TORQUE
ShowTool PRO

Manual Written by

David Wyand

October 2005

Torque ShowTool Pro

Developed by David Wyand

Using:
The Torque Game Engine
Synapse Gaming Lighting Code Pack

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Version 1.02

October 2005

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WHAT IS TORQUE SHOWTOOL PRO? 1

Torque ShowTool Pro started as a quick change to the Torque Game Engine back in December 2003. I was working with a user of my LightWave DTS Exporter that was having a problem with their nodes. Unfortunately, the TGE didn't have an easy mechanism to view a node's behavior in-game. I put together a small viewer that would allow me to see where the nodes were within a DTS shape and watch them as they animated. This was the beginning.

This little viewer sat on my hard drive for a few months, with a little tinkering here and there to help with the DTS exporter. It wasn't until the Spring of 2004 that I realized that such a tool was sorely needed by the community at large. There were a couple of efforts put forth to create a similar tool but none of them got very far. This seemed like a great opportunity!

I put some effort into getting the viewer into a state I would feel comfortable with releasing to some testers. Up go a couple of screen shots on the GarageGames web site, and people seemed to like the graphical interface. Great!

I then contacted Joe Maruschak of BraveTree to see if he was interested in trying out my DTS viewer, then entitled the Gnometech ShowTool – named after my own site www.gnometech.com. He had helped me in the past when I had some questions regarding the capabilities of the DTS and DSQ file formats. He agreed to take a look and really liked what he saw.

I can't stress enough how much it helps to have a tester that uses the software nearly every day. Joe offered many great suggestions that have been incorporated into the product. And he got the word out to other professional artists who then contacted me to also become testers. Having professionals bang away on your creation really lets you know what works and what doesn't.

It was now the Summer of 2004 and I started posting a number of screen shots of the viewer, now known as David Wyand's Looking Glass. Interest was really building and I was contacted by the guys at GarageGames to publish it with them. As their web site was the target audience, this made obvious sense.

The Fall of 2004 was the big push to get Looking Glass mostly complete for the IGC – the first I had attended. Demonstrating the product in front of groups of people and seeing their interest is a real boost that helps carry you through to product launch.

We're now nearing the end of 2004. Garage-Games would like to incorporate my viewing software into their core product line, and so it is renamed to Torque ShowTool Pro. Quite an honor! In a few days, the product will be unleashed onto the Indie masses and it has been quite a journey. One I hope to take again.

I would like to thank everyone that helped along the way.

Dave

David Wyand
December 2004

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Partial Feature List

• Runs on OSX and Windows

• Capable of loading multiple DTS objects into their own view. DSQ files may be loaded individually or through a standard .cs file to import multiple animation sequences at once. A list of the last five loaded objects is available for quick reloading.

• Multiple rendering formats: textured shaded, untextured shaded, flat shaded, textured wireframe, front face wireframe, wireframe, vertices, bounding boxes, and triangle strips.

• In addition to the perspective view, a number of orthographic views are available.

• User selectable bitmap for environmental mapping.

• The light source may be moved around with the mouse in a 'trackball'-like fashion, or turned off for unobstructed viewing of the applied textures.

• The current mip map level may be changed at any time with a key press. Mip mapping may also be turned off by locking the current mip map in place.

• Textures may be flushed and reloaded with a key press. They may also be reloaded automatically on a user defined interval.

• All DTS material properties are displayed.

• Background may be a solid color or a loaded bitmap. A snapshot of a game's level could be used.

• All nodes and their parent/child links may be shown. When a node is selected, its world or local position and rotation are shown along with a graphical representation of the node's axis.

• If a node controls a mesh's vertices, they are rendered with color coding indicating their weighting.

• Object bounding boxes, collision meshes, and line of sight collision meshes may all be rendered.

• Any loaded object may be mounted onto any other object using any node. Includes correct orientation for TGE vehicle wheels.

• Levels of detail may be manually selected or automatically determined as they would in-game.

• Animation sequences may be played forwards or backwards at a user defined time scale. The sequences may also be scrubbed through using the animation time slider.

• All animation sequence parameters may be viewed, including a list of controlled nodes and defined triggers.

• View the hierarchical structure of an exported DTS object using a number of methods. Useful for debugging a shape.

• See the rendering structure of your object at each detail level to determine the order the meshes will be drawn in.

• Activate the TGE's reskinning code to change a loaded shape's textures, such as for different team uniforms.

• View the rendering order of BSP-based sorted meshes to check that pieces are not overlapping inappropriately.

• Full support for the Synapse Gaming Lighting Pack. See how your object will look if you add this product to your game.

