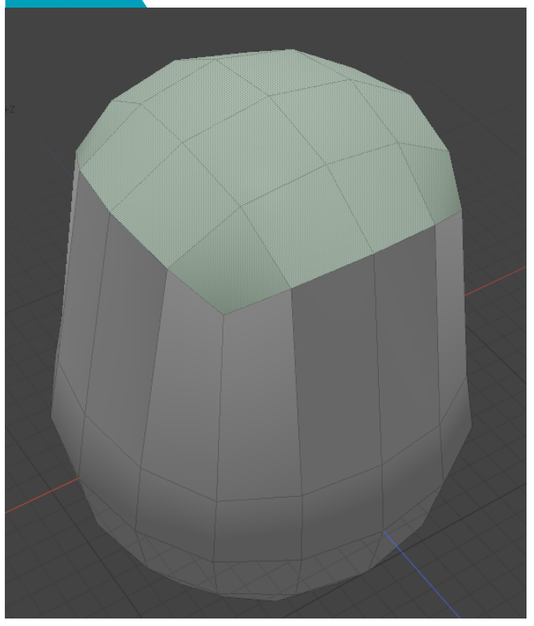
FIGURE 3.14 *Hide/Lock Geometry Hotkeys*

Keystroke(s)	Action
H	Hide selected
Shift+H	Hide unselected
Ctrl+H	Hide invert (toggle state)
U	Show
J	Lock selected
Shift+J	Lock unselected
Ctrl+J	Lock invert (toggle state)
I	Unlock

If you want to have the geometry remain visible but restrict it from being edited, use the Lock commands, which are also shown in (Figure 3.14).

Locked geometry will be shaded differently in the 3D Viewport, as seen in (Figure 3.15).

FIGURE 3.15



TOOL HANDLES

We experienced using the Y Axis handle for the Move Tool and how it restricted the movement of the selected geometry to a single axis. Let's take a closer look at the anatomy of tool handles.

Different tools have different handles (Viewport Manipulators/Gizmos), so we'll take a look at a few examples so you understand the basic handle conventions used in Modo.

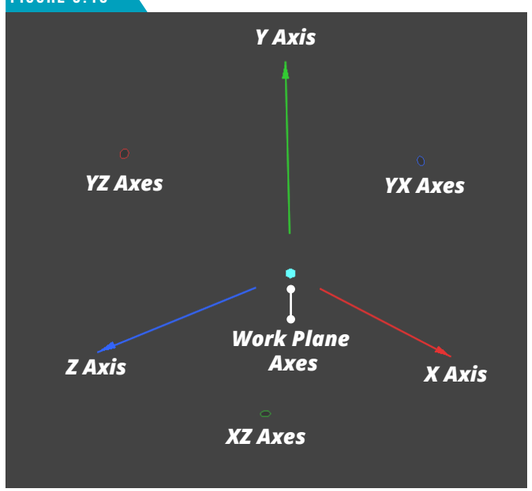
The Move Tool

Activate the Move Tool (W).

The Move Tool Gizmo (Figure 3. 16) consists of seven handles. The main handles are the red, green and blue arrow handles which are used to restrict the movement to the X (Red), Y (Green) and Z (Blue) axes.

The red, green and blue circular handles are planar handles that I also refer to as paddles. These handles enable you to move in two axes at the same time. For example, using the red paddle restricts you to the two axes that are perpendicular to the X axis, which are the Y and Z axes.

FIGURE 3.16



The cyan (light blue) handle in the center updates dynamically as you rotate around your scene, restricting the movement to the two axes perpendicular to the Work Plane. When the Work Plane isn't visible, use the XYZ axis gizmo in the lower left corner of the 3D Viewport as a reference for where the Work Plane is at any given time.

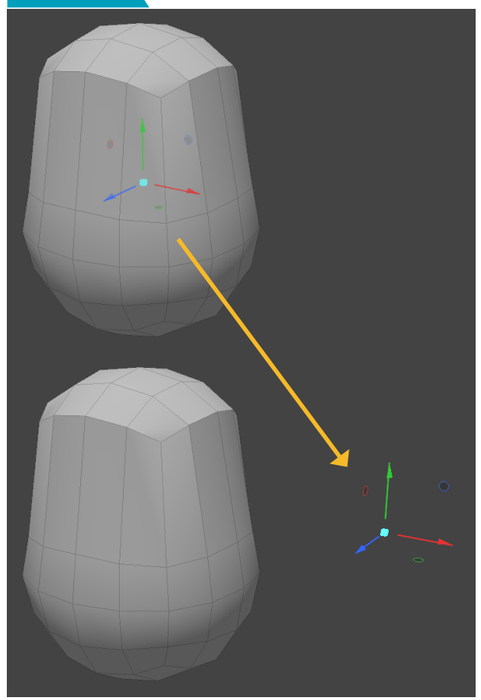
ACTION CENTERS

By default, the placement of the handle is centered at the bounding box of the current selection. The location of the handle is referred to as the Action Center, and it's the origin of the tool handle itself.

Left-clicking anywhere in the 3D viewport will change the tool handle's location, which changes it's action center.

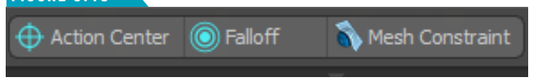
(Figure 3.17) shows the Move Tool's action center moved away from the mesh item.

FIGURE 3.17



Action Centers are a combination of center positions and axis directions for tools. There are a variety of action centers to choose from, and they can be accessed from the Modo Modes bar by clicking the Action Centers Button (Figure 3.18).

FIGURE 3.18



Action Centers are a feature that I take full advantage of, and I believe they are key to truly unlocking the power of working in Modo. Use the table in (Figure 3.19) to get a brief description of the available Action Center presets. You can also use the keyboard shortcuts in (Figure 3.20).

FIGURE 3.20 *Action Center Hotkeys*

Keystroke(s)	Action
Alt+W	Origin
Alt+E	Pivot
Alt+A	Automatic
Alt+S	Selection
Alt+D	Selection center, auto axis
Alt+F	Screen
Alt+Z	Element
Alt+X	Local
Alt+G	Pivot center, parent axis

FIGURE 3.19 *Action Centers*

Action Center	Description
None	Default behavior.
Automatic	Centers the tool's handle at the center of the current selection with the axis aligned to the World or Work Plane axes. You can explicitly select the axis in the properties panel and interactively modify it by adjusting the orientation handle, the thin blue line with the yellow dot. The Automatic action center is not fixed, like other action centers are. You can define a new center by clicking away from the tool handle, setting the positions at the intersection of where the pointer clicked in the viewport and the Work Plane.
Selection	Bases the action center on the average vertex position of the current selection. The action center is fixed.
Selection Border	Centers the tool handle around the border of the selected elements with the orientation of the tool derived from the average normals of all selected elements. The action center is fixed.
Selection Center Auto Axis	Keeps the center of the tool handles centered on the geometry, but re-aligns the tool handles to the major axes. The action center is fixed.
Element	Allows you to click on any element in the 3D model to set the action center. If you click on a polygon, Modo realigns the tool's handles to its normal. If you click on an edge or a vertex, Modo aligns the tool handle to the normal of those elements.
Screen	Allows the action center and axis to be based on the frame of the viewport or screen space.
Origin	Uses the world coordinates 0,0,0 for the center of any transform, regardless of item or element position.
Parent	Uses the pivot position of the parented item, as opposed to the center position. This is useful for transforming items in a hierarchy when you wish to keep items in proper relationship to their parents.
Local	Uses the center of individual element clusters for the operation center, like having a separate axis and center for each selection group. This lets you select multiple elements and have them each rotate around their own local axis.
Pivot	Uses the pivot position of the item as the center of any transform. This is especially useful for animated items that might not be near the origin center.
Pivot Center Parent Axis	Uses the current item's pivot position as the center, but adjusts the axis to match the parent item.

TOOL HANDLES CONTINUED

Spend some time experimenting with the various action centers and when you're ready to move on, we'll look at the Rotate Tool Handle.

The Rotate Tool

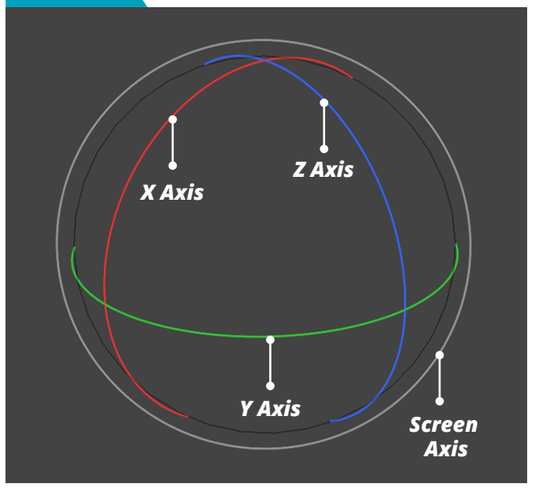
Activate the Rotate Tool (E).

The Rotate Tool Gizmo (Figure 3.21) consists of four handles. By using the various handles, you can easily constrain the movement to a single axis. Left-clicking and dragging on the X Axis Handle (Red) rotates the current selection around the X axis. Left-clicking and dragging on the Y Axis Handle (Green) rotates the current selection around the Y axis, and left-clicking and dragging on the Z Axis Handle (Blue) rotates the current selection around the Z axis.

The grey handle enables you to rotate around the screen axis. When using this handle, you manipulate all three rotational axes at the same time.

Spend a few minutes giving the handles a test drive.

FIGURE 3.21



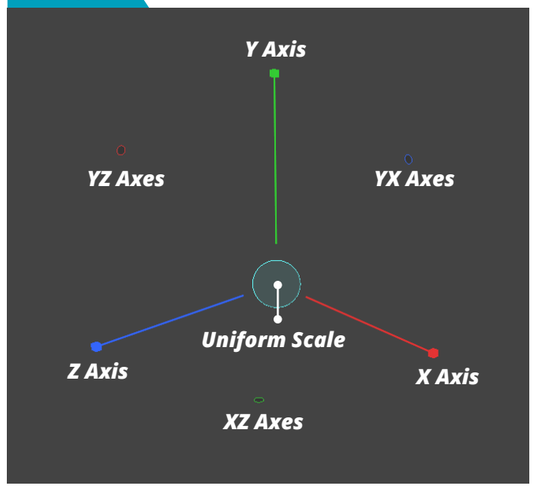
Be sure to activate a few of the action centers to see how they affect the results of rotating the current selection.

The Scale Tool

Activate the Scale Tool (R).

The Scale Tool Gizmo (Figure 3.22) consists of seven handles like the Move tool. The key difference, besides scaling instead of moving, is that the cyan (light blue) handle in the center scales the current selection uniformly in all three axes.

FIGURE 3.22



The Transform Tool

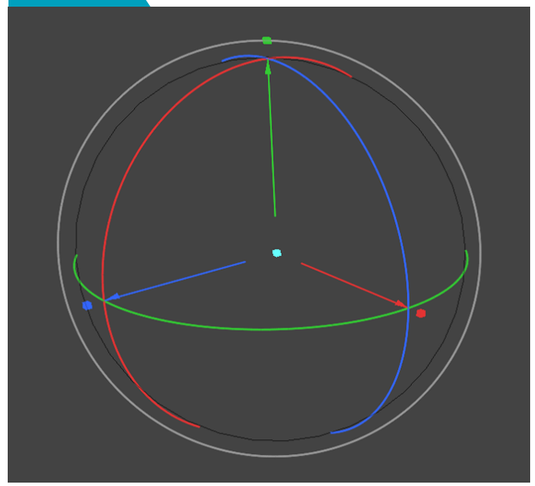
Activate the Transform Tool (Y).

The Transform Tool Gizmo (Figure 3.23) consists of nine handles and gives you access to the core Move, Rotate and Scale Tool Handles.

By using the various handles, you can quickly position, rotate and scale in one convenient tool.

Modo offers many tools beyond the standard transform tools we've discussed. If we are going to make it through this weekend (crash course) we simply don't have the time to discuss each and every tool.

FIGURE 3.23



You should, however, have a good idea about working with tools in Modo. Each tool will have its own set of tool attributes which you can access in the Tool Properties Panel, and you can interactively adjust some of these attributes right in the 3D viewport using the provided handles.

Let's look at another tool as an example. Select the top polygons of the subdivided cube and activate the Polygon Bevel Tool (B).

The Polygon Bevel tool enables you to perform a shift and inset on the selected polygons. Shift pushes the polygons away from their starting positions, and Inset scales the polygons. You'll notice that there are two handles for the Bevel tool (Figure 3.24) and a variety of attributes available in the Tool Properties Panel (Figure 3.25).

It's important to investigate the properties panel for each tool you are introduced to in order to take full advantage of what the tool has to offer.

FIGURE 3.24

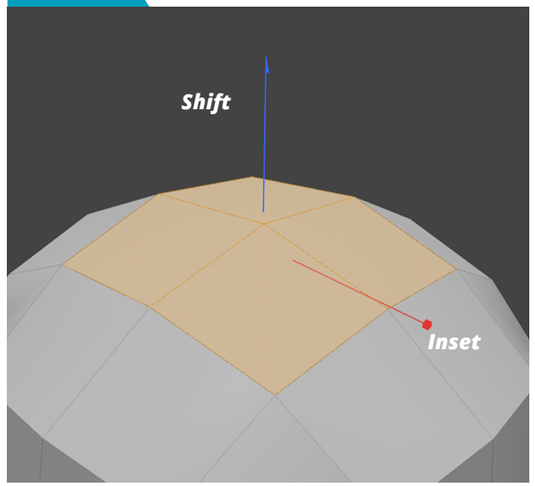
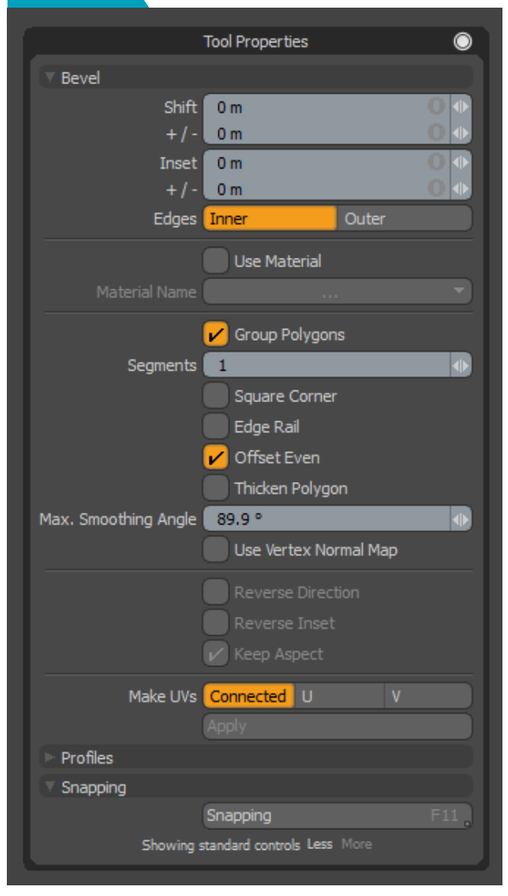


FIGURE 3.25



TOOL HANDLES CONTINUED

Spend some time exploring the tools available in the Model Toolbar. You'll want to have a look at the Tool Properties Panel for each as well as test drive the tools in the 3D Viewport to see how it feels to interact with them.

I've included some common keyboard shortcuts for common interactive tools and one-shot commands (Figures 3.26 to 3.31). If you're not sure how a tool should work, don't forget you can quickly access documentation for the tool by pressing (F1) to start the Activate Help feature, then click on the tool's button to launch the local documentation for that tool.

FIGURE 3.26 *Mesh Edit Hotkeys*

Keystroke(s)	Action
Backspace	Delete
Shift+Backspace	Remove
Ctrl+Backspace	Collapse
B	Bevel
Shift+B	Polygon Bevel
Alt+B	Sketch extrude
Ctrl+B	Create Spline Patch from Vertex Selection
C	Edge slice
Shift+C	Polygon slice
Alt+C	Loop slice
D	Subdivide selected geometry
Shift+D	Open subdivide options
F	Flip polygon normal
Ctrl+L	Split face by selected vertices
P	Make polygon
Shift+T	Triple polygons (convert to triangles)
V	Spin edge
Alt+V	Spin quads
S	Slide/Edge Slide in Component Mode

FIGURE 3.27 *Deform Tool Hotkeys*

Keystroke(s)	Action
Ctrl+E	Bend
T	Element Move (Tweak)
Ctrl+T	Soft Drag
Shift+Y	Flex
Shift+S	Smooth

FIGURE 3.28 *Duplicate Tool Hotkeys*

Keystroke(s)	Action
Shift+X	Extrude
Shift+L	Radial Sweep
Shift+Q	Grow Quads (Suppressed Dialog)
Z	Extend Edge
Shift+V	Mirror

FIGURE 3.29 *Curves Hotkeys*

Keystroke(s)	Action
Shift+O	Make Open Curve
Ctrl+P	Make Closed Curve

FIGURE 3.30 *Vertex Tools Hotkeys*

Keystroke(s)	Action
Shift+W	Weight
Shift+M	Morph

FIGURE 3.31 *SubD Hotkeys*

Keystroke(s)	Action
Tab	Toggle Modo Subdivs
Shift+Tab	Toggle Catmull-Clark subdivision surfaces
Numeric Keypad +/-	Increase/decrease subdivision level



AUTHOR'S NOTE

I keep throwing hotkeys at you from all directions. Remember, you don't have to memorize all of them. Just be aware that they are available and if you find yourself using a tool often, add that tool's hotkey to your list of things to remember.

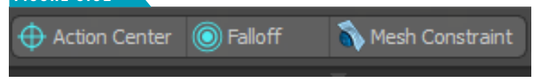
FALLOFFS

We discussed Falloffs in Section 1 of this guide, but since they play an important role in working with tools in Modo, I thought it would be a good idea to bring them back to your attention.

In Modo, elements are either selected or not selected. This means the effect of a tool happens at a constant rate across the selected range. Using Falloffs, you can attenuate the effect a tool has over a selection, gradually increasing or decreasing a tool's intensity across a defined range.

Using the Falloff Button in the Modo Modes Bar (Figure 3.32), you can define a falloff by selecting it from the list.

FIGURE 3.32



Just like Action Centers, Falloffs are persistent until disabled.

(Figure 3.33) shares a brief description of the different falloff types available.

Many tools in Modo are just Tool Presets, which are pre-made combinations of a specific falloff and a transform, such as the Taper, Soft Drag, Element Push and Vortex Tools. There are additional Tool Presets that are a combination of a transform tool, falloff and action center such as Element Move, Twist and Soft Selection Move.

FIGURE 3.33 *Falloffs*

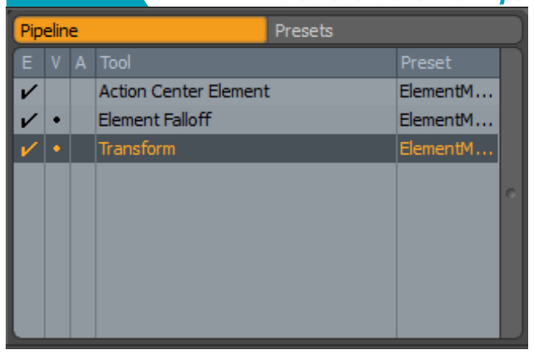
Action Center	Description
Linear	Uses a straight line to define the falloff.
Cylinder	Creates a circular falloff that extends across the length of a virtual cylinder.
Radial	Uses a sphere where all vertices at the very center of the sphere receive 100% tool influence, and any vertices outside the sphere receive 0% of the tool's influence.
Airbrush	Allows a tool's influence to be painted onto a mesh.
Screen	Similar to the Cylinder falloff, except rather than using one of the major axes to determine the angle of the projection, the Screen falloff projects a cylinder that is perpendicular to the viewport window (the computer's screen).
Element	Limits the tool's influence to the element (vertex, edge or polygon) in the mesh that is clicked on when using the current tool.
Noise	Uses a three-dimensional noise pattern to modulate the influence of the tool.
Curvature	Defined by surface variation. Generates a falloff that attenuates across changes in surface topology, especially noticeable in areas of abrupt change or protrusion.
Vertex Map	Converts values of the currently selected Vertex Map to values representing falloff strength.
Path	Combines the curve generator with the Path falloff. The curve generator creates a curve and the falloff reads the curve points to determine where the tool should be active.
Lasso	Uses several styles of Lasso selections drawn in screen space projecting outward toward infinity, producing very specific falloffs.
Image	Enables you to apply an image, in screen space, as a falloff, where the brightness (luminosity) of the image affects the selected geometry.
Selection	Allows you to modulate the falloff based on a selection area. The area of influence is at 0% on the selection border and ramps to 100% based on the Steps value.
Soft Selection	Similar to Selection, but it modulates the geometry outside of the selection.
Coplanar	Affects faces that are located on the same plane as the selection. It works similarly to the Soft Selection falloff, but it considers the angle between normals instead of the distance.

FALLOFFS CONTINUED

When you activate a Tool Preset such as Element Move, you can view the combination of functions that make it in the Tool Pipe (Figure 3.34).

Don't forget that not only can you see what tools and options are active with the Tool Pipe, you can also create custom tool combinations and save them as Tool Presets for later use.

FIGURE 3.34 *Element Move Tool Pipe*



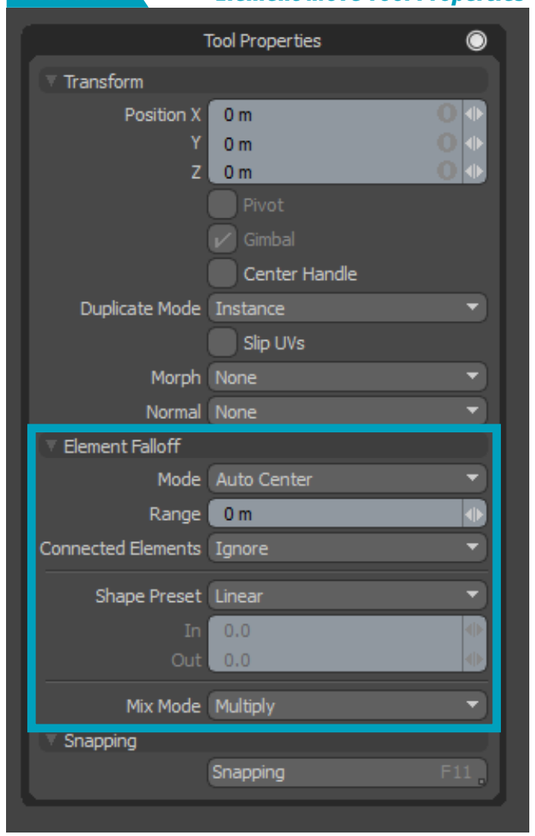
You'll also want to keep an eye on the Tool Properties Panel (Figure 3.35) when you activate a falloff to gain access to the falloff's attributes.

I would always recommend keeping the Tool Properties Panel open until you become familiar enough with Modo. This will ensure you don't miss out on key attributes of a given tool or function.

Sometimes just looking at the Tool Properties Panel of a given tool will be all that is needed to grasp the general concept of the tool.

I've also learned what many attributes of a tool do by simply adjusting the attributes' value to see what happens.

FIGURE 3.35 *Element Move Tool Properties*



PUT YOUR NEW SKILLS TO WORK!

Spend some time exploring the Model Toolbar and see how many tools you can find that are really just Tool Presets.

Not only will this give you an idea of how many Tool Presets there are, it will also help you understand what the tools are actually doing when you use them as well as give you a better understanding of Action Centers and Falloffs.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at working with tools in Modo.

CREATING GEOMETRY

To wrap up this section of the guide, let's look at using the Cube Primitive Tool.

Primitives

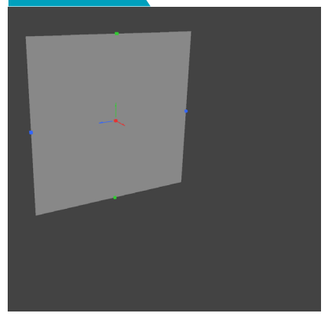
Primitive items, such as the cube we created earlier in this section, as well as spheres, cylinders, and cones are great foundational forms. They can then be edited, added to, modified, and molded into the form you want, using any of the deform or mesh editing tools.

For example, I start 98% of all models I create from a default cube primitive.

Activate the Cube Tool by clicking on the Cube Icon in the Model Toolbar.

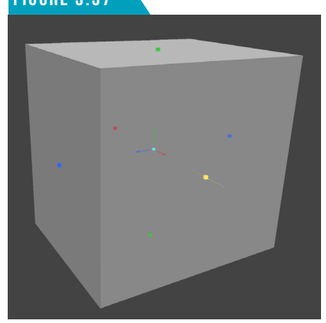
Next, left-click and drag in the 3D Viewport to create a single plane as seen in (Figure 3.36).

FIGURE 3.36



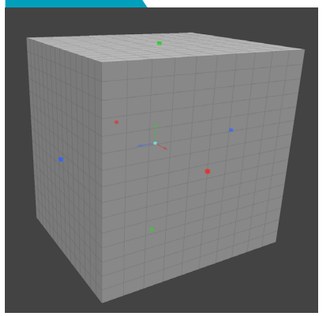
Left-click and drag the center box handle to give dimension to the plane (Figure 3.37).

FIGURE 3.37



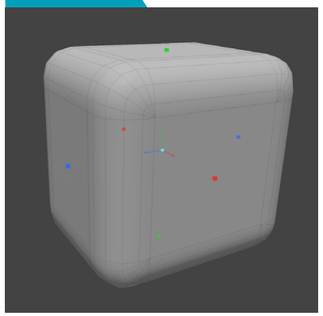
Right-click and drag up and down and left to right to add segments to the cube (Figure 3.38). Of course, you can also add segments by adjusting the X, Y and Z Segments attributes in the Tool Properties Panel, but I find it quicker to do it interactively in the viewport.

FIGURE 3.38



In the Tool Properties Panel, increase the Radius attribute to your liking using the mini-slider. (Figure 3.39) shows the results after I adjusted the Radius attribute.

FIGURE 3.39



Use the Red, Green and Blue arrow handles to position the cube, and the red, green and blue box handles to change the cube's dimensions. When you're happy with the look of your cube, press (Q) to commit.

It's important to understand that once you drop the tool, you've committed to those settings and cannot return to adjust those attributes. We'll discuss this further in the next section that explains the difference between Direct and Procedural modeling.

SECTION 4: DIRECT VS PROCEDURAL MODELING

There are many ways to tackle each modeling project using Modo. In this section I'd like to briefly discuss the difference between the two main types of modeling: Direct Modeling and Procedural Modeling.

I'll start with direct modeling since that is the most common type of modeling and what we've been working with so far.

DIRECT MODELING

Direct Modeling is creating and manipulating geometry directly using transform, deform and mesh edit tools in the 3D Viewport. Any changes made to the geometry are destructive, meaning once you commit to the action, you can't go back and edit the values of the previous operations.

For example, if you wanted to change the number of segments you added to the cube you created in Section 3, you couldn't simply reopen the properties for the cube.

Direct modeling has been the core approach to modeling in Modo since its first release and what has drawn so many artists to use it. 90% of the work I do involves direct modeling, and I still find it to be the quickest way to accomplish my modeling projects. So although its 'destructive,' it's still my method of choice for what I create.

PROCEDURAL MODELING

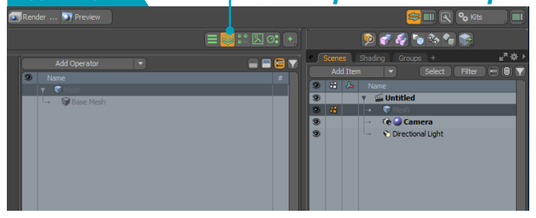
There has been an industry-wide growth in using procedural workflows over the past few years, and the Modo toolset has expanded to offer procedural modeling as an alternative approach to creating assets.

Procedural Modeling enables you to create assets with a non-destructive workflow, allowing you to perform topological edits to a mesh, which can be modified, rigged, and even animated. You can easily revert or modify operations, keeping the rest of the operations intact.

Let's create a procedural cube and adjust some of its attributes to get an apples to apples comparison between direct and procedural modeling.

To enhance our workflow, let's display the Mesh Operations List in our workspace. Open the Right Viewport using the Viewport Switcher Pie Menu (Alt+Spacebar), and select the Mesh Operations Viewport as seen in (Figure 4.0).

FIGURE 4.0



Click the Add Operator Button, and then locate the Cube mesh operation (meshop) (Figure 4.1). Double click on the Cube meshop to add it to the Mesh Operation List (Meshop Stack) (Figure 4.2).

You should now have a 1-meter procedural cube primitive in your scene (Figure 4.3).

Adjust the X, Y and Z Segment count to 12 and the Radius attribute to 200mm in the Properties Viewport. Your procedural cube should now look like (Figure 4.4).

FIGURE 4.1

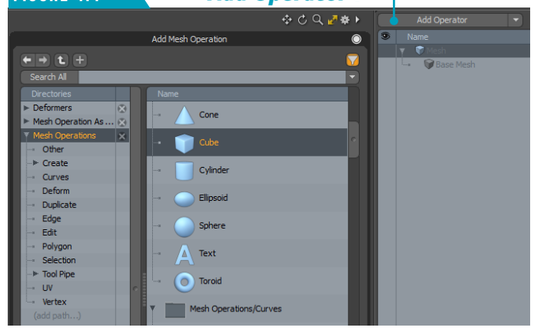


FIGURE 4.2



FIGURE 4.3

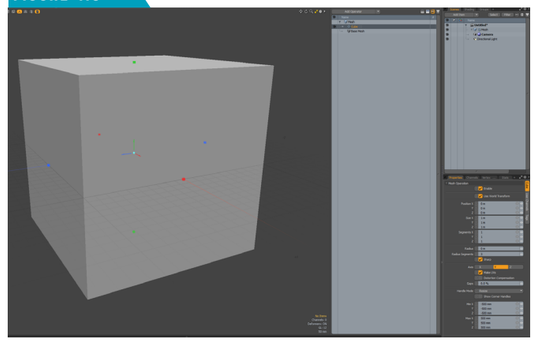
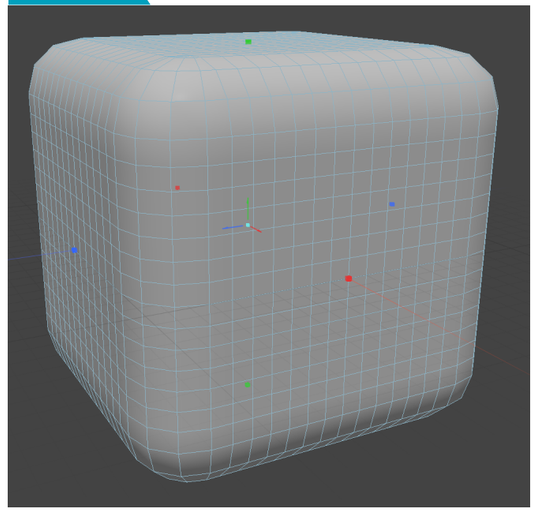


FIGURE 4.4



Select some polygon loops in the center of the cube as seen in (Figure 4.5), add a Polygon Bevel meshop to the stack and then adjust the Shift attribute for the Polygon Bevel to 150 mm (Figure 4.6).

FIGURE 4.5

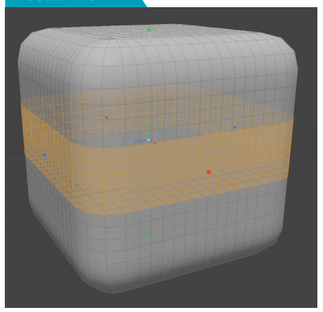
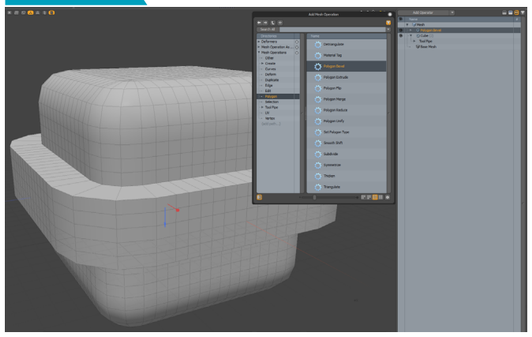
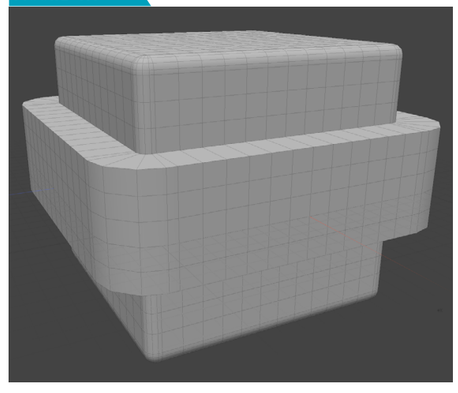


FIGURE 4.6



Select the Cube layer in the Mesh Operations List and adjust its Radius attribute to a value of 50 mm. Your procedural cube should look like (Figure 4.7).

FIGURE 4.7



PROCEDURAL MODELING CONTINUED

Although this example is extremely basic, it should demonstrate just how powerful procedural modeling can be.

Using direct/destructive modeling, you wouldn't have been able to go back and adjust the radius of the cube by simply changing a single value.

It's important to understand that the mesh operations' order of evaluation is determined by the order of mesh operations. Modo evaluates mesh operations at the bottom first and proceeds upwards in the list.

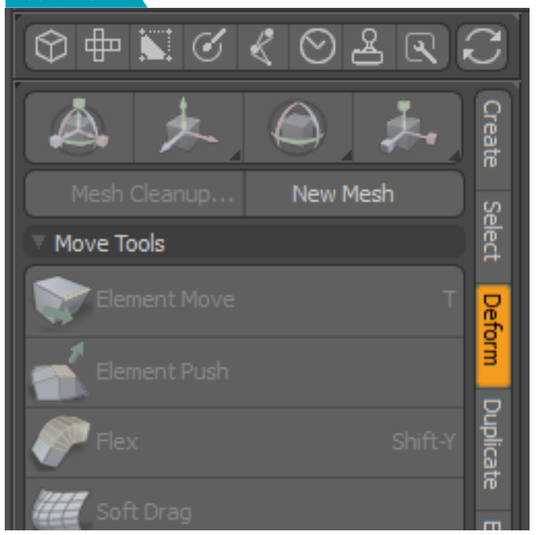
WATCH OUT!

Procedural meshes can't use direct modeling tools.

That's right. Procedural meshes contain no active data to operate on in the eyes of direct modeling tools.

If you look over at the **Model Toolbar** when a procedural mesh is selected, all of the tools will be ghosted **(Figure 4.8)**.

FIGURE 4.8



Fortunately, most of the existing modeling tools have procedural counterparts that boast full feature parity.

I've found that I can tackle some modeling challenges much more quickly using procedural modeling.

For example, creating 2D animated faces that conform to a 3D head is easy to set up using **Curve Fill**, **Axis Drill** and **UV Transform** mesh operations. **(Figure 4.9)** shows the result of this meshop stack on a toon character.

FIGURE 4.9

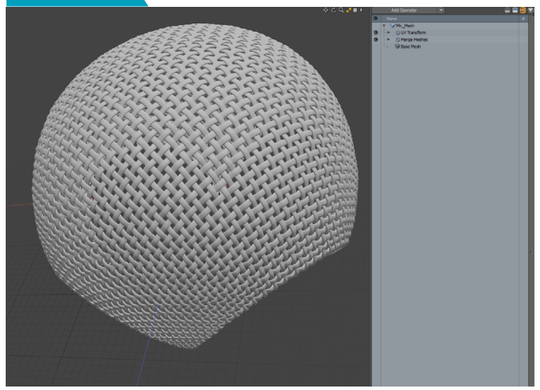


The **UV Transform** meshop has all sorts of uses, such as deforming a woven mesh into a spherical shape as seen in **(Figure 4.10)**.

Live procedural booleans **(Figure 4.11)** are my favorite set of features when working with procedural modeling. They allow for true freedom while working with Booleans in Modo. Being able to make changes to the base mesh as well as the driver meshes at anytime has brought me back to working with booleans after years of avoiding them due to feeling restricted with direct modeling.

I highly recommend giving them a try.

FIGURE 4.10



If you're used to traditional modeling, working with the procedural modeling system can take a little bit of practice to become comfortable using it, but it's worth the time invested. Adding procedural modeling to your toolkit will open up the flood gates to all sorts of possibilities.

This section only scratches the surface on working with the procedural modeling system, but you should have enough information to get started.

Remember that the order of operations is from the bottom up, and you can add operations using the **Add Operator Button**. This will open the **Mesh Operations Preset Browser**, where you can easily locate the operator you'd like to use.

PUT YOUR NEW SKILLS TO WORK!

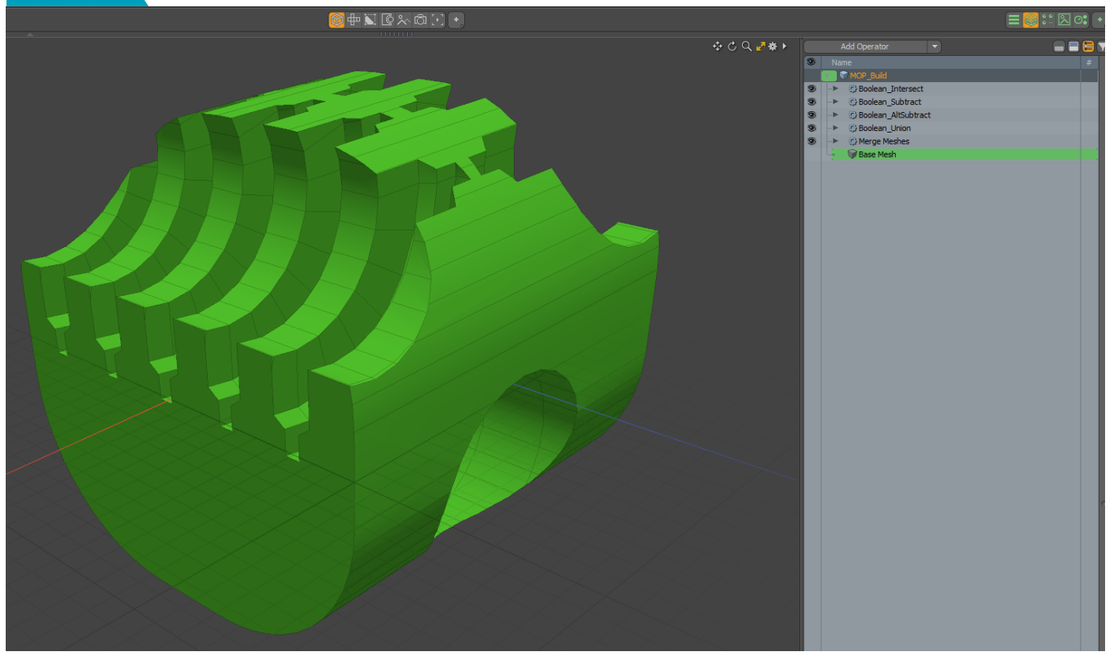
Explore what procedural modeling has to offer by spending some time creating multi-layered procedural meshes.

Change the order of the operations by clicking and dragging them to new positions in the list. Select meshop layers lower on the list, change their values and see how it affects the final results.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at procedural modeling.

FIGURE 4.11



SECTION 5: SUBDIVISION SURFACES (SUBD)

I'd be doing Modo, the entire development team and each of you reading this guide a disservice if I didn't introduce Subdivision Surfaces (SubD).

In my opinion, SubDs are what put a spotlight on Modo when it was first released and to this day, Modo is still "the" tool of choice for working on subdivision surface meshes.

Subdivision Surfaces is a refinement algorithm that creates a smooth curved surface from a coarse polygonal mesh.

The original polygonal mesh is often referred to as the control cage, or simply the cage. When a polygonal mesh is converted to subdivision surfaces, it produces a smoother mesh made up of more polygonal faces.

Unlike the cube we subdivided with the Subdivide command (d) in Section 3, converting to subdivision surfaces is non-destructive and can be toggled on and off using the keyboard shortcut (Shift+Tab).

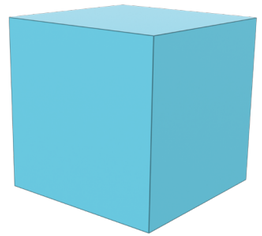
If you'd like to permanently convert a SubD mesh to a polygonal mesh, use the Freeze command (Geometry/Freeze).

(Figure 5.0) shows a cube in both polygonal and SubD mode.

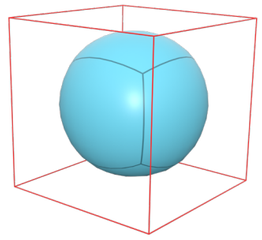
Modo offers two flavors of SubDs, Modo Subdivs (Tab) and Catmull-Clark SubDs (Shift+Tab).

The most commonly used subdivision surface algorithm is Catmull-Clark devised by Edwin Catmull and Jim Clark.

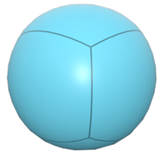
FIGURE 5.0



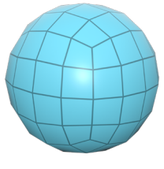
Polygonal Mesh



SubD Mesh with Control Cage



SubD Mesh



Polygonal Mesh after Freezing the SubD Mesh

While Modo Subdivs (Tab) are an acceptable SubD algorithm, Catmull-Calark SubDs (Shift+Tab) are the industry standard, so I recommend using them in every SubD asset you create.

Although Catmull-Clark subdivision surfaces accept non-quad polygons (tris and ngons), it's recommended that 3D meshes consist primarily of quad faces. The alien model in (Figure 5.1) is an all-quad mesh seen in the coarse polygonal state, and (Figure 5.2) shows the smooth SubD state.

One of the key benefits to working with subdivision surfaces is the ability to adjust the level of subdivision. This gives you full control over the density of the mesh at render time. You can adjust the Subdivision Level using the attributes found in the Surface tab of the Properties Viewport (Figure 5.3).

FIGURE 5.3

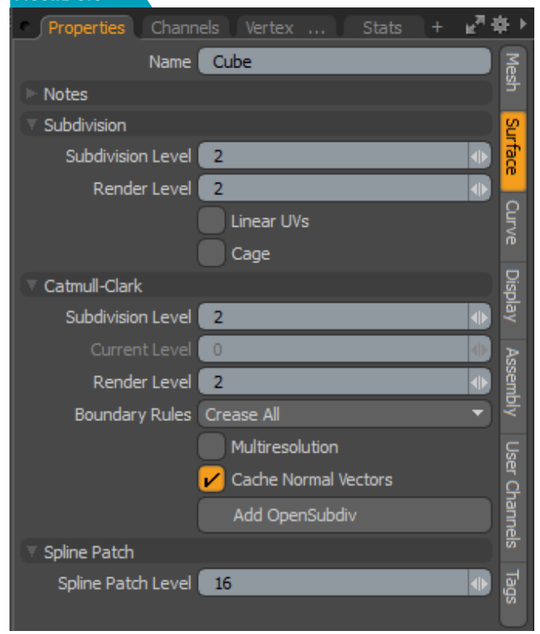
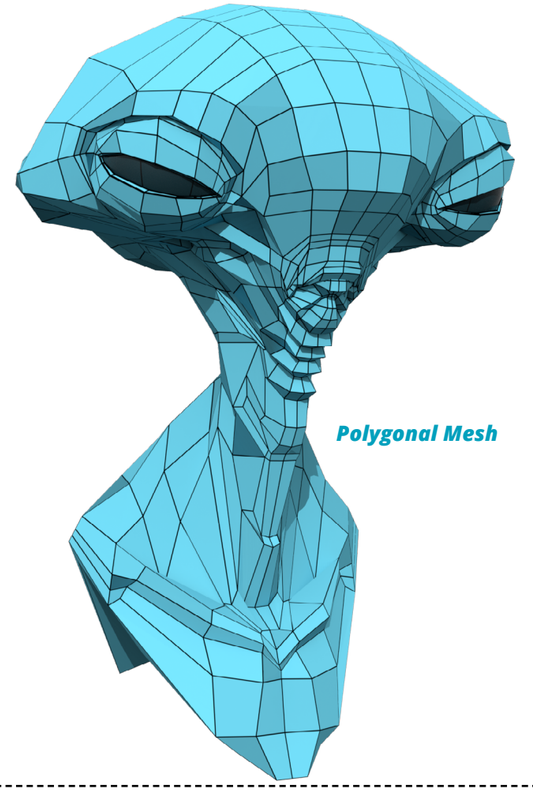
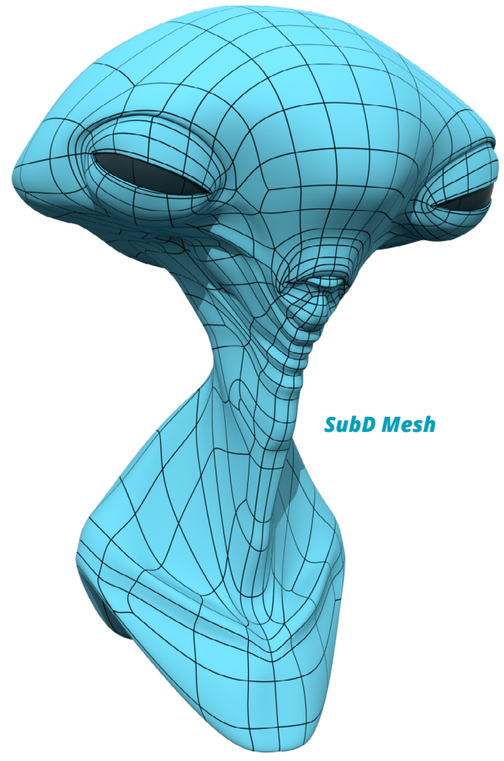


FIGURE 5.1



Polygonal Mesh

FIGURE 5.2



SubD Mesh

Whether you're modeling, rigging, animating, or generating the UVs for a complex smooth object, you'll almost always have an easier time manipulating and adjusting the polygonal cage of the mesh.