INSTALLING
TORQUE SHOWTOOL PRO

System Requirements

Below are the minimum system requirements for the various operating systems Torque Show Tool Pro runs on. As with most graphics intensive applications, the more memory and the higher display resolution, the better. If your system is capable of running one of the mainstream 3D modeling and animation packages or the TGE demo, then there shouldn't be an issue with Torque ShowTool Pro.

Machintosh OSX

- Mac OS X 10.3
- G3 with 64 MB RAM
- OpenGL 1.3 compatible 3D graphics accelerator
- 7 MB disk space
- 800x600 display resolution

Windows 98/SE/ME/2000/XP

- Pentium II 300 with 64 MB RAM
- OpenGL 1.3 compatible 3D graphics accelerator
- 5 MB disk space
- 800x600 display resolution

Upgrading from a Previous Version

If you already have a previous version of Torque ShowTool Pro on your computer, it is recommended that you first uninstall it. Please see below for instructions on how to uninstall on your platform.

OSX Installation (10.3 or higher)

Step 1: Download the .dmg from GarageGames.

Step 2a: A Torque ShowTool Pro folder should be on your desktop. Drag this folder to where you would like the program to be run from, such as in Applications.

Step 2b: If you don't have a Torque ShowTool Pro folder, double click on the .dmg file to open it in the Finder. Create a new Torque ShowTool Pro folder where you would like the program to be run from, such as in Applications. Drag the contents of the .dmg file into this new folder.

Step 3: If you still have the .dmg file, it may be safely placed in the trash.

Step 4: To start Torque ShowTool Pro, double-click the Torque ShowTool Pro application icon just as you would any other application.

Windows Installation

Step 1: Download the .exe file from Garage-Games.

Step 2: Start the installation process by double-clicking on the .exe file you just downloaded.

Step 3: Go through each of the steps in the installation software. If you want to select a different directory to install Torque ShowTool Pro into (the default is Program Files/TorqueShowToolPro), choose the new directory when asked.

Step 4: Once installed, you may safely delete the downloaded .exe file.

Step 5: To start ShowTool Pro, double-click the Torque ShowTool Pro icon on the desktop or go

through the Window's Start menu just as you would any other application.

OSX Uninstall

To uninstall Torque ShowTool Pro, simply drag the Torque ShowTool Pro folder to the trash.

Windows Uninstall

To uninstall Torque ShowTool Pro, select the uninstall option from the Torque ShowTool Pro entry under the Window's Start menu and follow the prompts.

Registering the Product

Torque ShowTool Pro allows for a 7 day trial period, after which time a license key must be purchased to continue using it. During this trial period, a window appears upon startup that allows you to purchase a license key from GarageGames and to register your key with the application.

Register a purchased license key

Opens your web browser to purchase a license key from GarageGames.com

Once you've purchased Torque ShowTool Pro, you'll be provided with an *Ignition Key* by GarageGames. If you ever loose your key, you may find it under the *My Garage* section of

www.garagegames.com. To use your Ignition Key, click on the *Register* button at the bottom of the startup window. This will open the REGISTRATION window.

ID required for off-line registration

Enter your Ignition Key from Garage-Games here

Enter your assigned Ignition Key into the text field and press the *Register* button. Torque Show-Tool Pro will then access the garagegames.com site to verify the key – Internet access will be required. If you'd prefer to or need to register without your computer accessing the Internet, you may use the off-line registration facility at www.garagegames.com/ignition. To use this method, you'll need to provide your off-line registration ID that is available from the ShowTool Pro REGISTRATION window.

Once Torque ShowTool Pro has been successfully registered, the startup window will no longer appear and you'll not need to worry about the 7 day trial period any longer.

Getting Help

If you ever need help with Torque ShowTool Pro, feel free to drop by the Torque ShowTool Pro forum found at www.garagegames.com. Don't forget to subscribe to the forum so you'll always see when someone has posted a new message.

GETTING STARTED WITH TORQUE SHOWTOOL PRO

With installation of the software complete and Torque ShowTool Pro started by double-clicking its icon, it's time to set up the project directories to your game content and load your first object.

Setting Up Project Directories

A project directory points to the location of your game's DTS and DSQ files. This could be the topmost level of your game directory hierarchy or a directory that only contains shape files. Torque ShowTool Pro begins at the selected project directory and searches down all subdirectories when looking for files to load.

ShowTool Pro allows you to set up multiple project directories and switch between them at any time. This allows you to load in shapes from different games or to organize your shapes within the same game in a logical manner.

For example, the standard TGE distribution has a file pathway of torque/example/starter.fps. Using this for your project directory would provide access to all shapes for the starter.fps game and below.

If you instead wanted to be more specific (which would decrease the number of files displayed within the load file window) you could use a file pathway of torque/example/starter.fps/data/shapes/player to access only those shapes used for the player. In the case of the starter.fps game, this is the Orc model.

When ShowTool Pro is started for the first time, no project directories are defined. Before you may load any files, you'll need to create one. To

do so, click on the *Project Directory* button at the top left of the main window, and then select [modify].
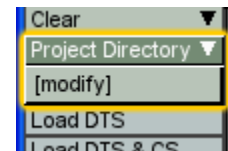
Choosing the [modify] option will open the MODIFY PROJECT DIRECTORIES window.
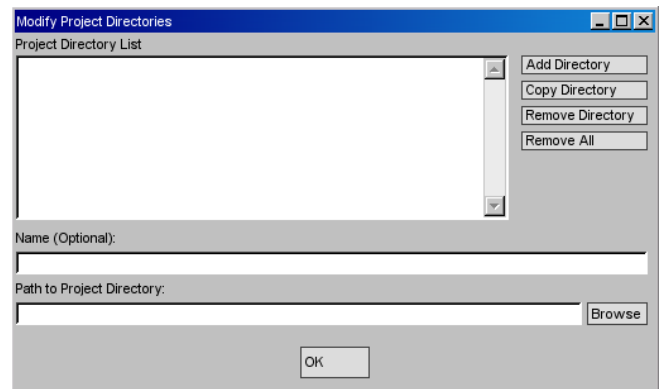
Click on the *Add Directory* button and a new project directory will be created. You may then either manually enter in a directory path into the *Path to Project Directory* text edit field or click on the *Browse* button. The *Browse* button will open an Operating System standard directory selection dialog from which you may select your game shape directory.

With a chosen project directory you may optionally enter in a more descriptive name using the *Name (Optional)* text edit field. This name will be used instead of the file pathway within the *Project Directory* popup.

When you are done adding project directories, click on the *OK* button of the MODIFY PROJECT DIRECTORIES window. When you eventually quit ShowTool Pro your project directories will automatically be saved for later.

Loading Your First Object

Before you may load in a DTS file you'll need to make sure that the correct project directory is selected. One way to do this is through the *Project Directory* popup. Click on the *Project Directory* popup and select the directory you set up above. In the example below, the shapes item has been chosen by the user.

With the appropriate project directory selected you may now load in a DTS file by clicking on the *Load DTS* button at the upper left of the main window.
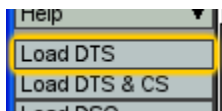
This will in turn open the LOAD FILE... window presenting all of the DTS files in the project directo-

tory and all subdirectories. If there are a lot of files it may take a while for the window to appear and it may be worthwhile to create a new project directory that starts further down the directory hierarchy.
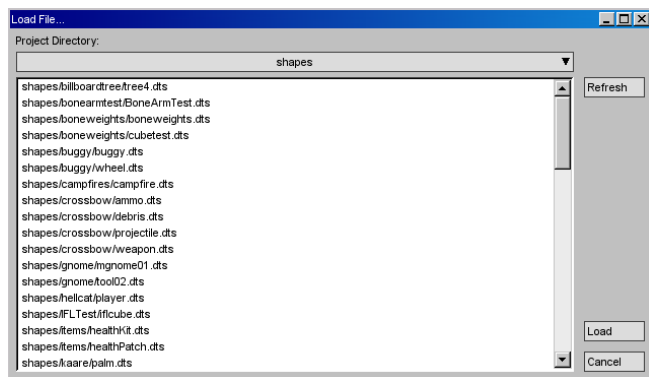
Select a DTS file and click on the *Load* button. The file listing window will close and the DTS file will be shown in the 3D window. Depending on the display settings, the shape's node hierarchy may also be shown.

The name of the currently viewed shape will always be displayed in the upper right corner of the main window in the *Current Shape* popup. When you load multiple shapes, you may use this popup to move between them.
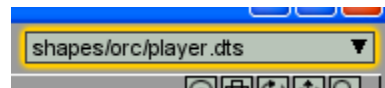
That's it for the *Getting Started with Torque ShowTool Pro* chapter. For further information on using Torque ShowTool Pro, please see the tutorial and reference chapters.

TUTORIALS

TUTORIAL 1: VIEWING DTS/DSQ FILES

This tutorial will step you through loading a DTS file into ShowTool Pro and then applying a DSQ file to it. A number of different display modes will be shown. It is assumed that a project directory has been setup to point to the standard TGE starter.fps directory and we'll make use of the Orc player model. For information on setting up a project directory, please see the *Getting Started with Torque ShowTool Pro* or *Reference* sections.