Topology plays a role when creating any 3D asset, but a greater attention to clean topology should be given when modeling with subdivision surfaces. As powerful as SubD geometry can be, it's important to remember that with great power, comes great responsibility.

Polygonal models are much more forgiving than SubD meshes. Boolean operations can be a godsend when constructing a polygonal mesh but can wreak havoc when modeling with subdivision surfaces.

Many artists never take the time to fully understand how to work with SubD topology and create overly dense, complex meshes that are difficult to work with in every stage of production. The old saying "you can't judge a book by its cover" holds true with 3D assets. Without seeing the underlying topology of a mesh, it can be difficult if not impossible to know if it is viable for production.

The good news is that once you truly grasp working with subdivision surfaces and gain control over the SubD topology of your meshes, creating clean, production-ready assets with any level of complexity becomes an enjoyable experience.

(Figure 5.4) shows a few basic examples of how SubDs could be used on hard-surface meshes such as vehicles and industrial equipment.

(Figure 5.5) Shows a stepped progression of how I model my SubD character meshes using a modeling technique often referred to as Box-Modeling.

Box-Modeling is the modeling technique where you start with a cube primitive and construct meshes using mesh edit tools such as the Polygon Bevel Tool.

Spend some time creating some low-resolution polygonal cage meshes and see what happens when you convert them into SubD meshes (**Shift+Tab**).

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at working with Subdivision Surfaces in Modo.

FIGURE 5.4

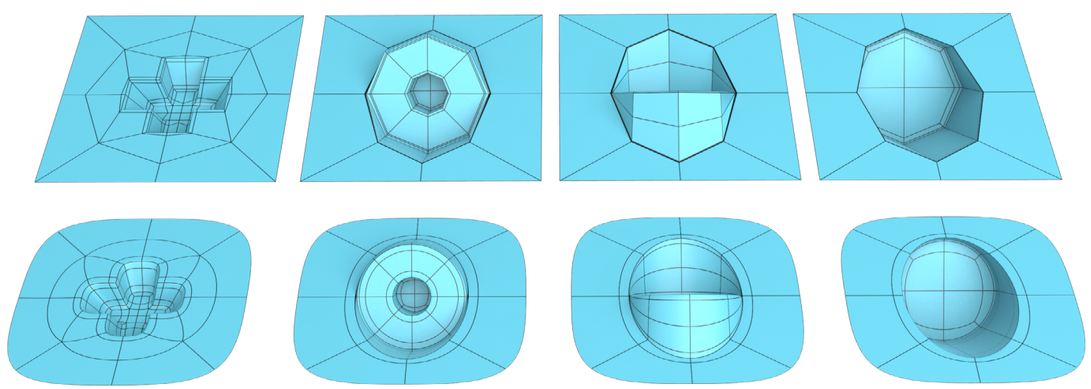
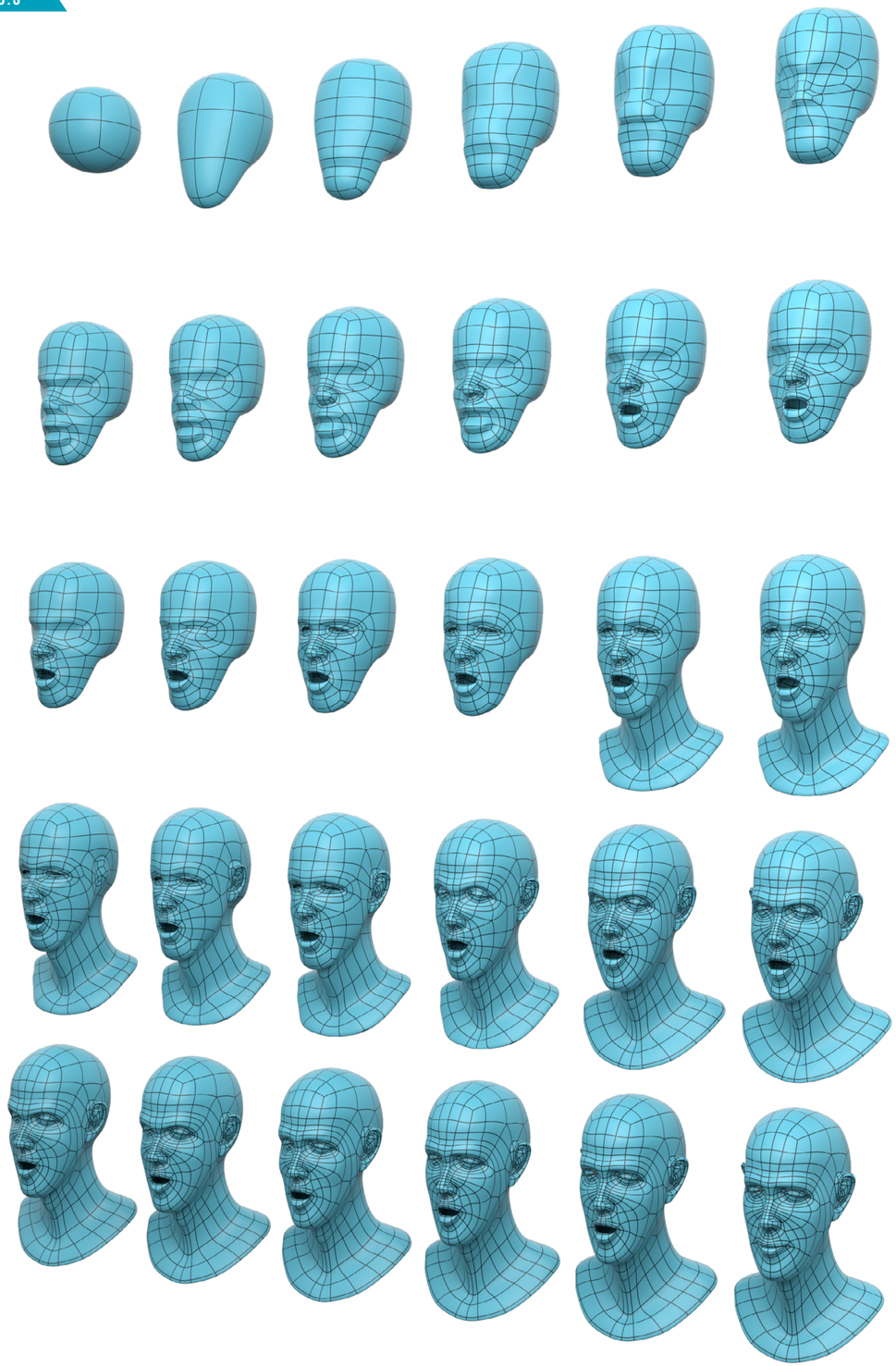


FIGURE 5.5



SECTION 6: RETOPOLOGIZING IN MODO

When discussing 3D models, topology refers to the geometric surface characteristics of a 3D mesh. Topology is often referred to as Polygon Flow, but the layout of the vertices and edges of a mesh also play an important role in whether a mesh is considered to have good or bad topology.

While many aspects of what defines good topology are universally agreed upon, there is no true industry standard or set of guidelines. The guidelines that I follow when arranging the topology of a mesh are based on years of production experience and are very much self-imposed.

There are times that you may wish to rebuild a mesh that has poor topology but keep the same volume and shape. This is a common practice often called **Retopologizing**.

Retopology can be a time-saving modeling technique for optimizing 3D sculpted meshes, 3D scanned data, or simply reworking meshes created with traditional modeling tools.

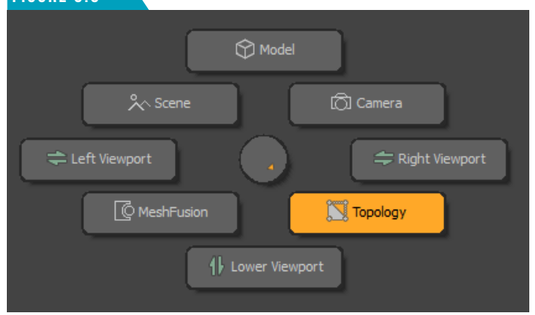
In this section I'll introduce you to the basic workflow of retopology in Modo, which has an amazing toolset that makes retopologizing a mesh incredibly easy.

I've included a scene file of a 3D scanned shoe for you to use if you'd like to follow along. Open (**File/Open**) the source file included with this guide named **ShoeScan_Vaughan.lxo.**

(**Modo_Essentials/Source/S6/Scenes**)

With the scanned mesh loaded, let's prepare the workspace. Using the **Viewport Switcher Pie Menu** (**Alt+Spacebar**) **(Figure 6.0)** change the center viewport to the **Topology Viewport** and switch to the **Topology Toolbar** using the third icon from the left in the **Toolbar Menu**.

FIGURE 6.0



There are two mesh items in the scene. Select the mesh item named **ShoeScan**. Your workspace should now look like **(Figure 6.1)**.

The Topology Viewport is designed to be ideal for retopologizing meshes. It uses a special OpenGL drawing mode to make it easier to see what is being drawn in the foreground over what is in the background.

The Topology Toolbar gives you access to tools that automatically conform to any item in the background. As you can see, there are quite a few tools at your disposal, but I find that I primarily use a single tool for 98% of my retopology work, so that is the tool we'll focus on in this guide.

Before we start creating new geometry, I want to take advantage of a feature that speeds up working with dense scanned meshes. Right-click on the **ShoeScan** item in the **Items List**, and then choose (**ChangeType/Static Mesh**).

Static Mesh Items can streamline workflows where extremely dense meshes are used.

Static meshes are non-editable, but the trade-off is they remove the overhead associated with editing a mesh, increasing overall performance and minimizing file size.

While this shoe scan is not overly dense, I've made it a habit of converting any sculpted or scanned data I plan to retopologize into static meshes to take advantage of any performance boost I can get.

Select the **Clean_Shoe** mesh item, and then activate the **Topology Pen Tool (Figure 6.2)**.

The **Topology Pen Tool** is a **Tool Preset** that automatically enables the **Background Mesh Constraint** and **Snapping** features. This will enable us to create new geometry that conforms to the background (Inactive) mesh.

To start using the tool, hold down the (**Ctrl**) key and left-click and drag over the surface of the **ShoeScan** mesh which should be inactive. A new four-point polygon (**Quad**) will be created that will conform to the background mesh item. **(Figure 6.3)**.

FIGURE 6.2

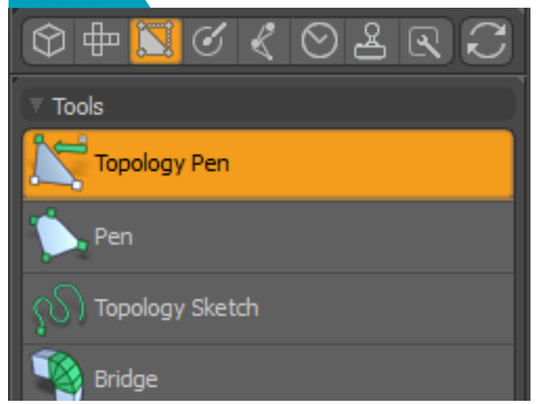


FIGURE 6.3

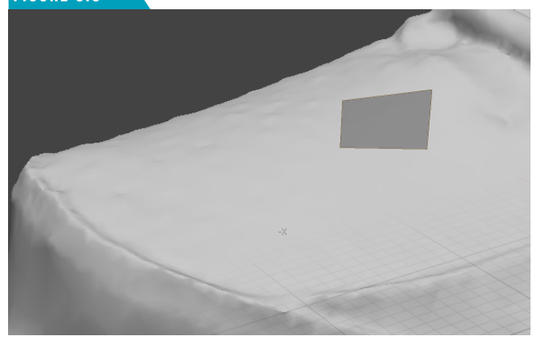
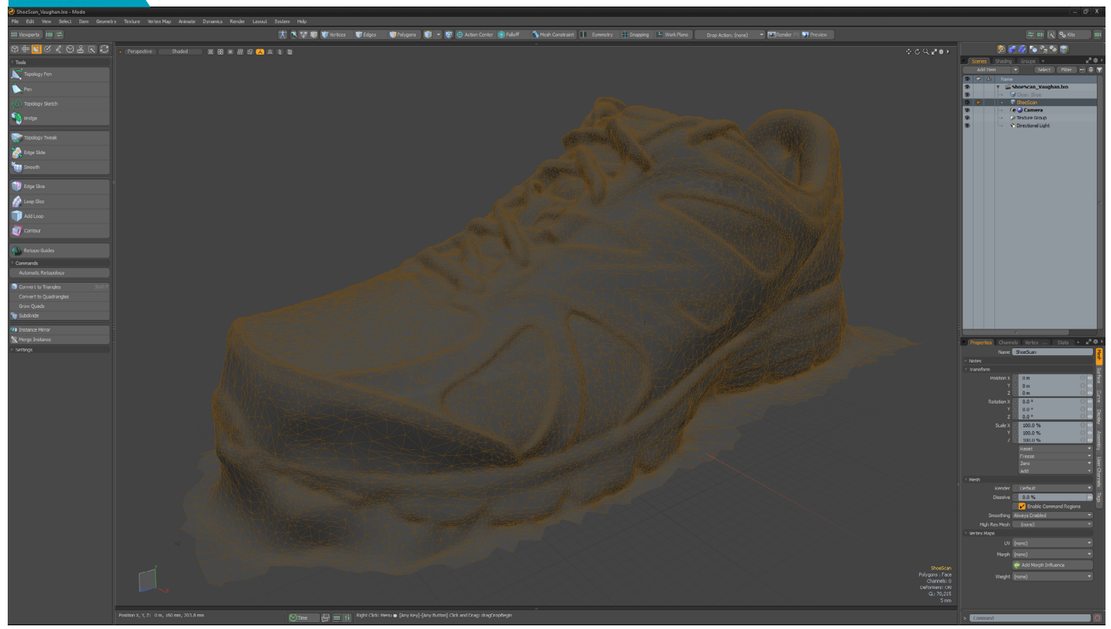


FIGURE 6.1



WATCH OUT!

A common mistake artists make when retopologizing is attempting to create new geometry on the same mesh item as the mesh they are wanting to rebuild.

Make sure you are working in a new/empty mesh when you start the retopology process.

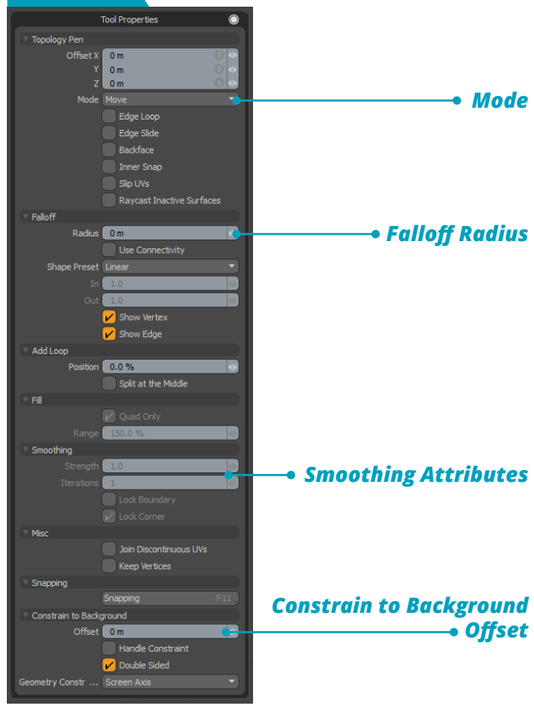
The Topology Pen Tool does so much more than allow you to draw out single quad-polygons. One look at the Topology Pen Tool Properties Panel (Figure 6.4) should give you an idea that this tool is packed with goodies.

The tool provides several Modes that directly relate to the process of retopologizing geometry such as removing, duplicating and smoothing.

There are also attributes you can toggle on and off. I've created some call-outs for some of the key attributes you'll want to take note of, but with that said, I rarely use the Tool Properties Panel when working with the Topology Pen Tool.

Instead, I take advantage of the mouse actions and keyboard shortcuts shown in (Figure 6.5).

FIGURE 6.4



Let's put a few of these to work. First, start by left-clicking and dragging the vertices and edges to change the location and shape of the first polygon we created.

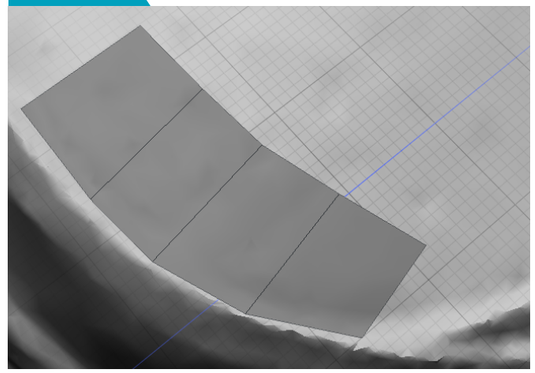
Next, hold down the (Shift) key and click and drag one of the edges to extend (duplicate) the edge and create another quad-polygon. Repeat this step a few times to generate a strip of quad-polygons as seen in (Figure 6.6).

FIGURE 6.5

Topology Pen Hotkeys

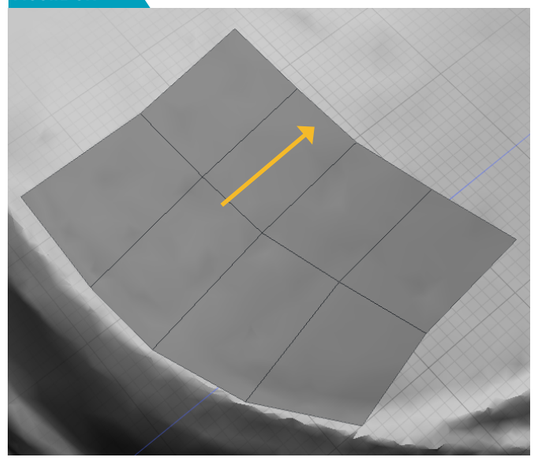
Keystroke(s)	Action
Ctrl+Left-click (Blank Area)	Create New Quad Polygon
Left-click	Move Elements (Click and Drag on Vertex, Edge or Polygon)
Right-click	Move Edge Loop (Click and Drag on Edge)
Middle-click	Split (Click Vertex to Vertex)
Shift+Left-click	Duplicate/Extend (Click and Drag on Vertex or Edge)
Shift+Right-click	Duplicate/Extend Loop
Shift+Middle-click	Add Loop (Click Edge)
Ctrl+Left-click	Slide (Click and Drag on Vertex, Edge or Polygon)
Ctrl+Middle-click	Remove (Click on Vertex, Edge or Polygon)
Shift+Ctrl+Left-click	Smoothing
Shift+Ctrl+Right-click	Edge Loop Smoothing

FIGURE 6.6



Hold down the (Shift) key and right-click and drag on one of the edges to extend the entire polygon loop, as seen in (Figure 6.7).

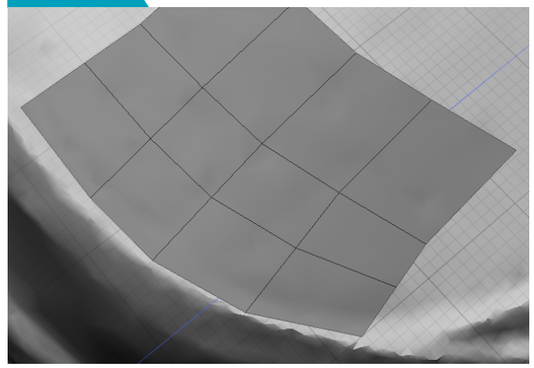
FIGURE 6.7



Hold down the (Shift) key and middle-mouse click on one of the edges to add a new edge loop to the original quad-strip. The results are shown in (Figure 6.8).

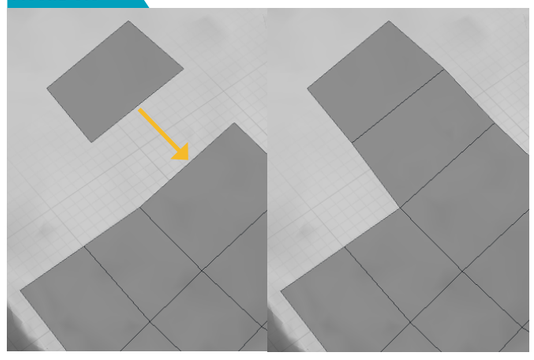
Create a new quad-polygon by hold down the (Ctrl) key and left-clicking and dragging away from the existing polygons.

FIGURE 6.8



Next, hold down the (Shift) key and left-click and drag one of the new edges toward one of the existing edges. The two edges will snap together, forming a single polygon island (Figure 6.9). Repeat this process to complete the new shoe topology.

FIGURE 6.9



PUT YOUR NEW SKILLS TO WORK!

If you took some time and retopologized the entire scanned shoe mesh, you'd master using the Topology Pen Tool. You might not have time to do it over this weekend crash-course, but come back and revisit it at some point to get the experience.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at working with the Topology Pen in Modo.

SECTION 7: UV MAPPING

Vertex Maps are a special type of vertex-specific information stored within a mesh's vertices, such as color (RGBA Maps), position offsets (Morph Maps) and percentages (Weight Maps).

A UV Map is a type of vertex map that stores vertical and horizontal positions on a 2D texture. The letters U (Horizontal) and V (Vertical) denote the axes of the 2D texture because X, Y and Z are used to denote the axes of the 3D space.

UV Mapping is the process of translating a 3D surface with volume and shape onto a flat 2D texture image. One way to visualize how this works is to think of cutting open product packaging and laying it flat as seen in (Figure 7.0).

Modo provides a special viewport along with a collection of tools and functions, which work in conjunction to simplify the otherwise tedious process of UV mapping.

I've included a scene file that contains two mesh items: a UV'd character mesh and a simple coil mesh without UVs.