Loading in the Orc Shape

To load in the Orc player shape, begin by clicking on the *Load DTS* button at the upper left of the main window.
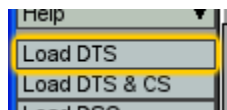
This will display the LOAD FILE... window. At the top of this window is a popup control showing the current project directory. If this is not set to the starter.fps project directory that you had set up previously, then click on the popup control and select it from the list.
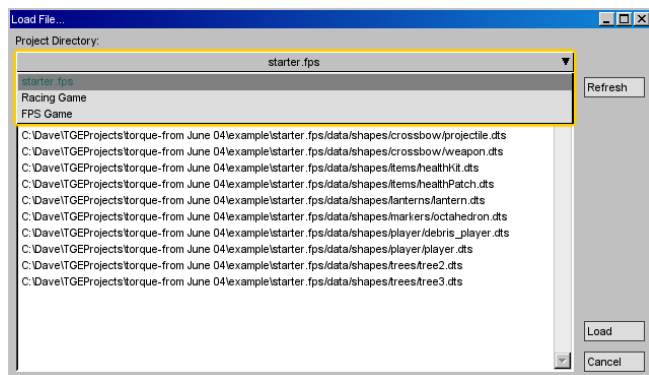
The Orc player shape is named player.dts and is within the shapes/player directory. Select it from the file list and click on the *Load* button. This will load up the Orc in its base pose as there are no animation sequences included within the DTS file.

Node Display

If this is the first time you're using ShowTool Pro, then by default the shape's nodes will also be displayed. These show up as yellow pluses with blue lines indicating their parent/child relationships. The drawing of a shape's nodes may be toggled on and off using the button in the tool bar at the top of the window; by pressing the "n" keyboard shortcut; or through the DISPLAY PROPERTIES window's NODES tab that is opened using the *Display Properties* button at the left of the main window.

The DISPLAY PROPERTIES window and nodes (bones) will be examined in later tutorials, or you may jump to the *Reference* section of this manual.

Rendering Modes

There are a number of different ways in which a shape may be drawn using the *Rendering Mode* popup and selecting from the list.

The most common rendering mode is Texture Shaded Solid. This will draw the shape as it will appear within the TGE with all of its texturing. Any lighting that has been setup with the LIGHT PROPERTIES window will also be visible. (Please see the other tutorials or the *Reference* section for more information on the LIGHT PROPERTIES window).

All of the other available rendering modes exist to allow the artist to check that their shape has been exported correctly from their 3D software. These modes very similar to the display types found in

typical 3D rendering and modeling packages but of course reflect how the information has been interpreted by the TGE. A subset of them will be reviewed here.

The Shaded Solid display mode will draw the shape without any texturing applied. This helps the artist get a sense of the vertex shading of the shape without texturing getting in the way.

The Textured Wireframe rendering mode overlays the polygon edges onto the textured shape.

The Front Face Wireframe rendering mode is similar to the textured wireframe mode but without textures. The Wireframe rendering mode (shown below) draws the shape hollow with only its polygon edges visible.
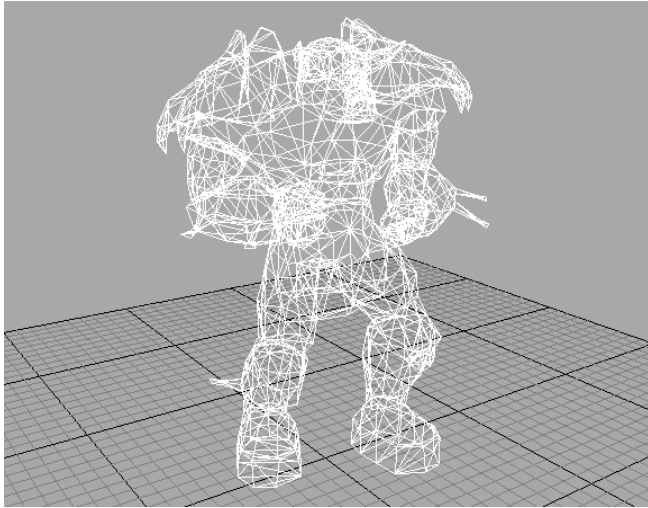
If the current shape makes use of triangle strips to improve rendering performance, then the Triangle Strip rendering mode is useful in seeing how a shape has been strippified. There is also a wireframe overlay version.
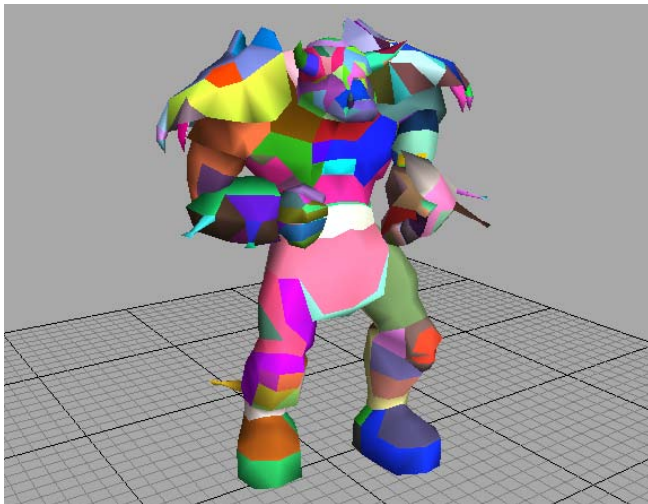
Moving the Camera

Once a shape has been loaded into ShowTool Pro, the camera may be rotated, panned, and zoomed

Hold down mouse button and drag within the 3D view

about. The easiest method is by holding down the appropriate mouse button while dragging the mouse within the 3D view.

The table below lists the various mouse button and key modifier combinations for a single button mouse:

Mouse & Key Modifier	Action
Mouse button	Rotates view
CTRL + button	Translates view
Command+button	Zooms view

And for a two button plus wheel mouse:

Mouse & Key Modifier	Action
Left mouse button	Rotates view
Right mouse button	Translates view
Mouse wheel	Zooms view

In addition, if the following modifier keys are held down at the same time as the above combinations, they have the following affect:

Keyboard Modifier	Action
SHIFT	Translates or zooms view faster
SHIFT+CTRL	Zooms view even faster

Camera Rotation Axis   **Camera Translation Axis**

When rotating or translating the camera, a colored axis is drawn in the center of the display that gives an indication of the world's orientation.

Each of the arrows indicates the positive direction of the axis. The red arrow is the x-axis, the green arrow is the y-axis, and the blue arrow is the z-axis.

It is also possible to move the camera using the set of buttons at the upper right of the 3D view.
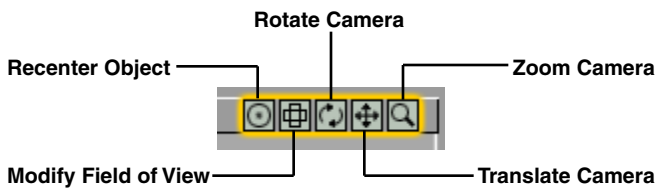
The *Rotate Camera*, *Translate Camera*, and *Zoom Camera* buttons all behave the same as using the mouse buttons and the keyboard modifiers have the same affect. To use them, hold down the left mouse button while the mouse pointer is over them and drag the mouse.

Clicking the *Recenter Object* button (or using the "a" keyboard shortcut) will move the camera and set its zoom such that the shape will be in the center of the screen. This is useful if you've moved the shape off the screen and cannot find it, or zoomed in too far or too far away.

The *Modify Field of View* button may also be used by placing the mouse pointer over the button, holding down the left mouse button, and dragging the mouse. This will modify the camera's field of view (FOV) providing more or less "peripheral"

vision to the shape at the expense of possible distortions.

If your in-game camera uses a different FOV than the standard TGE one, changing the Show-Tool Pro FOV to match helps the artist determine how the shape will actually look in-game. While the FOV is being modified, its current value in degrees is displayed just below the *Modify Field of View* button on top of the 3D view.

Loading a DSQ File

The Orc DTS file itself does not contain any animation sequences (although it could have. DSQ files are optional). The sequences are stored in separate DSQ files. To view these animation sequences in ShowTool Pro, they will need to be loaded in one at a time (please see the next tutorial on how to load in multiple DSQ files at once).

With the Orc as the currently viewed shape, click on the Load DSQ button at the left side of the main window.
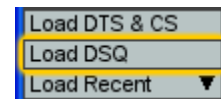
This opens the LOAD FILE... window displaying all of the DSQ files under the project directory (don't forget to set the correct project directory!).
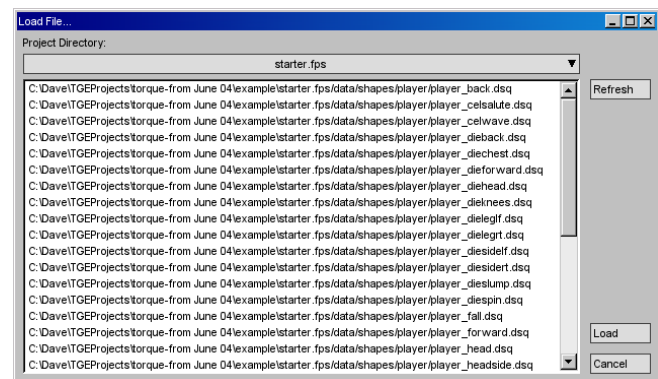
For this tutorial, select the player_forward.dsq file and click on the *Load* button. This will bring in the running animation sequence for the Orc.