You're free to use them if you'd like to follow along. Open (File/Open) the source file included with this guide named MagmaToad_Vaughan.lxo.

(Modo_Essentials/Source/S7/Scenes)

With the scene loaded, let's prepare the workspace. Use the Viewport Switcher Pie Menu (Alt+Spacebar) to open the Left Viewport.

By default the Left Viewport will be set to the UV Viewport, but if it's not, simply change it

FIGURE 7.0



using the UV icon (second from left) that is located just above the Left Viewport.

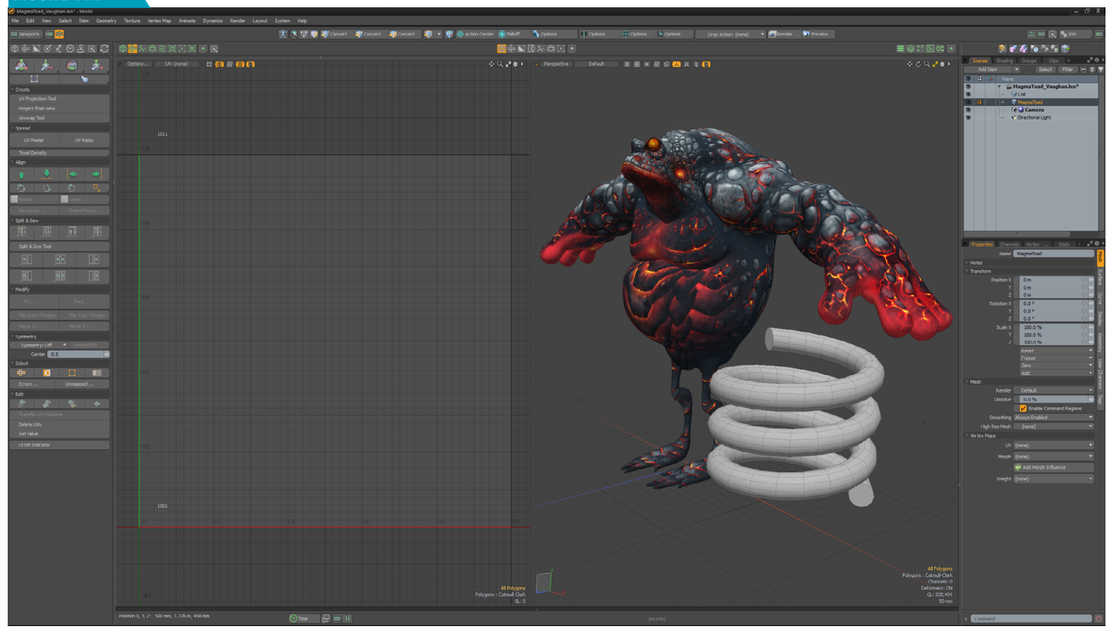
Next, switch to the UV Toolbar using the second icon from the left in the Toolbar Menu. Your workspace should look like (Figure 7.1).

This is an ideal layout for working with UVs. It gives you quick access to the UV Viewport, 3D Viewport and all the UV tools.

Let's take a look at the UVs that are already created for the MagmaToad mesh item.

Select him in the Items List, open the Vertex Maps Tab, click the small arrow (▶) next to UV Maps, and then select Magma_UV (Figure 7.2).

FIGURE 7.1



The Left Viewport should now display the selected UV Maps' UVs. (Figure 7.3)

FIGURE 7.2

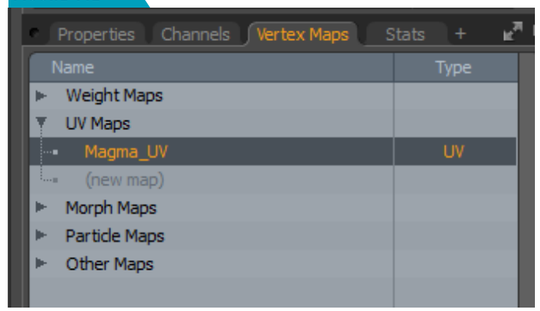
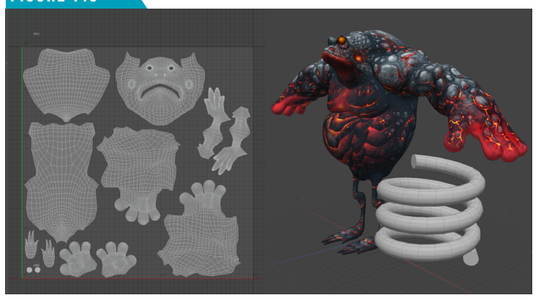


FIGURE 7.3



As we discovered in Section 1, anytime you see a small gear icon in the top corner of a viewport, it denotes viewport options. The UV Viewport has its own set of specific options for changing the display settings.

In the top-left section of the UV Viewport, you'll find some quick access buttons (Figure 7.4).

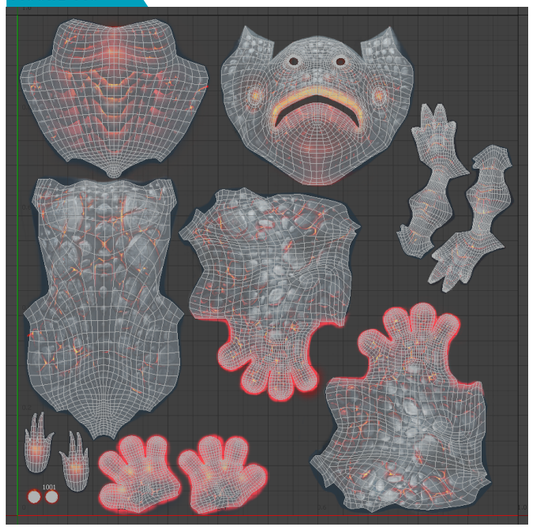
These buttons are similar to the ones found in the 3D Viewport, but these focus on display options related to UVs.

FIGURE 7.4



From the UV Viewport Options Popup, choose (Backdrop/ToadMagma). This will display the image that is applied to the MagmaToad surface in the UV Viewport (Figure 7.5).

FIGURE 7.5



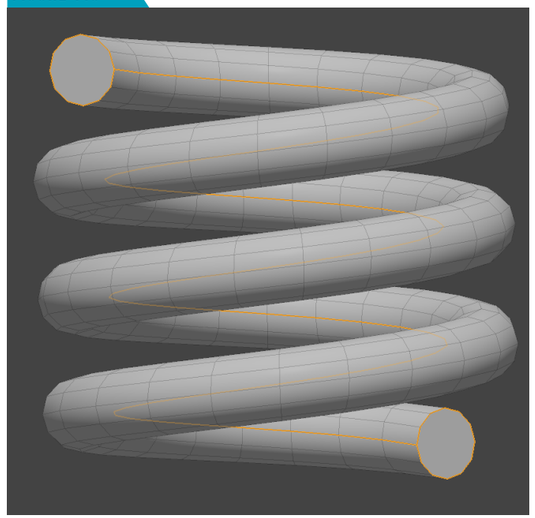
Speaking of tweaking UVs, although it's great that Modo offers an amazing array of UV specific tools, it's good to know that you can use the standard tools and falloffs to manipulate UVs as well.

For example, I use Element Move pretty much every time I'm UV mapping, and when UV mapping character faces, I almost always use Radial Falloff with the Scale tool to help fix UV distortion.

Let's create UVs for the Coil mesh item to get an idea of creating UVs from scratch. Start by turning off the backdrop image display (Options/Backdrop/None).

Select the Coil mesh item, and then use the selection skills you learned in Section 2 to mimic the selection seen in (Figure 7.6). You should be able to select the edges in three steps.

FIGURE 7.6



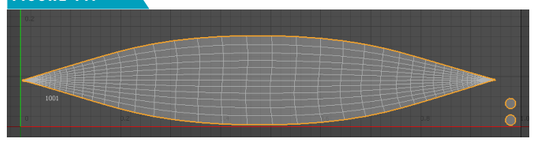
We'll use this edge selection to define our UV seams. UV Seams are the areas of the mesh that are cut to allow the 3D mesh to be flattened.

It is usually best to place seams where they are the least visible, so I chose to select the edge loop that is on the inside of the coil.

With the edges that will define our UV seams selected, create a new UV Map by selecting (New Map) in the Vertex Maps Viewport. Give the new map a unique name (Coil_UV) and click OK.

Activate the Unwrap Tool located at the top of the UV Toolbar and then left-click and drag in the UV Viewport until your UVs look like (Figure 7.7).

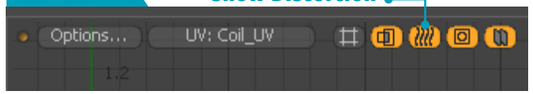
FIGURE 7.7



Drop the Unwrap Tool (Q). While technically unwrapped, these UVs are not ideal. There is some major distortion in the main portion of the coil's UVs.

If you'd like a visual display of distortion, click the (Show Distortion) icon in the top-left portion of the UV Viewport (Figure7.8).

FIGURE 7.8



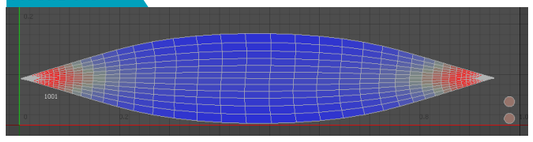
Distortion is a fact of life with UV mapping, and completely eliminating distortion is not always required. My end goal is to produce UV maps with as little distortion as possible. This visual display helps show where distortion is happening.

Polygons that are the closest in relative size to others in the map with the least distortion display a middle gray/green color.

Distorted and smaller relative polygons fade toward red; distorted and larger relative polygons display as blue.

Looking at the UVs in our coil (Figure 7.9), it becomes obvious we have a distortion issue we should address.

FIGURE 7.9



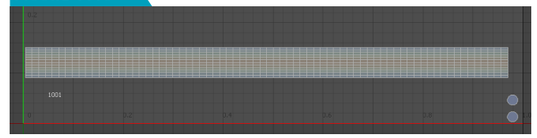
There are many options for manipulating the UVs and addressing distortion. As mentioned earlier, we have access to all the tools in the UV Toolbar as well as the standard modeling tools in the Model Toolbar.

Since the shape of this UV island is a rectangle, we can take advantage of a powerful command in the UV Toolbar called (Rectangle), which straightens quadrangle selections of UVs into rectangle sections.

Change to Polygon Selection Mode, double-click on the UV island that makes up the main part of the coil to select all of the connected polygons, and then run the Rectangle Command from the UV Toolbar.

Your UVs should now have little to no distortion and they should look like (Figure 7.10).

FIGURE 7.10



One look at the UV Toolbar and it becomes obvious that we've only just scratched the surface of UV mapping in Modo.

Spend some time exploring the UV Viewport options as well as the collection of UV specific tools available in the UV Toolbar.

PUT YOUR NEW SKILLS TO WORK!

Load up the Gidget and Pepperjack and Crunk Car scenes and have a go at UV'ing them.

Start with some of the smaller, simpler components and then work your way to some of the more complex organic shapes.

Play with UV seam placement and explore some of the UV specific tools to see how they can aid in the UV mapping process.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at UV mapping in Modo.

SECTION 8: RIGGING AND ANIMATION

When you're ready to animate a 3D asset, Modo offers a variety of tools and functions for rigging.

Rigging is the process of creating controls that aid in the manipulation of items in a scene. Think of a marionette puppet that is controlled from above using strings. With just a few subtle hand movements, the puppet can be brought to life.

In this section we'll look at creating a basic vehicle rig that will enable us to save time when animating.

I've included a scene file of a carton truck that you're free to use if you'd like to follow along. Open (File/Open) the source file included with this guide named Truck_Vaughan.lxo.

(Modo_Essentials/Source/S8/Scenes)

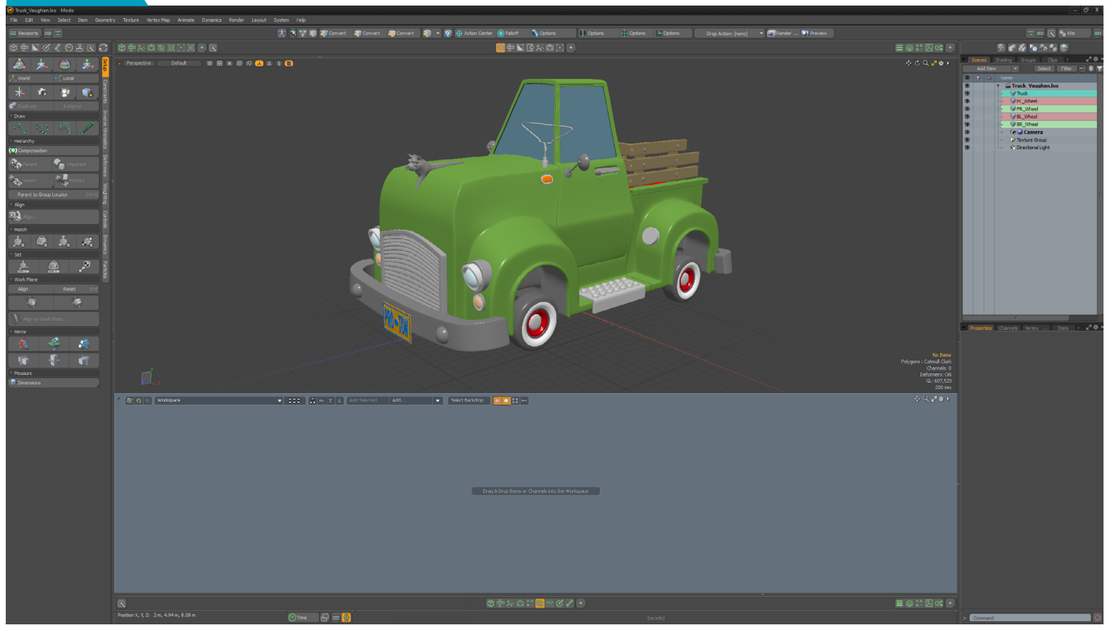
Just like we've done in previous sections, let's adjust our workspace to gain access to tools and viewports that will speed up the rigging process.

Switch to the Setup Toolbar using the fifth icon from the left in the Toolbar Menu. Next, use the Viewport Switcher Pie Menu (Alt+Spacebar) to open the Lower Viewport, and then switch the lower viewport to the Schematic Viewport. Your workspace should look like (Figure 8.0).

To enable the wheels and the truck to move together but remain independent of each other, we'll create a locator that they can all be parented to.

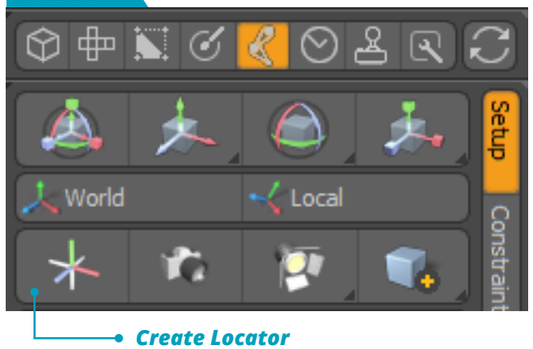
In Modo, a locator plays many important roles in rigging and animation, as they can be used as targets, controllers, parents, manipulators, selectors, and more.

FIGURE 8.0



Click the Create Locator Button (Figure 8.1) in the Setup Toolbar to add a locator to the scene.

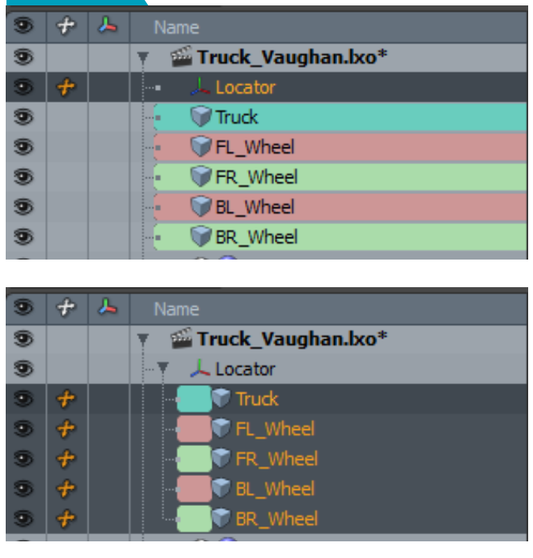
FIGURE 8.1



A new locator will be added to the scene at the origin. Move it to the top of the Items list by left-clicking on it and dragging it to the top of the list.

Next, select the Truck and Wheel mesh items and left click and drag them on top of the locator to parent them to the locator (Figure 8.2).

FIGURE 8.2

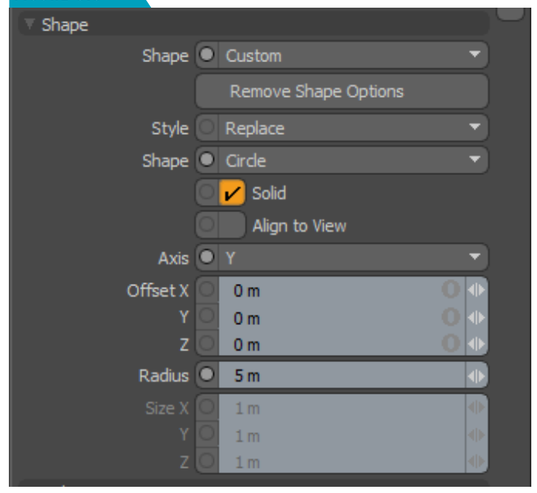


By default, a locator looks like an asterisk, but we can change the look of a locator by changing its display properties.

Select the locator in the Items List and rename it (Truck_Mover).

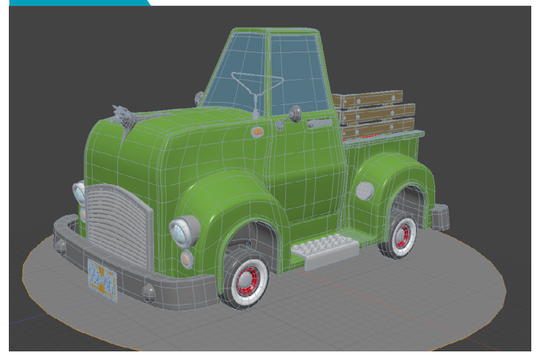
In the Properties Viewport, change the Shape attribute to (Custom). This will reveal additional attributes. Next, change the Shape to (Circle), the Axis to (Y), and the Radius to (5m) (Figure 8.3).

FIGURE 8.3



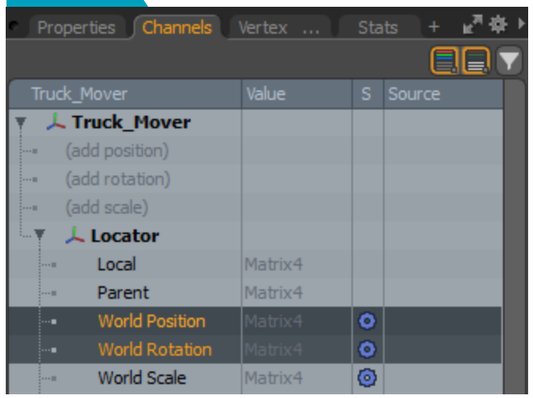
Your locator should now look like (Figure 8.4). This will make it easier to see and select in the 3D viewport.

FIGURE 8.4



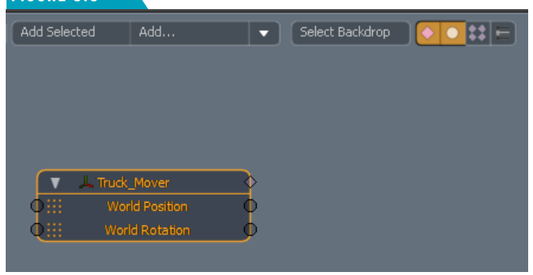
With the locator still selected, open the Channels Viewport (to the left of the Properties tab), and then shift-select (World Position and World Rotation) (Figure 8.5).

FIGURE 8.5



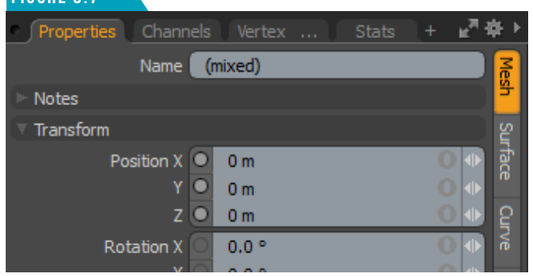
With both channels selected, right-click and choose (Add Channel to Schematic). A new node will be added to the Schematic Viewport (Figure 8.6).

FIGURE 8.6



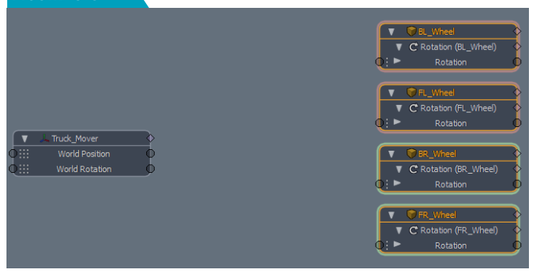
Select all four of the wheel mesh items, open the Properties Tab, and then locate the Rotation X channel attribute (Figure 8.7).

FIGURE 8.7



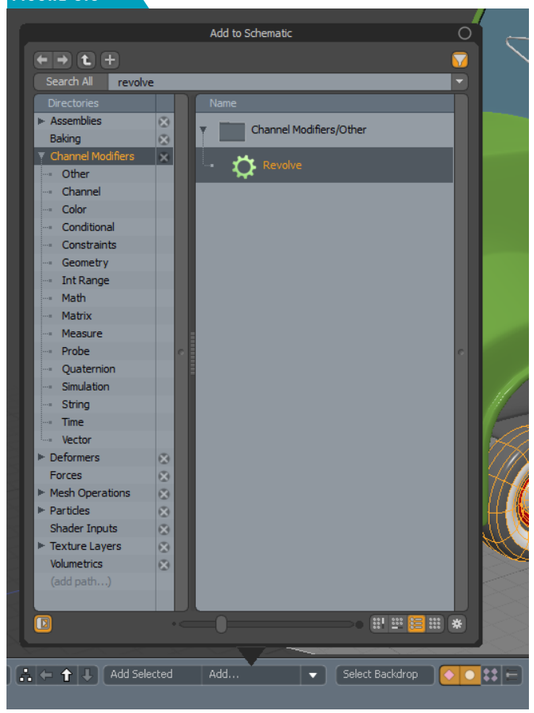
Right-click on the Rotation X channel attribute name and choose (Add Channel to Schematic). Four new nodes will be added to the Schematic View. Spend a minute organizing them by left-clicking and dragging them into place (Figure 8.8).

FIGURE 8.8



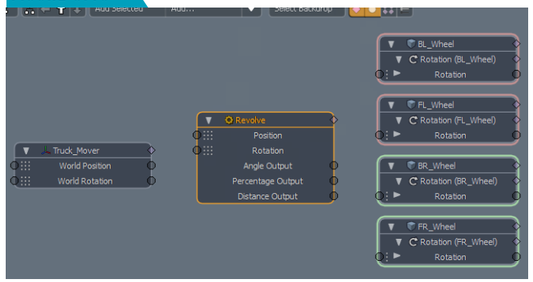
Click the (Add...) button in the Schematic Viewport and locate the (Revolve) channel modifier. The fastest way to do this is to use the (Search All) field at the top of the browser (Figure 8.9).

FIGURE 8.9



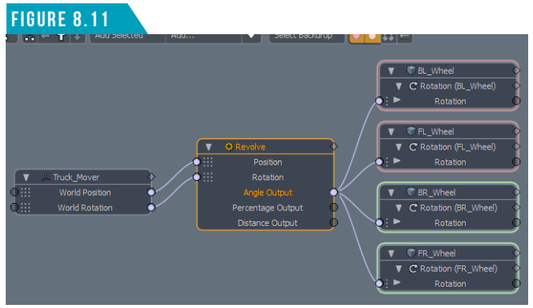
Double-click (Revolve) to add it to the Schematic View (Figure 8.10).

FIGURE 8.10



To make connections in the Schematic Viewport, you simply left-click and drag on the small circles located on the sides of the nodes. Connect the following channels: (World Position to Revolve Position), (World Rotation to Revolve Rotation) and (Revolve Angle Output to all four Wheel Rotation Inputs). Your Schematic View Should look like (Figure 8.11).

FIGURE 8.11

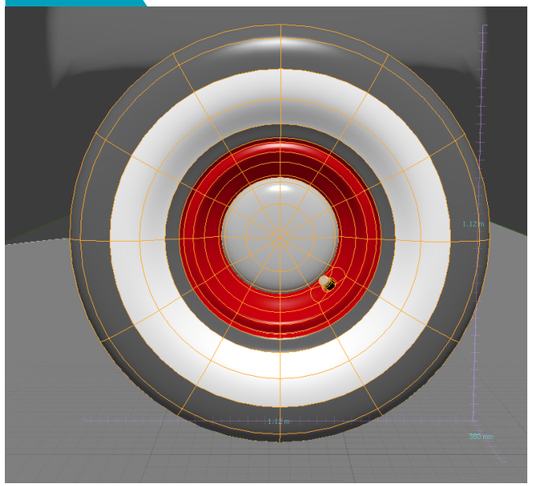


We're almost done with setting up the rig for this truck. All that's left to do to get the Revolve channel modifier to produce the correct results is to feed it the radius of the Wheels.

An easy way to get the dimensions of a selection is to activate the Dimensions Tool (View/Dimensions Tool).

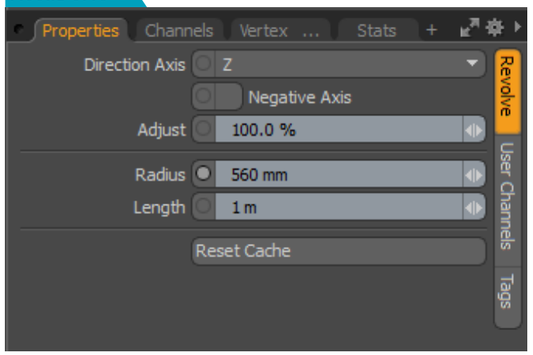
Next, select one of the wheels and make note of the diameter (Figure 8.12).

FIGURE 8.12



Select the Revolve channel modifier node and enter (1.12m/2) into the Radius attributes input field. Modo will calculate the simple math equation and produce (560mm) to give us the radius of the wheel. (Figure 8.13)

FIGURE 8.13



Our truck is now complete and ready to animate. If we've done everything properly, all we should have to do is animate the locator we created, and the Truck and Wheels will move with it.

All four wheels will also spin the proper amount, which will save us loads of time when animating.

ANIMATING WITH THE TRUCK RIG

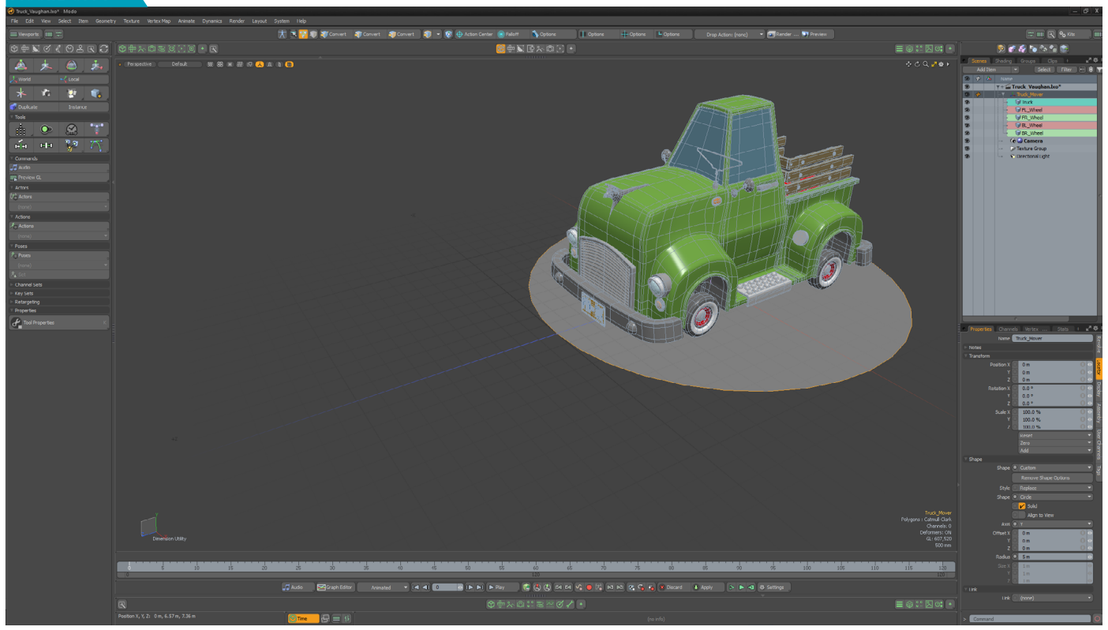
Let's spend a second adjusting our workspace. Switch to the Animation Toolbar using the sixth icon from the left in the Toolbar Menu.

Next, use the Viewport Switcher Pie Menu (Alt+Spacebar) to close the Lower Viewport, and then disable the Dimensions Tool (View/Dimensions Tool).

Click the Time Button at the bottom of the UI to open the Timeline Viewport, and then select the (Truck_Mover) locator. Your workspace should look like (Figure 8.14).

To animate the truck, we'll need to create at least two keyframes. In animation, keyframes are frames in a sequence in which prominent changes take place. You create a "key" at critical positions for an item, and Modo will automatically fill in the frames between keyframes smoothly interpolating the motion.

FIGURE 8.14



Let's use the current location of the truck as our starting position. To set a keyframe for the locator's position channels, make sure you're in Items Selection Mode and then use the keyboard shortcut (Shift+W).

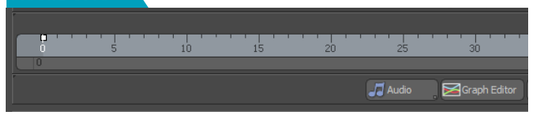
For additional shortcut keys related to setting keyframes, check out (Figure 8.15).

FIGURE 8.15 *Setting Keyframes Hotkeys*

Keystroke(s)	Action
Shift+Y	Key transforms
Shift+E	Key rotations
Shift+W	Key positions
Shift+R	Key scale
S	Key selected channels
Shift+S	Key selected items

If you look at the Timeline, you should see a small white square on frame zero (Figure 8.16). Congrats! You just created your first keyframe in Modo.

FIGURE 8.16

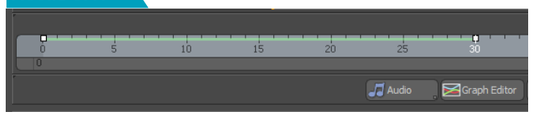


Left-click and drag in the Timeline to move to (Frame 30), and then use the Move Tool (W) to move the locator forward in the (Positive Z).

Take note that the wheels are automatically rotating when the locator is moved, thanks to the rig we created. When you're happy with the new position of the truck, drop the Move Tool.

A new keyframe will automatically be created at frame 30. You'll also see a light green line between the two keyframes that denotes in-between frames (Figure 8.17).

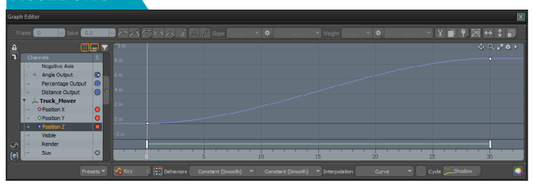
FIGURE 8.17



You can scrub the animation by left-clicking and dragging in the timeline. This can be a quick way of testing portions of your animation while you animate.

Open the Graph Editor by clicking the Graph Editor Button in the Timeline Viewport. Use the keyboard shortcut (A) to fit all selected channels into view. Select the (Position Z Channel) from the Channel List to isolate that channel for editing (Figure 8.18).

FIGURE 8.18



The Graph Editor is an animator's sniper rifle. It allows you to control not only keyframes, but how Modo interpolates the in-between frames as well. You'll want to spend some time becoming familiar with both the Timeline and Graph Editor options if you want full control when animating in Modo.

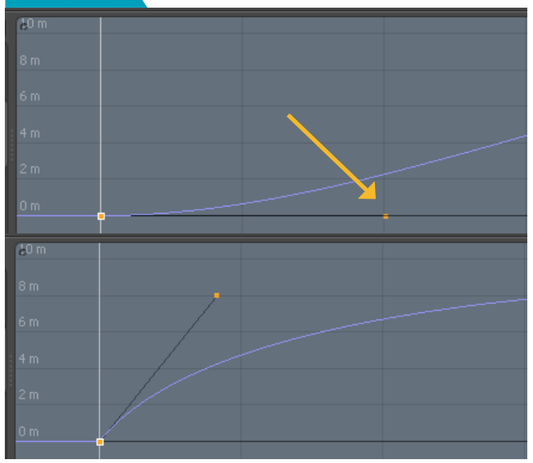
Use the keyboard shortcuts in (Figure 8.19) to help speed up navigating the Graph Editor.

FIGURE 8.19 *Graph Editor Hotkeys*

Keystroke(s)	Action
A	Fit selected
Ctrl+F	Fit visible
Shift+F	Fit visible width
Alt+click	Pan view
Ctrl+Alt+click	Scale view
Alt+Right-click	Scale graph size
Ctrl+Alt+Right-click	Box zoom (drag box to zoom)
Ctrl+Shift+V	Paste insert keyframes to selected channels
Ctrl+Alt+V	Paste replace keyframes to selected channels

Select the keyframe on (Frame 0) by left-clicking it. Left-click and drag the handle located to the right of the keyframe to adjust the easing-in and out of the curve (Figure 8.20).

FIGURE 8.20



ANIMATING WITH THE TRUCK RIG CONT.

It's important to learn your way around the **Graph Editor** if you plan on spending time in Modo. Almost every property/attribute of any item can be animated by keyframing the values of an item's channel.

I've labeled a few key components in **(Figure 8.21)** to help introduce you to where some of these important options are.

The **Channels List** on the left side of the **Graph Editor** are the same channels that appear in the **Channels Viewport** we've worked with on the right side of the UI.

The line (curve) that connects the individual keyframes represents the value's change over time. By default, Modo uses a smooth curve to interpolate between keyframe values, providing a nice ease-in/ease-out type of effect.

There may be times when you want a very different interpolation style, or simply to apply finer control.

Animation curves can only be changed by manipulating the keyframes and are very similar to working with the Bezier Curve Tool in the Model Toolbar.

Keyframes are represented as small squares along the line.

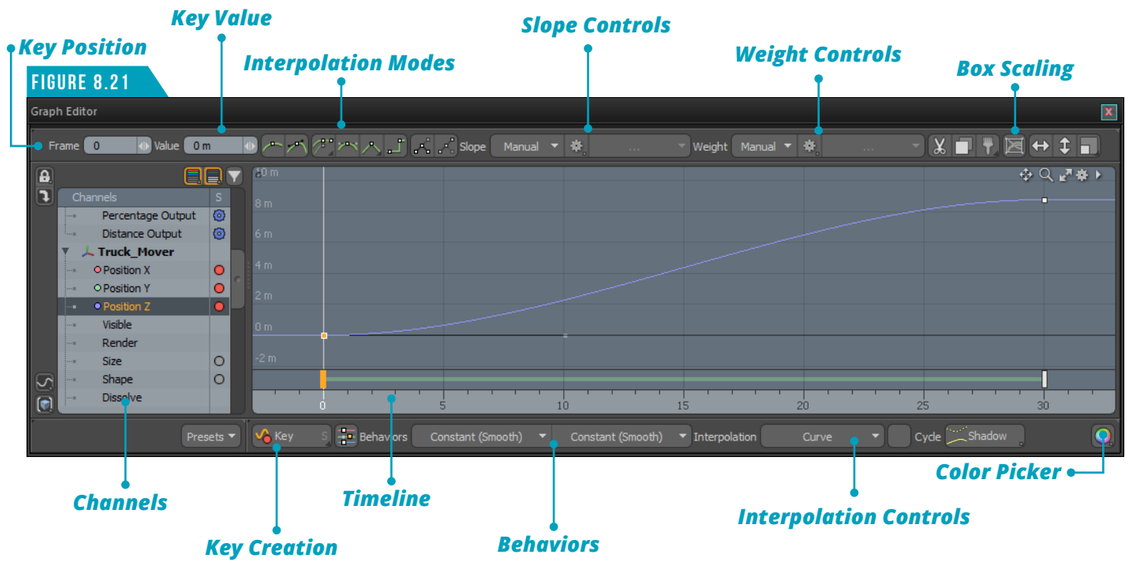
The Timeline across the bottom of the Graph Editor is pretty much identical to the Timeline in the main workspace. Clicking and dragging changes the current time.

As you drag the current time value around, you can see the effect of the animation curve in the 3D viewport. Handles appear in the Timeline wherever a keyframe appears, and you can click and drag them in time forwards or backwards, modifying the position of the keyframes for selected channels.

If you plan on doing any animation in Modo, you'll want to take advantage of what the Graph Editor has to offer to avoid stiff, lifeless motion in your animations.

Save your work (**File/Save As...**), and then load **Liam_ACS_Rig_Vaughan.lxo**.

FIGURE 8.21



(Modo_Essentials/Source/S8/Scenes)

This scene **(Figure 8.22)** contains a fully rigged character for you to explore. Spend some time selecting the different controls (locators) that make up the rig, and study the keyframes in both the **Timeline** and **Graph Editor.**

When you're ready, we'll continue to the next section of the guide.

PUT YOUR NEW SKILLS TO WORK!

You now know enough to be dangerous with rigging and animation in Modo. Use the truck rig you created as well as the provided Liam rig and start animating.

The best way to get comfortable doing something is to simply do it. So, start rigging and animating and using the vast collection of tools Modo has to offer.

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at Rigging and Animating in Modo.

FIGURE 8.22



SECTION 9: SHADER TREE AND RENDERING

How're you holding up? We're at the tail end of the weekend, but we still have a few essentials to cover before we conclude this crash course of Modo. Don't worry, just a few more pages and then you can collapse knowing that when you wake from your much-deserved rest, you'll be ready to use the software with confidence.

Modo uses a unique shading system with it's **Shader Tree** that we caught a glimpse of in Section 1 of this guide. Before we can use the **Shader Tree**, we really need something to shade (texture). Fortunately, I got you covered with a scene file.

Open (**File/Open**) the source file included with this guide named **Ivan_Vaughan.lxo**.

(Modo_Essentials/Source/S9/Scenes)

Ivan **(Figure 9.0)** was the first character model I created during my own weekend crash course with Modo, so I thought it was fitting to use him for yours.

FIGURE 9.0

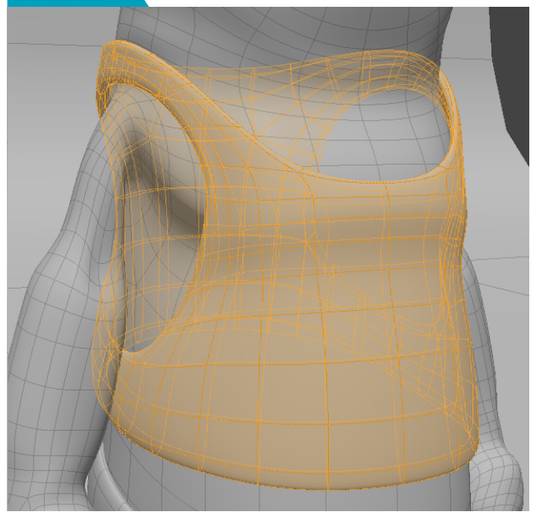


ASSIGNING MATERIALS

For us to be able to change the surface attributes of the various parts of this mesh, we need to assign material tags. The process is quite simple. For this session we'll assign a few material tags to break up this character's surface and to give you some hands-on experience.

Start by selecting all the polygons that make up Ivan's shirt **(Figure 9.1)**.

FIGURE 9.1



Next, use the keyboard shortcut (**M**), to bring up the **Polygon Set Material Dialog (Figure 9.2)**.

Give the **Material Tag** a unique name. I'll use (**Ivan_Shirt**). Next, click the **Color Bar**, and from the **Color Dialog** choose a color, such as the blue (0.0,0.5,1.0) color I went with in **(Figure 9.3)**.

FIGURE 9.2

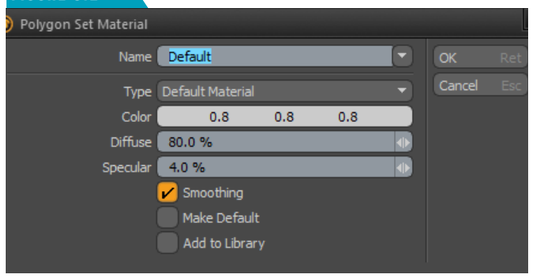
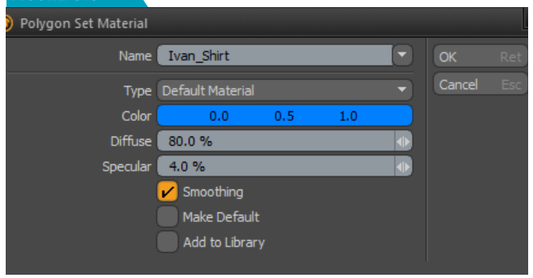


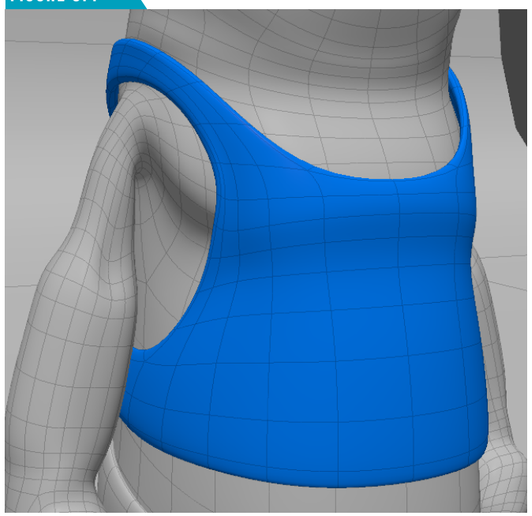
FIGURE 9.3



There are additional material attributes that could be adjusted, but for now, let's keep the default values for those settings. When you're happy with the name and color, click **OK**.

The polygons that make up Ivan's shirt should now display color in the 3D Viewport **(Figure 9.4)**.

FIGURE 9.4



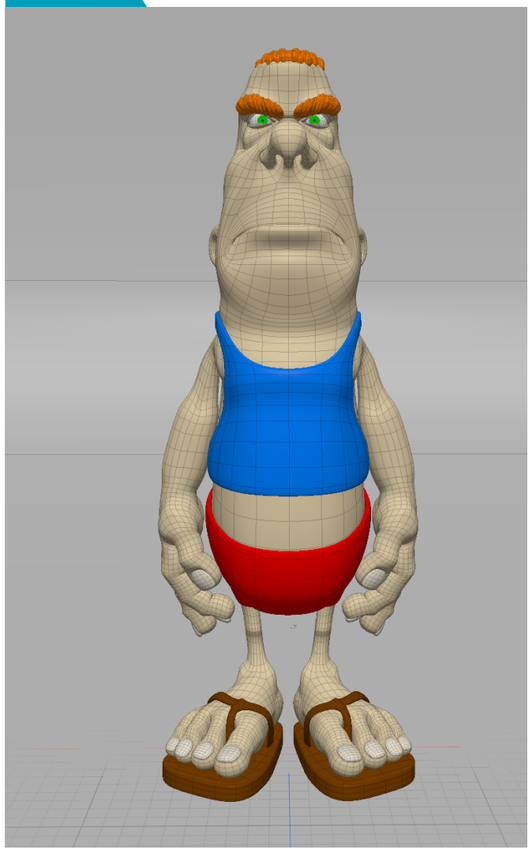
Rinse and repeat. Break up the rest of Ivan's mesh so that we have some material tags to work with.

Create material tags with the following eight material tag names: **Ivan_Shorts**, **Ivan_Skin**, **Ivan_Nails**, **Ivan_Hair**, **Ivan_Sandals**, **Ivan_EyeWhite**, **Ivan_Iris**, **and Ivan_Pupil**.

Remember the steps. Make a polygon selection, press (**M**), assign a name and color and then click **OK**.

When you're done, Ivan should look something like **(Figure 9.5)**.

FIGURE 9.5



With all of our material tags created, let's set up our workspace to take full advantage of the features available, and to make shading and rendering an enjoyable experience.

Switch to the **Setup Toolbar** using the fifth icon from the left in the **Toolbar Menu**.

Next, use the **Viewport Switcher Pie Menu** (**Alt+Spacebar**) to open the **Lower Viewport**, and then switch the **Lower Viewport** to the **Scene Viewport**.

Change the **Center Viewport** to the **Progressive Render Viewport** (Preview Viewport) and click on the **Shading Tab** in the **Lists Viewport** to display the **Shader Tree**.

Click the large white arrow (▶) in the center of the **Preview Viewport** to activate the progressive renderer.

Your workspace should look like **(Figure 9.6)**.

FIGURE 9.6



LIGHTING

I'm not all that excited about the lighting in the scene. While the default **Directional Light** has its uses, I usually prefer to work with **Area Lights**, which are similar to studio soft-box lights, often used in professional photography because of the soft shadows they produce.