Playing an Animation Sequence

With a DSQ file loaded, the first thing you'll notice is that the Orc has now changed his pose to a beginning of a run. The second thing to make note of is the *Sequences* popup in the lower left of the main window has gone from [none] to Forward, the name of the animation sequence as defined within the DSQ file.
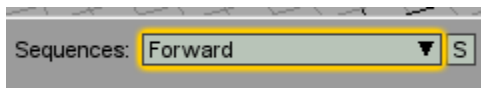
The *Sequences* popup is where you may select which animation sequence is currently being viewed. As only one DSQ file has been loaded and the DTS file did not contain any animation sequences, there is only one entry in the popup.

To view this new sequence in action, take a look at the set of arrows at the bottom right of the main window. Many of them are similar to what you would find on a VCR or DVD player.
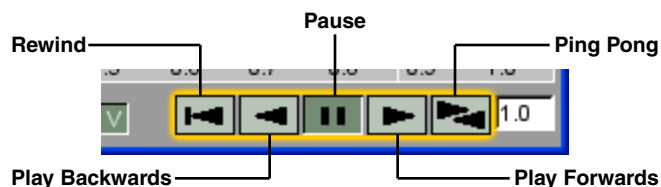
To see the run animation click on the *Play Forwards* button. This will cause the Orc to run forward at the same speed as was defined at the time the animation sequence was exported. To stop the animation, click on the *Pause* button.

While the run animation is playing, you'll notice the Animation Slider control moves in time.
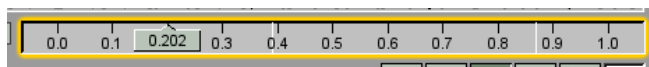
This slider indicates where within whole sequence the current frame sits, from 0.0 to 1.0. In the TGE this is known as the sequence's position. It may also be modified manually (or scrubbed) by clicking within the slider and dragging the mouse. If the sequence was playing at the time, it will pause and jump to the frame where the mouse was clicked.

Animation Sequence Parameters

An animation sequence contains a number of parameters that control what is actually animated within the shape. To find out more about a sequence's parameters, click on the *Sequence Info* button at the left of the main window.
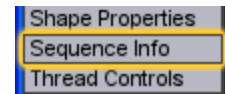

This will open the SEQUENCE INFO window.
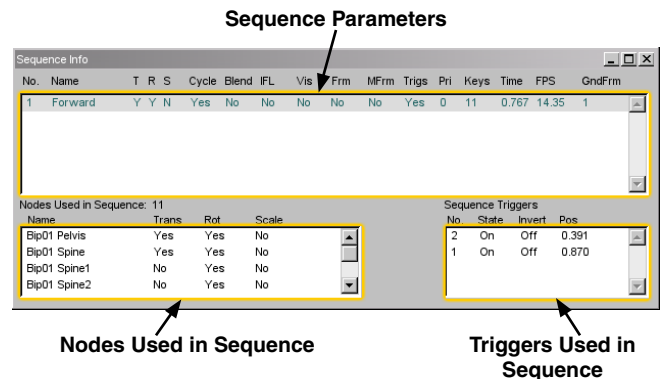
The *Sequence Parameters* list shows how the sequence has been set up to animate (i.e.: cycle, blend, etc.); what to animate (nodes will translate, rotate, or scale); and how fast it will animate (frames per second, and total length of the sequence in seconds).

The *Nodes Used in Sequence* list displays all of the nodes that are animated for this sequence and which parameters are animated, i.e.: rotation.

Finally, the *Triggers Used in Sequence* list gives all of the triggers for the selected sequence and their parameters, i.e.: execution position and trigger state.

For more information on the SEQUENCE INFO window, please see the *Reference* section.

❧

That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

TUTORIAL 2: TSSHAPECONSTRUCTOR FILES

A TSShapeConstructor is a datablock within the Torque Scripting Language. It is used to automatically associate a number of DSQ files with a given DTS file. Then while in game, any time that DTS file is loaded all of the DSQ files will also be loaded and are available to animate the shape.

A TSShapeConstructor datablock is built within a .cs file just like any other TGE scripting component. For this tutorial we'll be using the player.cs file located within the starter.fps/data/shapes/player directory. It is used to bind the Orc shape to its various animation sequences. For the curious, here's the first few lines from that datablock:

```
datablock TSShapeConstructor(PlayerDts)
{
    baseShape = "./player.dts";
    sequence0 = "./player_root.dsq root";
    sequence1 = "./player_forward.dsq run";
    sequence2 = "./player_back.dsq back";
    sequence3 = "./player_side.dsq side";
    sequence4 = "./player_lookde.dsq look";
    sequence5 = "./player_head.dsq head";
    ...
```

Loading a DTS & Matching .cs File

Loading in a DTS file (such as player.dts) and its matching .cs file (such as player.cs) within Show-Tool Pro is straightforward. However, there are two constraints that must be kept in mind:

• The script file and DTS file must have the same base name i.e.: player.dts and player.cs.