Select the **Directional Light** in the Scene Viewport, then choose (**Item/Change Type/Area Light**) from the Application Menu.

This keeps the position and rotation values of the light but changes it to a different type of light.

Modo has nine unique light types **(Figure 9.7)** that simulate real world sources of illumination.

When you have time to experiment, you should explore the different light types so that you are aware of what is available for future projects. For this scene we'll stick with Area Lights.

FIGURE 9.7 *Light Types*

Light Type	Description
Area	Similar to a studio soft-box style light.
Cylinder	Similar to a common fluorescent tube.
Directional	Similar to the Sun.
Dome	Creates a virtual dome of lights around the scene producing a flat, even illumination over surfaces like photos taken on an overcast day.
Photometric	Uses data provided by lighting manufacturers in the form of IES or EULUMDAT format photometry files.
Point	Similar to a light bulb or a candle flame.
Portal	Portals are not lights in that they produce no illumination by themselves. They are meant more to control lighting, especially that of interior renders that rely mainly on Global Illumination. Think of them as gathering rays and focusing them into a specific area.
Spotlight	Similar to a real-world spotlight.
Mesh Light	Direct light source whose shape comes from a mesh item in the scene.

With the Light still selected, press (**R**) to activate the **Scale Tool**. Click on the cyan circle handle in the center and scale the light up to a larger size. When you're happy with the size, drop the **Scale Tool** (**Q**).

The intensity of the **Area Light** is also increased as the volume (size) of the light increases. Increasing the size of the light relative to the model it affects also increases the amount of shadow spread.

Press (**Ctrl+D**) to **Duplicate** the light, and then **Move** (**W**), **Rotate** (**E**) and **Scale** (**R**) it to create a back light.

Don't forget that all items in Modo have properties. You'll also want to explore the **Properties Viewport** when you have your light selected to gain access to its attributes. You can change settings such as **Radiance** (intensity of the light), **Shadow Type** and more.

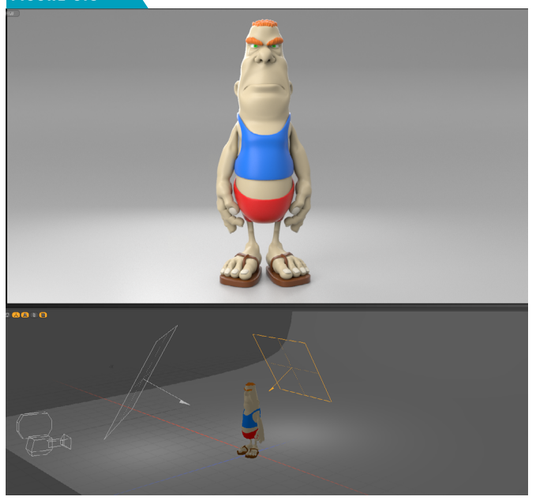
As you make adjustments in the **Scene Viewport**, you can see the **Preview Viewport** update, giving you real-time feedback of the changes you're making. This speeds up lighting and texturing and takes the guesswork out of refining your renders.

Lighting and Texturing play off each other, so I like to get my lighting 90% in place before moving on to texturing.

Everyone has his or her own workflow when it comes to lighting, but this method has served me well over the years.

When you're happy with the lighting of your scene, we will move on to texturing. I settled on the simple setup in **(Figure 9.8)**.

FIGURE 9.8



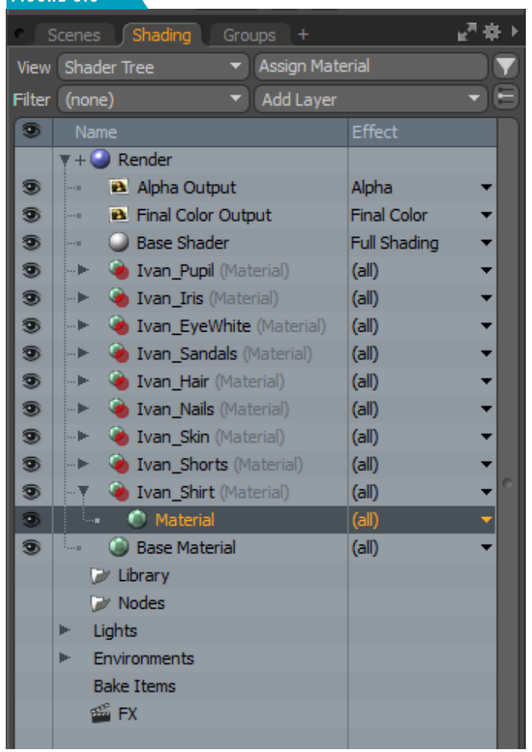
SHADER TREE

Click on the shirt in the Preview Viewport to select the Material Item for the shirts' Material Group. (Figure 9.9) shows the results after the selection.

Selecting Materials by clicking on surfaces in the Preview Viewport is an efficient way of quickly selecting items in the Shader Tree.

Let's Take a brief look at what we have in the Shader Tree (Figure 9.9).

FIGURE 9.9



Every Material Tag we assigned earlier created a Material Group (Green Ball with a Red Ball in front of it) in the Shader Tree.

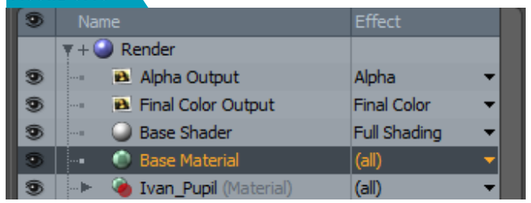
Material groups can be thought of as containers that hold any of the various Shader Tree items, such as shaders, materials, textures, and even render outputs.

Each Material Group that was created also contains a Material Item, which controls all the standard shading attributes for a surface's final rendered look. The Material item contains channels to control Diffuse, Specular Amount, Bump Amplitude, and Transparency, as well as other surfacing attributes.

By default, every new scene contains a Base Material that sits in the root of the Shader Tree. If no Material Tags are assigned, this material shades everything.

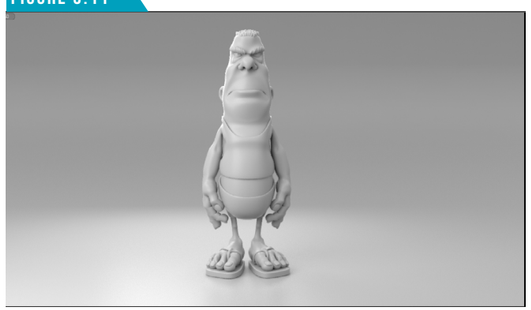
To get a better understanding of the stacking order of the Shader Tree, left-click and drag the Base Material, and place it under the Base Shader (Figure 9.10).

FIGURE 9.10



Everything in the scene now receives the shading attributes of the Base Material (Figure 9.11).

FIGURE 9.11



Move the Base Material back to the bottom of the stack, and with it still selected, change its Diffuse Color attribute (Figure 9.12).

The Cyclorama (Cyc) changes color in the Preview Viewport (Figure 9.13).

FIGURE 9.12

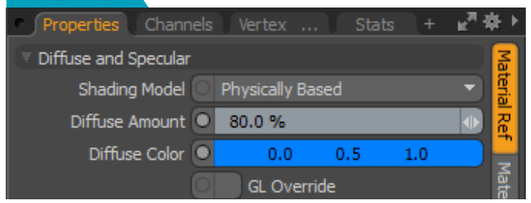


FIGURE 9.13

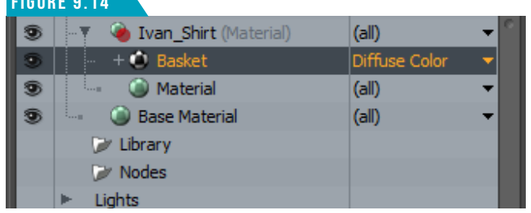


This is because we never assigned a Material Tag to the Cyc's surface. If no Material Tags are assigned, the Base Material gets applied. It's kind of like a catch all that ensures everything in your scene gets some shading attributes.

Select the Ivan_Shirt Material Item again. Lower the Specular Amount to (1.0%) and the Fresnel to (20%).

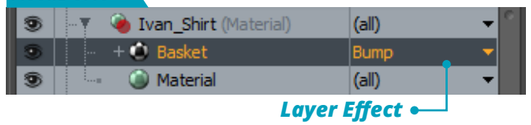
Click (Add Layer) at the top of the Shader Tree and choose (Enhance:Modo Textures/Tiles/Basket). A new item will be added to the Ivan_Shirt Material Group (Figure 9.14).

FIGURE 9.14



Change the layer's effect to (Bump) by choosing (Surface Shading/Bump) in the Effects Column (Figure 9.15).

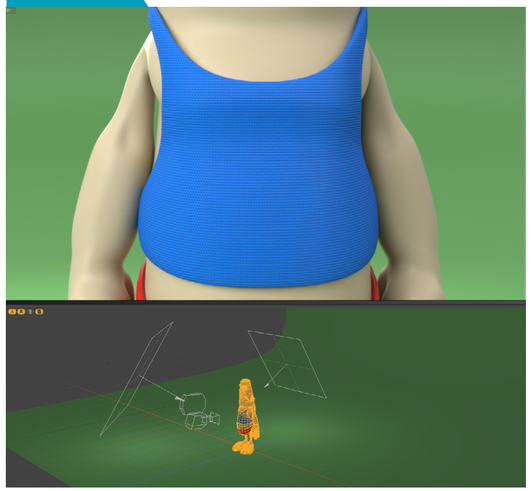
FIGURE 9.15



Zoom into the shirt using the Mouse Wheel in the Preview Viewport. Take note that the Camera, seen in the Lower Viewport, moves closer to Ivan.

With the Basket Layer's Effect set to (Bump), we've produced a nice "material" feel to the shirt's surface (Figure 9.16).

FIGURE 9.16



By default, any new texture layer added to the Shader Tree will have its Layer Effect set to the Diffuse Color channel, meaning the layer affects the visual color of the surface. You can change the Effect, as we did, to affect other channels such as Displacement, Specular Amount, and others.

This is often overlooked, so keep it in mind when building up your material stack.

Without a doubt, you'll want to work with images when texturing your assets. Let's add an image layer to the shirt.

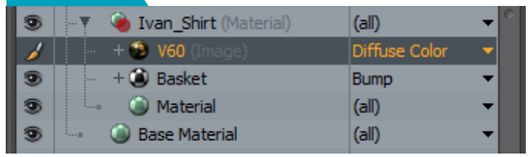
SHADER TREE CONTINUED

Click (Add Layer) again, but this time, choose (Image Map/ (load image)), and then choose the V60.png image file.

(Modo_Essentials/Source/S9/Scenes/Images)

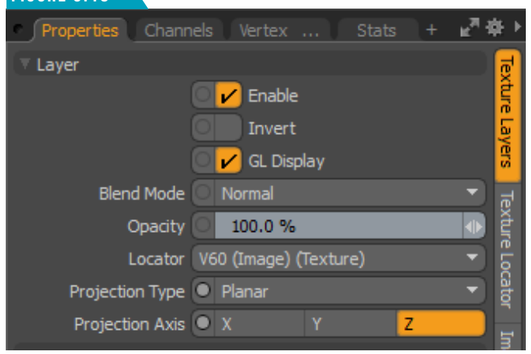
A new layer will be created in the Shader Tree (Figure 9.17).

FIGURE 9.17



Unlike the Basket layer, the default values aren't going to work well for us in this case. Start by changing the Projection Type from Cubic to (Planar) (Figure 9.18).

FIGURE 9.18



Next, switch to the Texture Locator SubTab. Change Front Culling to (Cull Backfacing) so the image doesn't project onto the back of the shirt's surface.

Change the Horizontal and Vertical Repeat attributes to (Reset) so the image doesn't tile (repeat).

Position the image (950 mm) in the Y Axis, and change the Scale to 300 mm in all three axes.

Your Texture Locator settings should look like (Figure 9.19).

Your shirt should now be sporting a Vaughan in 60 Seconds logo (Figure 9.20).

FIGURE 9.19

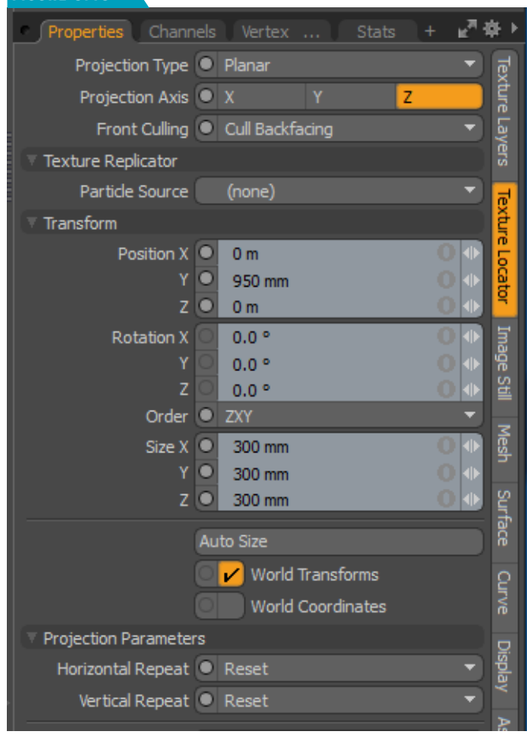


FIGURE 9.20



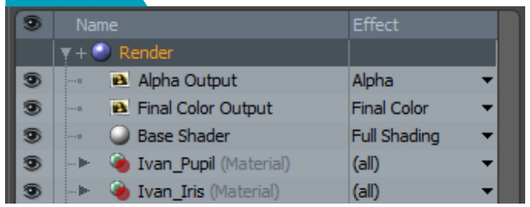
You can add as many layers as you'd like to the Shader Tree, which offers an endless amount of possibilities.

Feel free to play with the other Material Groups, and experiment with your own images and the other Enhance:Modo Procedural Textures.

RENDERING

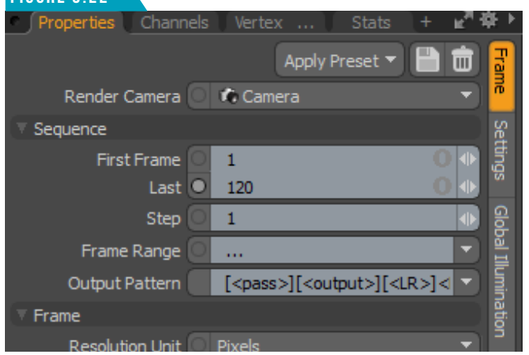
We'll wrap up this section with a brief discussion about rendering. The Render Item can always be found at the top spot in the Shader Tree (Figure 9.21).

FIGURE 9.21



It contains the global scene render settings, and when selected, its various attributes become available in the Properties Viewport. The Render Properties are broken into three sub-tabs (vtabs) of related settings: Frame, Settings and Global Illumination (Figure 9.22).

FIGURE 9.22

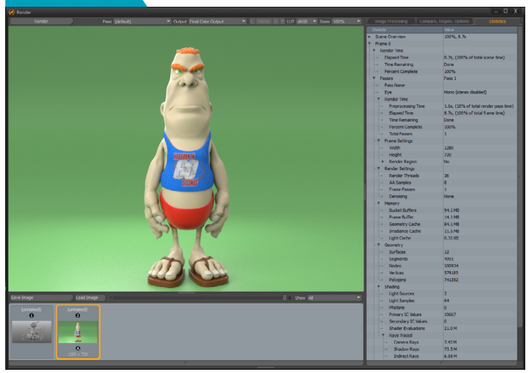


When you have all the settings to your liking, you can click the Render Button, or use the keyboard shortcut (F9) to open the Render Display Window (Figure 9.23) and start the rendering process.

Once the render is completed, you can view Render Statistics, perform Image Processing and more. Most importantly, you can save the rendered output using the (Save Image Button) located just under the rendered image.

Spend some time exploring the options in the Render Viewport, and then head back to

FIGURE 9.23



PUT YOUR NEW SKILLS TO WORK!

Now that you have some lighting, texturing and rendering knowledge, put it to work on the Gidget and PepperJack scene from Section 1.

The first ten artists who fully texture, light and render the scene, share it online and send me a link to their work will receive a prize.

I look forward to seeing what you create!

CLICK HERE FOR A QUICK VIDEO

This video takes a quick look at working with the Shader Tree in Modo.

SECTION 10: FINAL THOUGHTS AND RESOURCES

OK, someone has to say it, so it may as well be me. That was one hell of a weekend. I'm still not sure how we packed it all in, but it looks like you've made it to the end of the guide.

While this may be the conclusion to the book, it's merely the beginning of your journey with Modo. After some well-deserved time away from the computer, there is much more to learn about this feature-rich software.

That said, you should have all the essential information needed to start producing content with Modo.

So where do you go from here?

To continue to help you on your way, I've included some additional resources in this section of the guide to aid you in your further understanding of Modo.

I'd also like to suggest something I wish someone would have told me years ago. Ready for it?

Make Bad Art!

Make bad art... make loads of it. Make so much bad art that you start to believe you'll never create anything good. By doing this, something interesting will start to happen... you'll get better and so will the work you produce.

I've made more bad art than good over the years, but each "bad" sketch, illustration or model I have created has moved me one step closer to producing better art.

Many artists forget to share the fact that they all had to produce "bad" art and loads of it to get to the good stuff. I'm still producing bad art on a regular basis, but every once in a while it leads to the good stuff that I'm proud to showcase.

I'd like to share three suggestions to aid you in your quest to produce "good" art.

1. Make art as if no one will ever see it... then show everyone.

My art teacher in high school once told me that a sketchbook isn't for anyone else to see. It's a place for you to explore ideas and practice your craft. That advice allowed me to dive into a new sketchbook without hesitation and flood the pages with sketches.

However, I still find myself skipping the first page and leaving it blank... some habits are hard to kick.

While a sketchbook can be a safe place for you to practice and explore without the fear of others judging your work, you need to get your work in front of as many people as possible.

Take advantage of the countless resources online that allow you to get feedback from artists of all levels of experience. Share your work with as many people working in the industry as possible, then make more art and share that as well.

Work all of the "bad" art out of your system so you can start creating better work.

2. Don't search for approval... look for proper critiques.

It feels great to receive positive feedback about your work, but receiving a critique that points out the good AND the bad elements in your work will help you far more.

If people give you positive feedback about your work, thank them and ask them if there is anything you could do to make it better.

On the flip side, try filtering out feedback that is purely negative. There are people out there who will only offer negative feedback because it makes them feel better about themselves. Unfortunately, these people have no intention of helping you improve your work.

When you find someone that consistently provides a solid critique of your work, make sure to share any and all future work with him.

I have a short list of artists who I always show my work to who are quick to point out issues and ways to improve the work. Their feedback is more valuable than 100 likes on any forum, and it's their feedback that continues to make me a better artist.

3. Be Inspired by the work of other artists... not defeated by it.

It's easy to get discouraged when you see the massive amount of amazing work being produced and shared online.

Don't let that stop you from progressing and attaining that same level of quality in your own work. Remember that the artists who are producing amazing work have invested countless hours to hone their skills.

I've been at this for over 20 years and sometimes I feel like a monkey throwing poo at the screen when I see the work of my favorite artists.

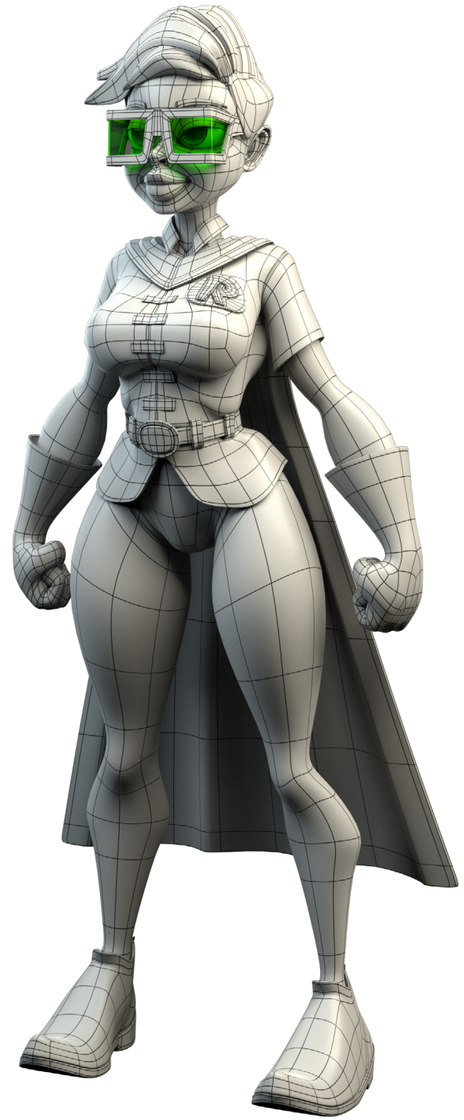
That feeling of discouragement quickly shifts to inspiration and I become encouraged to create better work.

So what are you waiting for?

There's some bad art waiting to flow from your fingertips. But just remember, releasing the bad art makes way for your best work.

I look forward to seeing all of it, the good, the bad, and the amazing.

Thanks for including me in your journey. Enjoy! - William



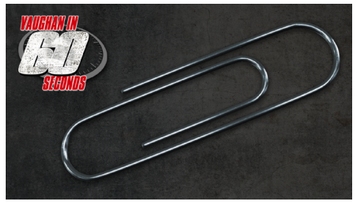
VAUGHAN IN 60 SECONDS VIDEO TUTORIALS



The Vaughan in 60 Seconds series is a free collection of over 600 short-form training videos designed to quickly share a tool, tip or technique in roughly a minute to allow artists the ability to "get in and get out" so they can spend their time creating instead of wading through hours of videos.

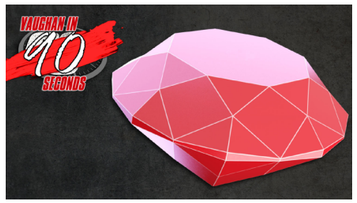
In this section I've included a small sampling of links (Click Thumbnails) broken into a few categories. Click the Vaughan in 60 Seconds logo to the left to access the entire playlist.

DIRECT AND PROCEDURAL MODELING



Model a Paper Clip

This video quickly shows a technique for creating a paperclip in Modo.



Modeling a Diamond

This video shows a quick tip on modeling a diamond in Modo.



Modeling a Basketball

This video walks through the creation of a basketball in Modo.



Modeling a Woven Mesh

This Vaughan in 60 Seconds video walks through the creation of a woven mesh model. (Part 1 of Microphone Mesh)



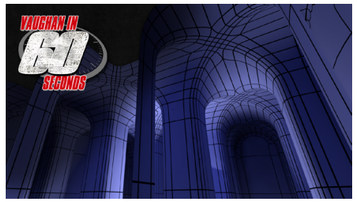
Modeling a Microphone Mesh

This Vaughan in 60 Seconds video walks through the creation of a microphone mesh model. (Part 2 of Microphone Mesh)



Modeling Braids

This Vaughan in 60 Seconds video walks through the creation of a simple three-strand braid model. You will also be introduced to the render curves option which allows you to give volume to your curves at render time.