• The script file with the TSShapeConstructor data-block must be located in the same directory as the DTS file it is meant to work with.

To get started, click on the *Load DTS & CS* button at the upper left of the main window.
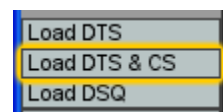
This will open the LOAD FILE... window. If you need to, select the starter.fps project directory (see the *Getting Started with Torque ShowTool Pro* chapter if you need help setting up a project directory). Select the player.dts file from the list of DTS files and click on the *Load* button.
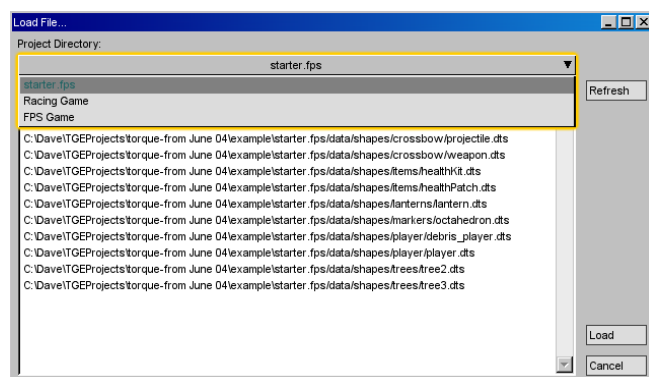
If the player.cs file exists, it will be compiled and executed. Then the player.dts file will be loaded as will all of the DSQ files that were defined within the TSShapeConstructor datablock.

If everything worked, the Orc will automatically be in the starting position for the Root animation sequence as the *Sequences* popup shows.

You may go ahead and try out the Root animation sequence using the animation controls described in the previous tutorial. You may also use the *Sequences* popup to change the currently viewed sequence.

Playing Multiple Sequences

The TGE allows you to stack multiple animation sequences on top of each other such that they play simultaneously. Each animation sequence is known as a *thread* and there are a number of rules that determine how a shape will animate if there is more than one thread:

• If a sequence controls only a subset of the total number of nodes in the shape it will not interfere with the animation of the other nodes.

• If a sequence has been set to "blend" then its animation will be added to any previous thread.

• If two sequences want to control the same node then the sequence with the higher priority will actually animate it.

To set up multiple animation sequence threads in ShowTool Pro, click on the *Thread Controls* button at the left of the main window.
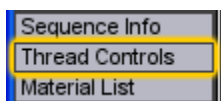
This will open the THREAD CONTROLS window.
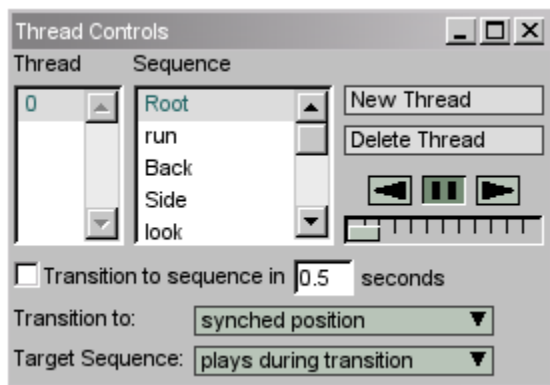
The THREAD CONTROLS window is where threads may be added or deleted from the shape. It also sets up how sequences will transition from one to another (please see the *Reference* section for more information on transitions). If the shape has any animation sequences loaded then there will always be at least one animation thread (numbered 0) in the *Thread* column. The *Sequence* column lists all of the loaded animation sequences. A thread's sequence may be changed by clicking on a sequence in this list. For example, selecting the run sequence will put the Orc into a run pose (give it a try!).

To add a second thread to the shape, click on the *New Thread* button. With thread number 1 selected in the *Thread* column, choose the look animation sequence. This sequence is set to blend (see the SEQUENCE INFO window for a sequence's parameters) so it will play nicely with the run animation on thread 0 we set above.
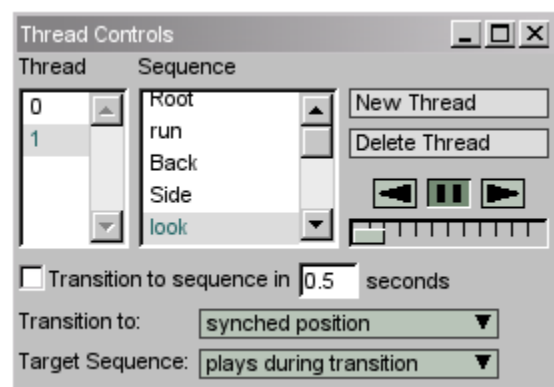
The look sequence moves the Orc's arms from up at position 0.0 to down at position 1.0. With thread 1 selected, go ahead and move the *Animation Slider* at the bottom of the main window. You'll see that the Orc's arms move with the slider without modifying the rest of the body.