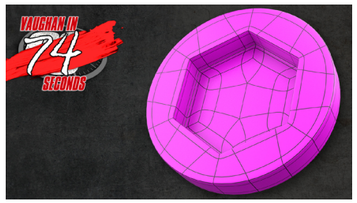
Model Cathedral-Style Ceilings with Pillars

This video is a step-by-step instructional video on modeling cathedral-style ceilings with pillars in Modo.



Modeling a Soccer Ball

This video walks through the creation of a Soccer Ball in Modo.



Modeling an All-Quad Internal Hex Shape

There are several ways to model an all-quad internal hex shape in a SubD mesh, and I thought I'd use this video to showcase some of the powerful modeling tools in Modo that make light work of this modeling task.



Model Screw Threads

This video shares a walkthrough of modeling screw threads in Modo.



Model a Figure 8 Knot

This video is a quick walk through of modeling a figure 8 knot in Modo.



Stitching

This video is a quick introduction to the Stitch Mesh Setup in Modo, which lets you quickly add stitching to your mesh items.

VAUGHAN IN 60 SECONDS VIDEO TUTORIALS

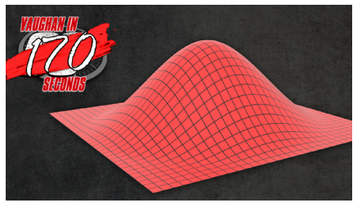
Click the Thumbnail Images below to open these quick Vaughan in 60 Second videos covering Action Centers and Falloffs.

ACTION CENTERS AND FALLOFFS



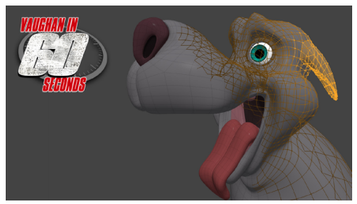
Action Centers

This video is an introduction to Action Centers in Modo, which are a definable origin position for modeling and transform actions. They allow you to easily change the positions from where the action of any tool originates.



Falloffs: Linear and Radial

This video is a quick introduction to using Linear and Radial Falloffs in Modo, which are two common ways to gradually decrease the intensity of a tool across a defined range.



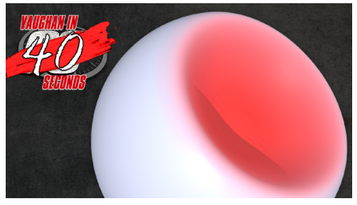
Falloffs: Selection and Soft Selection

This video is a quick look at the Selection and Soft Selection Falloffs in Modo, which allow you to gradually decrease the intensity of a tool based on a selection area.



Using Airbrush Falloff

The Airbrush falloff option is a powerful, yet often overlooked feature in Modo that allows you to paint a tool's influence onto a mesh. This quick video introduces the Airbrush Falloff option showing its use with multiple tools.



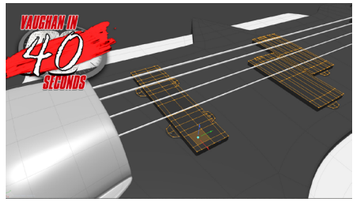
Curvature Falloff

This video is a quick introduction to the Curvature Falloff in Modo, which generates a falloff that attenuates across changes in surface topology.



Noise Falloff

This video is a quick introduction to the Noise Falloff in Modo, which uses a three-dimensional noise pattern to modulate the influence of a tool on the selected geometry.



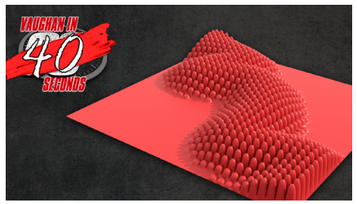
Coplanar Falloff

This video is a quick introduction to the Coplanar Falloff option in Modo, which attenuates the falloff based on the angle between the selected polygon's normals.



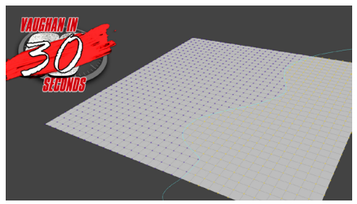
Vertex Map Falloff

This video is a quick introduction to the Vertex Map Falloff option in Modo, which converts values of the currently selected Vertex Map to values representing falloff strength.



Path Falloff

This video is a quick introduction to Path Falloff in Modo, which uses a curve to determine the area of influence of a tool.



Lasso Falloff

This video is a quick introduction to the Lasso Falloff option in Modo, which uses lasso selections drawn in screen space to determine the area of influence of a tool.

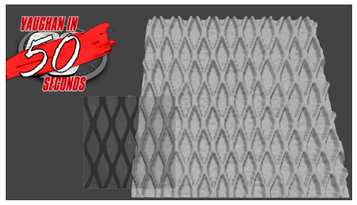
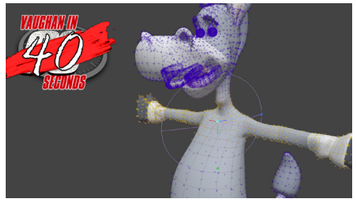


Image Falloff

This video is a quick introduction to the Image Falloff option in Modo, which uses the brightness of an image to determine the area of influence of a tool.



Cylinder Falloff

This video is a quick introduction to the Cylinder Falloff option in Modo, which uses a circular falloff that extends across the length of a virtual cylinder.



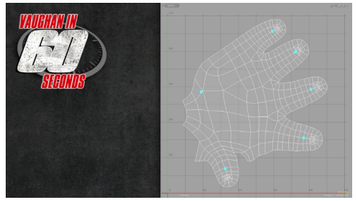
Screen Falloff

This video is a quick introduction to the Screen Falloff option in Modo, which defines the falloff using a disc drawn in screen space.

VAUGHAN IN 60 SECONDS VIDEO TUTORIALS

Click the Thumbnail Images below to open these quick Vaughan in 60 Second videos covering UV Tools and Commands.

UV TOOLS AND COMMANDS



UV Pins

This quick video tutorial introduces UV Pins in Modo. UV Pins allow you to interactively drag portions of the UV map in an elastic-type fashion, allowing you to quickly refine a UV map.



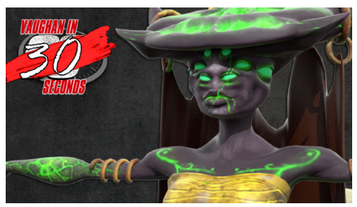
UV: Use Image Ratio

This video takes a quick look at the Use Image Ratio option when working with UVs in Modo.



Convert UVs to Mesh

This short video introduces the Convert UVs to Mesh command. This powerful command converts a UV map into a separate Mesh Item or a morph map.



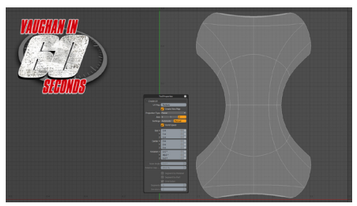
UV Pixel Snapping

This video shares a quick tip for UV Pixel Snapping in Modo.



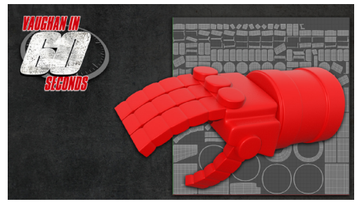
UV Alignment Tools

This video is a quick introduction to the UV Alignment Tools in Modo, which are designed to quickly align UVs.



Modo | UV Projection: Manual Settings

This video is a quick introduction to the Manual Settings for the UV Projection Tool in Modo, Which gives you access to the Size, Center and Rotation settings.



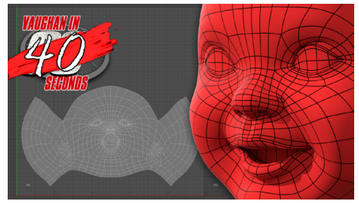
UV Projection: Atlas and Altas 2

This video is a quick introduction to Atlas and Atlas 2 UV Projection types in Modo.



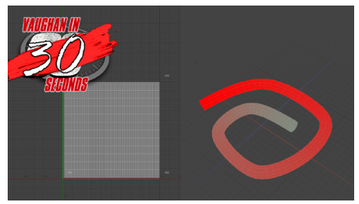
Slip UVs

This video is a quick introduction to the Slip UVs option in Modo, which enables you to edit a mesh without changing the existing UV map.



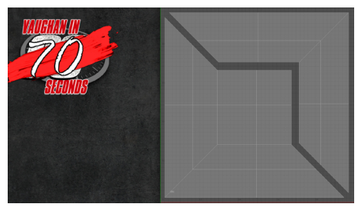
Symmetrize UVs

This video is a quick introduction to the Symmetrize UVs function in Modo, which can be used to mirror UVs from one side to another in UV space.



UV to Weight

This video is a quick introduction to the UV to Weight commands in Modo, which creates a new weight map and converts UV values to weight values.



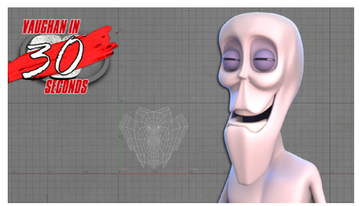
Split, Sew and Move and Sew Selected UVs

This video is a quick look at the Split, Sew and Move and Sew UV options in Modo. Use this collection of UV tools to separate and merge UVs to produce clean and efficient UVs for your meshes.



Implicit UVs

In this introduction to Implicit UVs in Modo, I show a quick way to create a fully detailed bush using the Fur material on a simple sphere primitive.



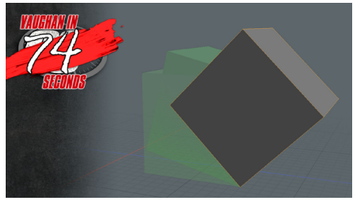
UV Viewport: Spans

This video is a quick introduction to the Spans options for the UV Viewport in Modo, which Control the number of UV sections or spans displayed in the viewport.

VAUGHAN IN 60 SECONDS VIDEO TUTORIALS

Click the Thumbnail Images below to open these quick Vaughan in 60 Second videos covering Rigging and Animation.

RIGGING AND ANIMATION



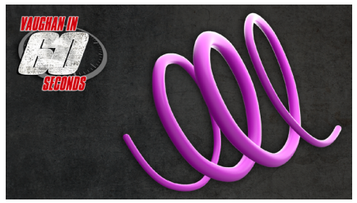
Animate a Rolling Cube

Animating a rolling cube is a trivial task in Modo if you understand centers and pivots. This video introduces the concept of Centers and Pivots and then walks through animating a rolling cube.



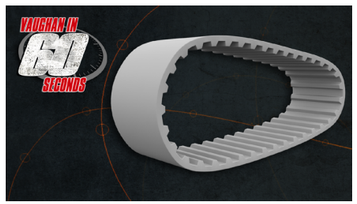
Animate Liquid Filling a Glass

This video shares a quick tip for animating liquid filling a glass in Modo.



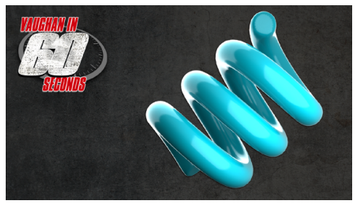
Animate a Tube Growing

This video quickly walks through creating a tube growing over time.



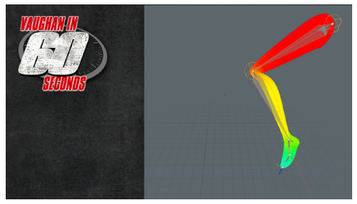
GearBelt Rig

This video demonstrates how to rig a gear belt in Modo. It only takes a couple of minutes to setup and can be quite useful on mechanical rigs!



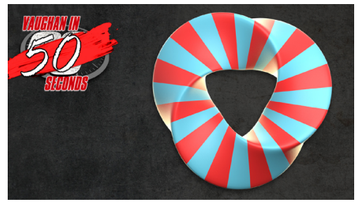
Model and Rig a Spring

This video walks through modeling and rigging a spring in Modo.



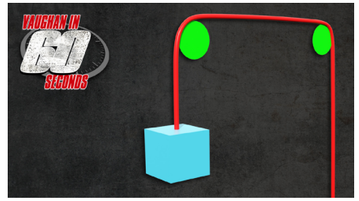
Skeletons and Binding

This video introduces skeletons and binding a mesh to a skeleton hierarchy.



Creating an Animated Mobius Strip Torus

This video is a quick walkthrough of creating an animated mobius strip torus in Modo.



Rope Pulley Rig

This video shows a quick technique for setting up a rope pulley rig in Modo.



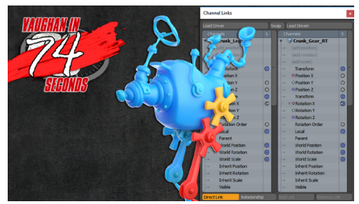
Dynamic Parenting

Dynamic Parenting enables an item's inheritance of another item's transform channels to be turned on and off over the course of an animation. This video introduces Dynamic Parenting in Modo by animating a Rubik's Cube.



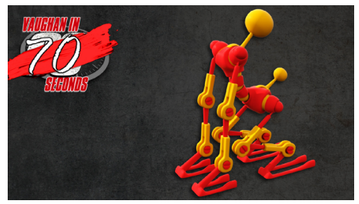
Introduction to Command Regions

Command regions allow you to execute commands or scripts and to select other items in the scene by clicking on areas of a mesh.



Channel Links

Channel links are a way for the property of one item to control the property of another. In this short video, I use this handy feature to rig up a mechanical leg with gears.



Pose Tool

This video is a quick introduction to the Pose Tool in Modo, which enables you to pose and animate item hierarchies, using an intuitive pin and drag workflow.



Keyframe Tool

This video is a quick introduction to the Keyframe Tool in Modo, which adds a control widget to the 3D viewport for you to visualize and modify keyframes directly in the Animation view.

VAUGHAN IN 60 SECONDS VIDEO TUTORIALS

Click the Thumbnail Images below to open these quick Vaughan in 60 Second videos covering the Shader Tree and Rendering.

SHADER TREE AND RENDERING



Texture a Logo on a Glass Surface

There are several options for texturing a logo on a glass surface and in this video, I share an option that enables you to isolate the material attributes of the logo on the glass surface and adjust them independently.



Modeling without Modeling

Using a Halloween pumpkin as an example, this video walks through using powerful options in the Shader Tree to aid in the modeling process. This image-based modeling approach uses Stencils and Displacement maps.



Introduction to Light Linking

Light Linking is a shader option that allows you to control which surfaces of a mesh are affected by specific lights in a scene. This quick video introduces you to this incredibly powerful feature and shows multiple ways of using it.



Creating a Shadow Catcher

This video introduces the Shadow Catcher option. While not exclusively used for compositing, this feature can be incredibly useful for compositing cg elements into a photograph or live action sequence.



Tension Texture

This quick video tutorial introduces the workflow for using a Tension Texture for both Diffuse color and as a Group Mask.



Rust

This quick video shows one way of adding rust to the surface of your mesh in Modo.



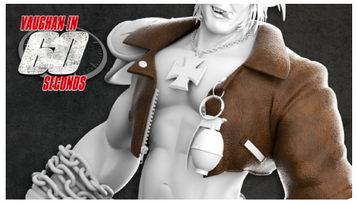
Introduction to Fur

The Fur material in Modo is a texture layer that produces fibers that can be used to produce hair, grass, fur and more. For this introduction, I show how to apply fur to a material and a few important settings to get you started.



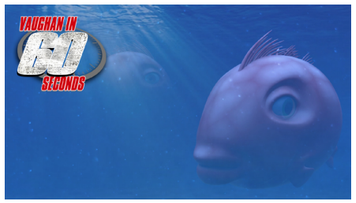
Introduction to Render Passes

Render passes in Modo offer you a way to control channel values in a scene and store them in separate containers. This video is a quick introduction to working with Render Passes and should get you up and using them in no time.



Procedural Leather Texture

This video shares a quick tip on creating a procedural leather texture in Modo.



Environment Fog

This video is a quick introduction to the Environment Fog option, which produces a simulated fog effect by applying the environment color to relevant materials with increased intensity as the geometry is further from the camera.



Shader Tree: Grilled Patty

This video is an introduction to Shader Tree basics in Modo, with a quick example of creating the appearance of grill marks on a patty.



Create a Waffle Cone

This video shares a quick technique for creating a waffle cone in Modo.



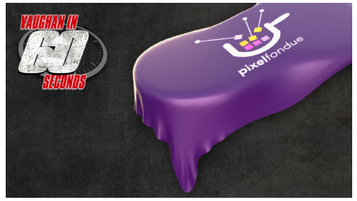
Using Weight Maps as Layer Masks

Weight Maps are discontinuous, one-dimensional Vertex Maps holding weight percentages. Although primarily used for Rigging, in this video I create a weight map and use it to aid in texturing a mesh.

VAUGHAN IN 60 SECONDS VIDEO TUTORIALS

Click the Thumbnail Images below to open these quick Vaughan in 60 Second videos covering Dynamics and Particles.

DYNAMICS AND PARTICLES



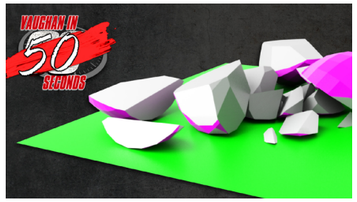
Soft Body Goal Map

This video is a quick look at the power of goal maps in Modo. When working with Soft Body Dynamics in Modo, a 'Goal Map' is a Vertex Map that controls how much the soft body mesh retains its initial shape.



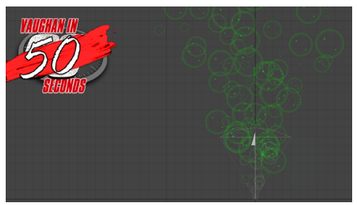
Apply Soft Body Dynamics to a Cape

This video takes a quick look at setting up Soft Body dynamics on a cape in Modo.



Dynamics: Procedural Shatter

This video is a quick introduction to the Procedural Shatter option in Modo, which is a simple way to shatter and break models using dynamics.



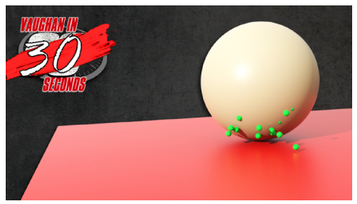
Sprites

This video is a quick introduction to the Sprite Item in Modo, which uses bitmap images to generate volume-like effects that render faster than standard volume effects.



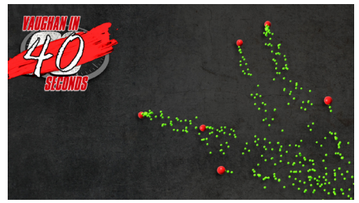
Easy Curtains

This video is a quick walkthrough of creating curtains in Modo.



Collision Emitter

This video is a quick introduction to the Collision Emitter in Modo, which emits particles into a particle simulation whenever a collision event happens between two or more dynamic items.



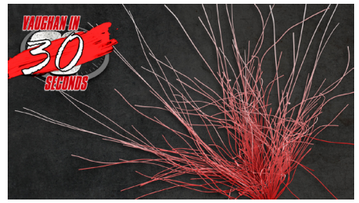
Particles Emitting Particles

This video shows a quick technique to setup particles emitting particles in Modo.



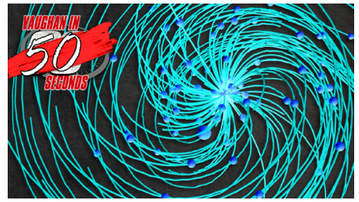
Dynamic Curves

This video is a quick introduction to working with Dynamic Curves in Modo, which enables you to animate curves using the dynamics system, allowing the curves to be affected by gravity, collisions and more.



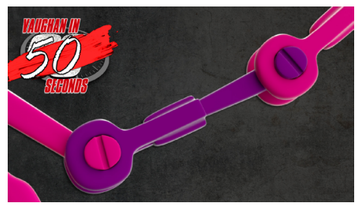
Particles To Curves

This video is a quick introduction to the Particles To Curves command in Modo, which converts particle paths from a simulation into curves.



Particles To Mesh

This video is a quick introduction to the Particles To Mesh command in Modo, which converts the particle positions at each frame into a Mesh Item.



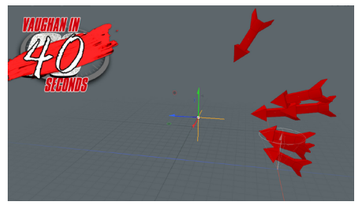
Hinge Constraint

This video is a quick introduction to Hinge Constraints in Modo, which limits the rotation movement of a dynamic object to swivel as if fixed by a hinge joint, like that of a door.



Dynamics: Sleep

This video takes a quick look at using the Sleep options when working with dynamic simulations.



Particle Look At Modifier

This video is a quick introduction to the Particle Look At Modifier in Modo, which orients the direction of the source particles toward a user-defined target item.

MORE BOOKS FROM PUSHING POINTS

If you enjoyed this book and would like to continue expanding your knowledge of Modo and 3D production, you might be interested in these additional books I've written.

Click the large Images to link to their official page on the Pushing Points online site.

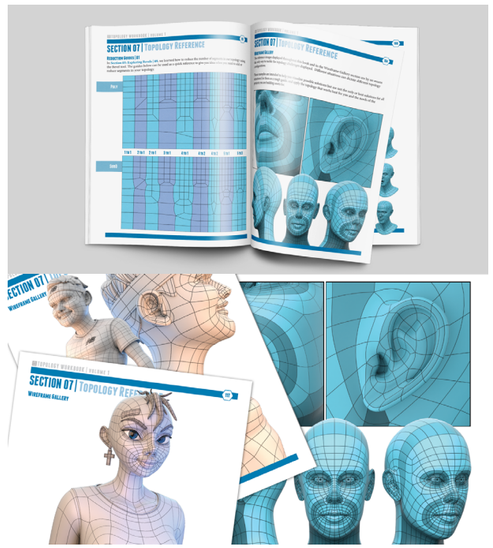


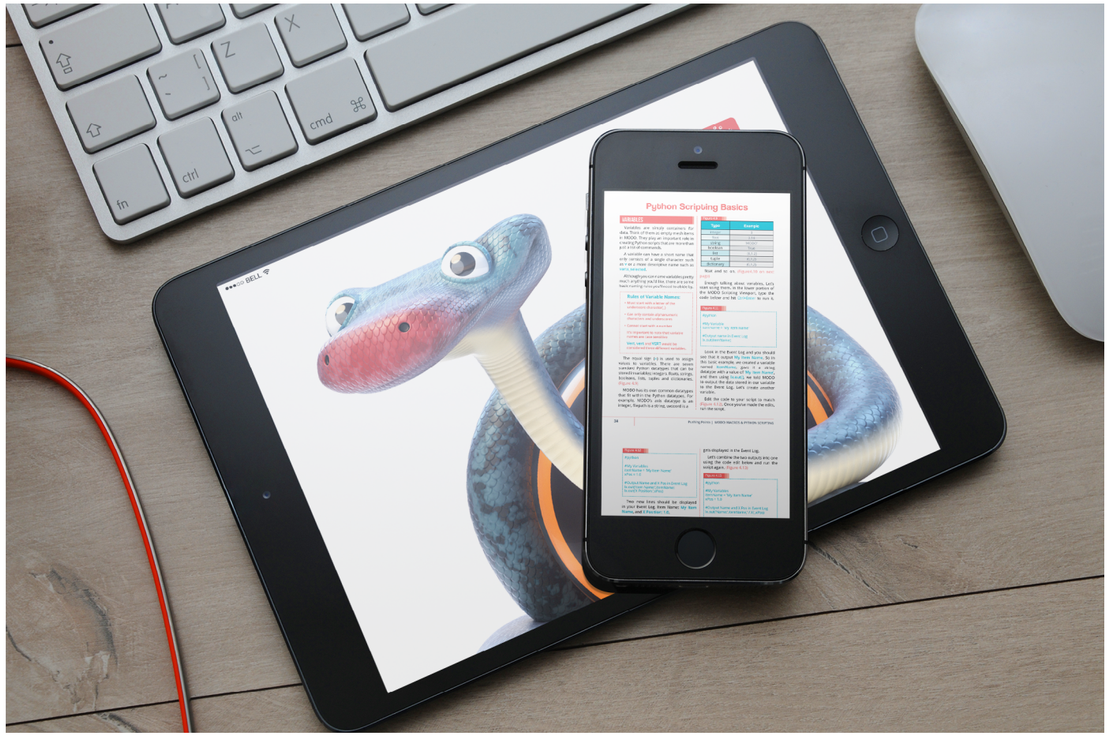
The Pushing Points | Topology Workbook

The Pushing Points Topology Workbook is a 125-page software-agnostic guide that teaches you the foundation of SubD topology.

There are over sixty exercises packed with loads of tips, tricks and techniques designed to teach you how to manage the topology of your meshes.

Throughout the book you will also find many images of wireframe rendered assets and their topology that you can study for reference. This book doesn't show you how to build a car, character or creature. Instead, it teaches you the foundation of SubD topology, so you can construct ANY SubD asset with clean polygon flow.





The Pushing Points | Modo Macros & Python Scripting

The Pushing Points | Modo Macros & Python Scripting book is a guide that teaches you the foundation of scripting in Modo.

This book is packed with loads of tips, tricks and techniques designed to teach you how to create custom macros and scripts to increase your speed and enhance your current workflow in Modo. This book doesn't just show you how to create specific macros and scripts. Instead, it teaches you the foundation of scripting, so you can create unique custom scripts.





KITS FROM PUSHING POINTS

Once you get fully up and running in Modo, you might want to expand its capabilities. Over the past few years I started creating Kits (Add-ons) for Modo that have helped speed up my workflow.

Click the Thumbnail Images to access more information about these Kits and Assemblies.



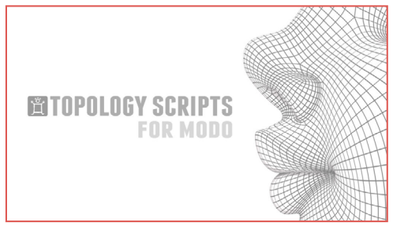
The Pushing Points PySnippets for Modo

The Pushing Points PySnippets for Modo is a collection of small blocks of reusable code that can be quickly inserted into the Modo Script Editor or any external source code editor. Use these commonly used code blocks to speed up the creation of python scripts.



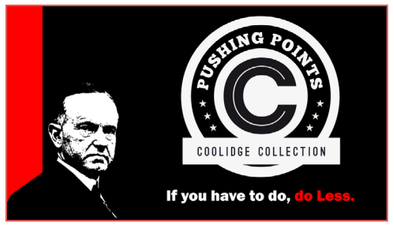
The Pushing Points Hatchet Collection

This Modo Kit consists of over 100 Python scripts developed to add functionality to Modo and make creating more efficient.



The Pushing Points Topology Scripts for Modo

Over 70 scripts for Modo! This incredible collection of scripts is designed to help speed up the process of reconfiguring mesh topology and so much more.



The Pushing Points Coolidge Collection

The Pushing Points Coolidge Collection for Modo 12 is a collection of scripts, tool presets and commands designed to add functionality and increase the speed of working in Modo.



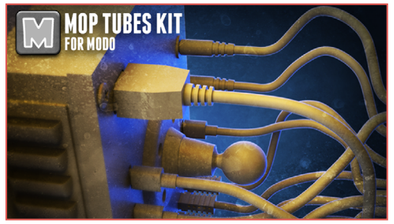
The Pushing Points Polystein Kit

The Pushing Points Polystein Kit is a Modo Kit consisting of an array of all-quad SubD mesh presets that can be seamlessly added to a model, making mesh detailing incredibly easy. This powerful toolset positions, scales, orients and auto-stitches these mesh presets to your active mesh, relieving you of the tedious process of doing it manually.



The Pushing Points MOP Booleans Kit

The Pushing Points MOP Booleans Kit is a Modo Kit designed to remove the challenges of working with complex boolean operations and introduces a non-destructive workflow that makes creating highly detailed meshes a trivial task.



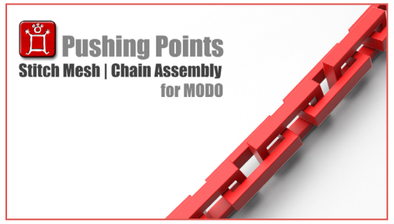
The Pushing Points MOP Tubes Kit

The Pushing Points MOP Tubes Kit is a Modo Kit that introduces a non-destructive workflow which speeds up the process of creating procedural tube geometry.



The Pushing Points Zipper Assembly

The Pushing Points Zipper Assembly is designed to work with the Stitch Mesh Setup command introduced in Modo 12.2. Quickly create zipper geometry that remains live for easy editing.



The Pushing Points Chain Assembly

The Pushing Points Chain Assembly is designed to work with the Stitch Mesh Setup command introduced in Modo 12.2. Quickly create chain geometry that remains live for easy editing.



The Pushing Points Marker Assembly

The Pushing Points Marker Assembly is designed to work with the Stitch Mesh Setup command introduced in Modo 12.2. Quickly create line art and displacement seams on the surface of your mesh.



V60 Search Tool

V60 Search Tool is a custom search engine for the Vaughan in 60 Seconds video series. This search engine works right inside of Modo, making it easy and efficient to access over 600 videos. Add the V60 Search tool to your Modo UI today!

KEYBOARD SHORTCUTS

General Hotkeys

Keystroke(s)	Action
F1	Interactive Help
Ctrl+N	New scene
Ctrl+O	Open saved scene
Ctrl+I	Open saved image
Ctrl+W	Close current scene
Ctrl+Shift+W	Close all open scenes
Ctrl+S	Save current scene
Ctrl+Shift+S	Save scene as...
Ctrl+Q	Quit Modo
Alt+F12	Config file save
Shift+F5	Run script
Ctrl+Z	Undo
Ctrl+Shift+Z	Redo
Ctrl+X	Cut
Ctrl+C	Copy
Ctrl+V	Paste
Delete	Delete
Ctrl+R	Brings up the last tool used
Alt+R	Brings up the last tool used, ignoring UI interactions and selections
Ctrl+D	Reset tool attributes

Vertex Tools Hotkeys

Keystroke(s)	Action
Shift+W	Weight
Shift+M	Morph

Items List Hotkeys

Keystroke(s)	Action
F	In Items selection mode, centers the viewport on the selected item (layer). In other modes, flips polygons.
Shift+click ▶	Expands/Closes all (also in Shader Tree)
' (apostrophe)	Swaps foreground/background layers
Ctrl+D	Duplicates selected layer(s) (only in Items mode)
Shift+D	Instances selected layer(s) (only in Items mode)
N	New Mesh Item
L	New locator item (only in Items mode)

Tabbed Viewport Hotkeys

Keystroke(s)	Action
Ctrl+ Shift+Home	When cursor is over List Viewport, opens the first tab.
Ctrl+Shift+End	When cursor is over List Viewport, opens the last tab.
Ctrl+ Shift+Page Up	When cursor is over List Viewport, opens the next tab.
Ctrl+ Shift+Page Down	When cursor is over List Viewport, opens the previous tab.

Toolbar Menu Hotkeys

Keystroke(s)	Action
Alt+Left-click Toolbar Icon	Opens toolbar as a popover. Moving the popover pins it open.
Ctrl+Shift+Home	When cursor is over toolbar, opens first toolbar (Model Toolbar)
Ctrl+Shift+End	When cursor is over toolbar, opens last toolbar (Context Toolbar)
Ctrl+Shift+Page Up	When cursor is over toolbar, opens next toolbar
Ctrl+Shift+Page Down	When cursor is over toolbar, opens previous toolbar
Ctrl+Shift+W	Closes all open scenes
F2	Opens Modeling Toolbar as a floating window
F3	Opens Painting and Sculpting Toolbar as a floating window
F4	Opens Setup Toolbar as a floating window
` (backtick)	Toggle floating window visibility

Viewport Navigation Hotkeys

Keystroke(s)	Action
Alt+click	Rotate view
Alt+middle-click	Rotate viewport Z axis (bank) view
Alt+right-click	'Flick' rotate
Shift+Alt+left-click	Pan view
Shift+Alt+right-click	Pan up/down only
Ctrl+Alt+left-click	Zoom to mouse position
Ctrl+Alt+right-click	Box zoom
. (period)	Zoom in (only in component modes)
Shift+. (period)	Zoom in x2
, (comma)	Zoom out (only in component modes)
Shift+, (comma)	Zoom out x2
G	Center the view on the cursor's position
/	Turntable (only in component modes)
Shift+/	When turntable is running, displays upright turntable
Mouse Wheel Scroll	Zoom view in and out to mouse pointer
A	Fit (zoom to scene extents/all items)
Shift+A	Fit selected (zooms to selected elements)
Ctrl+A	Align selected (aligns view to the current selection)
Ctrl+Shift+A	Fit and align selected (zooms and aligns the view to the current selection)
0 (zero) Num Keypad	Maximize/Minimize the viewport the cursor is over (Alt+0 on Keyboard)

Viewport Display Hotkeys

Keystroke(s)	Action
Ctrl+Spacebar	View Type Pie Menu
Ctrl+2	Shading Style Pie Menu
Numeric Keypad . (decimal)	View Type: Perspective
Numeric Keypad 1	View Type: Top (press again to toggle Top/Bottom view)
Numeric Keypad 2	View Type: Front (press again to toggle Front/Back view)
Numeric Keypad 3	View Type: Right (press again to toggle Right/Left view)
Numeric Keypad 4	Shading Style: Shaded
Numeric Keypad 5	Shading Style: Texture
Numeric Keypad 6	Shading Style: Reflection
Numeric Keypad 7	Shading Style: Wireframe
Numeric Keypad 8	Shading Style: Solid
Numeric Keypad 9	Shading Style: Vertex Map (VMap)
Numeric Keypad /	Wireframe Overlay None
Shift+Numeric Keypad /	Wireframe Overlay Uniform (Light)
Ctrl+Numeric Keypad /	Wireframe Overlay Colored (Dark)

KEYBOARD SHORTCUTS CONTINUED

Timeline Hotkeys

Keystroke(s)	Action
Shift+Up arrow	Go to first frame
Ctrl+Up arrow	Go to first keyframe
Ctrl+Left arrow	Go to previous keyframe
Shift+Left arrow	Go back one frame
/	Start/stop animation playback
Shift+Right arrow	Go forward one frame
Ctrl+Right arrow	Go to next keyframe
Ctrl+Down arrow	Go to last keyframe

Setting Keyframes Hotkeys

Keystroke(s)	Action
Shift+Y	Key transforms
Shift+E	Key rotations
Shift+W	Key positions
Shift+R	Key scale
S	Key selected channels
Shift+S	Key selected items

Graph Editor Hotkeys

Keystroke(s)	Action
A	Fit selected
Ctrl+F	Fit visible
Shift+F	Fit visible width
Alt+click	Pan view
Ctrl+Alt+click	Scale view
Alt+Right-click	Scale graph size
Ctrl+Alt+Right-click	Box zoom (drag box to zoom)
Ctrl+Shift+V	Paste insert keyframes to selected channels
Ctrl+Alt+V	Paste replace keyframes to selected channels

Snapping Hotkeys

Keystroke(s)	Action
X	Toggle snap state (hold with tool active for temporary snap)
F11	Open snapping popover
Ctrl+Shift+T	Element snap

Action Center Hotkeys

Keystroke(s)	Action
Alt+W	Origin
Alt+E	Pivot
Alt+A	Automatic
Alt+S	Selection
Alt+D	Selection center, auto axis
Alt+F	Screen
Alt+Z	Element
Alt+X	Local
Alt+G	Pivot center, parent axis

Work Plane Hotkeys

Keystroke(s)	Action
Home	Align to geometry under cursor
Shift+Home	Align to selection (average of all selected)
Ctrl+Home	Align to viewport
End	Reset the Work Plane
Shift+End	Open Work Plane pop-over
Page Up	Offsets the Work Plane incrementally in the positive direction
Page Down	Offsets the Work Plane incrementally in the negative direction
Numeric Keypad * (asterisk)	Toggle visibility
Alt+O	Offset Work Plane to geometry position under cursor

Render Hotkeys

Keystroke(s)	Action
F9	Render
Ctrl+F9	Render visible
Shift+F9	Render selected
F10	Render current view
Alt+Shift+F9	Open render display window

Preview Viewport Hotkeys

Keystroke(s)	Action
Ctrl+F	Focus under cursor
Shift+Mouse Wheel	Preview zoom
Middle-click+drag	Pan the preview (only when zoomed in)

Selection Mode Hotkeys

Keystroke(s)	Action
Spacebar	Cycles the selection sequentially from vertices to edges to polygons
1	Vertices
2	Edges
3	Polygons
4	Materials/Parts/Smoothing Groups/Selection Sets
5	Items
6	Pivot
7	Center
Alt+Q	Selection mode/Transform tools Pie Menu
Shift+Spacebar	Toggle Component mode to Item mode (or last mode)

Selection Hotkeys

Keystroke(s)	Action
Alt+Shift+A	Select all
Up arrow	More (select next plausible element in loop)
Shift+Up arrow	Select expand
Down arrow	Less (deselect last element)
Shift+Down arrow	Shrink
Left arrow	Select previous loop
Shift+Left arrow	Select previous loop add
Right arrow	Select next loop
Shift+Right arrow	Select next loop add
L	Select loop
Alt+L	Select ring
]	Connected
[	Invert selection
Shift+]	Close loop
Shift+G	Select between
Alt+1	Convert selection to vertices
Alt+2	Convert selection to edges
Alt+3	Convert selection to polygons
; (semicolon)	Select through toggle

Transform Tool Hotkeys

Keystroke(s)	Action
W	Move
E	Rotate
Alt+Shift+E	Axis Rotate
R	Scale
Shift+R	Uniform Scale
Y	Transform
Alt+Q	Transform Tools Pie Menu

Hide/Lock Geometry Hotkeys

Keystroke(s)	Action
H	Hide selected
Shift+H	Hide unselected
Ctrl+H	Hide invert (toggle state)
U	Show
J	Lock selected
Shift+J	Lock unselected
Ctrl+J	Lock invert (toggle state)
I	Unlock

Tool Hotkeys

Keystroke(s)	Action
Q	Drop Active Tool
Ctrl+Tab	Toggle the Tool HUD
K	Tool properties pop-over
Esc	Escape current operation/drop active selection
= (Equals)	Tool handles larger
- (Minus)	Tool handles smaller
0	Toggles Tool Handle Style (Basic/Advanced)
Ctrl+D	Reset tool attributes
Ctrl+R	Fire Last Command

Gang Edit Hotkeys

Keystroke(s)	Action
Enter	Independent Values
Ctrl+Alt+Enter	Copy (=)
Ctrl+Enter	Proportional (α)
Alt+Enter	Relative (+)

KEYBOARD SHORTCUTS CONTINUED

Action Center Hotkeys

Keystroke(s)	Action
Alt+W	Origin
Alt+E	Pivot
Alt+A	Automatic
Alt+S	Selection
Alt+D	Selection center, auto axis
Alt+F	Screen
Alt+Z	Element
Alt+X	Local
Alt+G	Pivot center, parent axis

Mesh Edit Hotkeys

Keystroke(s)	Action
Backspace	Delete
Shift+Backspace	Remove
Ctrl+Backspace	Collapse
B	Bevel
Shift+B	Polygon Bevel
Alt+B	Sketch extrude
Ctrl+B	Create Spline Patch from Vertex Selection
C	Edge slice
Shift+C	Polygon slice
Alt+C	Loop slice
D	Subdivide selected geometry
Shift+D	Open subdivide options
F	Flip polygon normal
Ctrl+L	Split face by selected vertices
P	Make polygon
Shift+T	Triple polygons (convert to triangles)
V	Spin edge
Alt+V	Spin quads
S	Slide/Edge Slide in Component Mode

Curves Hotkeys

Keystroke(s)	Action
Shift+O	Make Open Curve
Ctrl+P	Make Closed Curve

Deform Tool Hotkeys

Keystroke(s)	Action
Ctrl+E	Bend
T	Element Move (Tweak)
Ctrl+T	Soft Drag
Shift+Y	Flex
Shift+S	Smooth

Duplicate Tool Hotkeys

Keystroke(s)	Action
Shift+X	Extrude
Shift+L	Radial Sweep
Shift+Q	Grow Quads (Suppressed Dialog)
Z	Extend Edge
Shift+V	Mirror

SubD Hotkeys

Keystroke(s)	Action
Tab	Toggle Modo Subdivs
Shift+Tab	Toggle Catmull-Clark subdivision surfaces
Numeric Keypad +/-	Increase/decrease subdivision level

Floating Windows Hotkeys

Keystroke(s)	Action
F2	Modeling toolbar
F3	Sculpt/Paint toolbar
F4	Setup toolbar
F5	Command History viewport
F6	Presets viewport
F7	Graph Editor
F8	Render preview
F11	Snapping pop-over
` (backtick)	Toggle window visibility

Multi-Res Sculpting Hotkeys

Keystroke(s)	Action
Alt+(numeric pad) +	Subdivision level up
Alt+(numeric pad) -	Subdivision level down
Ctrl+(numeric pad) +	Current level up
Ctrl+(numeric pad) -	Current level down

Topology Pen Hotkeys

Keystroke(s)	Action
Ctrl+Left-click (Blank Area)	Create New Quad Polygon
Left-click	Move Elements (Click and Drag on Vertex, Edge or Polygon)
Right-click	Move Edge Loop (Click and Drag on Edge)
Middle-click	Split (Click Vertex to Vertex)
Shift+Left-click	Duplicate/Extend (Click and Drag on Vertex or Edge)
Shift+Right-click	Duplicate/Extend Loop
Shift+Middle-click	Add Loop (Click Edge)
Ctrl+Left-click	Slide (Click and Drag on Vertex, Edge or Polygon)
Ctrl+Middle-click	Remove (Click on Vertex, Edge or Polygon)
Shift+Ctrl+Left-click	Smoothing
Shift+Ctrl+Right-click	Edge Loop Smoothing

Paint and Sculpt Hotkeys

Keystroke(s)	Action
B	Open brush tips pie menu (only when tool is active)
O	Open large color picker pop-over (hover over UI color picker)
S	Swap foreground/background colors
Shift+click and drag	Reposition the node and any child nodes further down the chain.
Ctrl+click	Create a new node between an existing one.
Middle Mouse Button+click	Remove individual nodes.
E/R	Image ink rotate left/right
D/F	Image ink scale up/down
Shift+Z	Adjust offset amount (sticky key, only while Brush tool is active)

Camera Hotkeys

Keystroke(s)	Action
Shift+Alt+click+drag	Move camera item
Shift+Alt+right-click+drag	Move up/down direction only
Alt+click+drag	Rotate around target distance
Alt+right-click+drag	Rotate around Z axis
Ctrl+Alt+click+drag	Move forward/backward only
Ctrl+Alt+right-click+drag	Adjust focal length
Roll Mouse Wheel	Zooms to cursor
Ctrl+A	Auto focus camera (only in a viewport defined as Camera and with auto-focus on)
Ctrl+F	Restart preview (only in the Preview viewport)



2ND GeN

Andrea and William Vaughan

With Earth rapidly becoming inhospitable to human life, G.S. Archean carries a one-way crew of courageous passengers to Uelara, an earth-like planet in the Cieri star system. Uelara is ideal, except for one minor detail—its distance from Earth. Traveling at sub-light speed, the generation ship won't reach Uelara within the original crew's lifetime.

Thirty years into the journey, a new generation born on the Archean trains to fulfill the first generation's mission. Eager to reach Uelara, the 2nd Gen crew prepares, as planned, to assume their parents' responsibilities—that is, until. . . someone goes missing and a devastating secret is discovered, putting the future of the human race in jeopardy. Will the crew rally and carry out the mission—or is humanity doomed?

It's all up to the 2nd Gen.

BUY IT NOW AT amazon.com

*Cover Illustrated with Modo by Fred Gambino

"The ultimate test of man's conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard."

—Gaylord Nelson



The Journey is the Destination.

MODO ESSENTIALS

WEEKEND CRASH COURSE

The Pushing Points | Modo Essentials book is a guide that teaches you the foundational skills needed to work in Modo.

This book was created to demystify navigating and working with the tools and features in Modo. In this guide you'll learn the fundamentals of Modo, useful hotkeys and much more.

The information I present in this book is an attempt to share what I've learned during my time using and teaching Modo. This resource would have saved me countless hours and allowed me to focus on what I love most... creating.

About the Author

William Vaughan is an award-winning artist, writer, and director. He has created thousands of original computer-generated characters, including Tofu the Vegan Zombie. William has trained thousands of cg artists throughout the world and authored more than one thousand tutorials and instructional videos. He has been published by major cg magazines, contributed to over twenty books, has written and directed several award-winning films, and has created digital art for many top studios, including Nickelodeon and Pixar Animation Studios.

William Vaughan | pushingpoints.com

PUSHING POINTS | WILLIAM VAUGHAN