Let's see the Orc in action. Click on thread 0 in the *Thread* column of the THREAD CONTROLS window. This should be set to the run sequence. Now click on the play button to start the Orc

running. With the sequence playing forward, the *Animation Slider* will move from left to right. Now select thread 1 (the look sequence). The *Animation Slider* will stop moving and show the current position for the selected thread. However, the Orc will continue to run as thread 0 is still playing in the background. Drag the *Animation Slider* to see the Orc's arms move while he is running. Fun, fun, fun!

For more information on the THREAD CONTROLS window, please see the *Reference* section.

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That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

Sequences Popup List Sorting

The *Sequences* popup on the main window allows for its list to be sorted alphabetically. In its unsorted state, the animation sequences are shown in the same order as they are defined within the DTS file or through a TSShapeConstructor datablock. Clicking on the S button toggles the sorting on and off.

Unsorted Sequence List   **Sorted Sequence List**

TSShapeConstructor Datablock Breakdown

The TSShapeConstructor datablock is used to tie a number of DSQ files to a DTS file during a game's startup. It may exist in any script (.cs) file although very often it is within its own file. The de facto standard is to have the datablock within its own script file that has the same base name as the DTS file (i.e.: badguy.dts and badguy.cs) and is within the same directory as the DTS file.

The TSShapeConstructor datablock requires two parameters. The first parameter is named `baseShape` and points to the DTS file that the datablock will be used with. The second parameter is an array (or list) that points to all of the DSQ files, with a maximum of 64. This parameter begins with `sequence` and is written in the datablock as `sequence0` or `sequence1` for the first two DSQ files. This parameter also contains an optional name for the DSQ animation sequence that will be used instead of the file name, and is separated from the file name by either a space or a tab character. i.e.:

```
sequence0 = "./player_root.dsq root";
```

where "root" is the name that will be given to the animation sequence. Something to be aware of is if there is a space in the directory pathway to the DSQ file or in the file name itself, everything after the space will be treated as the animation sequence's name and the DSQ file will not load in.

```
datablock TSShapeConstructor(PlayerDts)
{
   baseShape = "./player.dts";
   sequence0 = "./player_root.dsq root";
   sequence1 = "./player_forward.dsq run";
   sequence2 = "./player_back.dsq back";
   sequence3 = "./player_side.dsq side";
   sequence4 = "./player_lookde.dsq look";
   sequence5 = "./player_head.dsq head";
   sequence6 = "./player_fall.dsq fall";
   sequence7 = "./player_land.dsq land";
   sequence8 = "./player_jump.dsq jump";
   sequence9  = "./player_diehead.dsq death1";
   sequence10 = "./player_diechest.dsq death2";
   sequence11 = "./player_dieback.dsq death3";
   sequence12 = "./player_diesidelf.dsq death4";
   sequence13 = "./player_diesidert.dsq death5";
   sequence14 = "./player_dieleglf.dsq death6";
   sequence15 = "./player_dielegrt.dsq death7";
   sequence16 = "./player_dieslump.dsq death8";
   sequence17 = "./player_dieknees.dsq death9";
   sequence18 = "./player_dieforward.dsq death10";
   sequence19 = "./player_diespin.dsq death11";
   sequence20 = "./player_looksn.dsq looksn";
   sequence21 = "./player_lookms.dsq lookms";
   sequence22 = "./player_scoutroot.dsq scoutroot";
   sequence23 = "./player_headside.dsq headside";
   sequence24 = "./player_recoilde.dsq light_recoil";
   sequence25 = "./player_sitting.dsq sitting";
   sequence26 = "./player_celsalute.dsq celsalute";
   sequence27 = "./player_celwave.dsq celwave";
   sequence28 = "./player_standjump.dsq standjump";
   sequence29 = "./player_looknw.dsq looknw";
};
```

Full TSShapeConstructor listing for the TGE starter.fps Orc player.cs

TUTORIAL 3:
WORKING WITH NODES

Nodes play an important role within DTS files. They often act as bones within a virtual skeleton to animate a shape. They are also used to mark out a reference point in space, such as where a weapon is to be mounted onto a player. Torque ShowTool Pro provides the user with a number of options when viewing nodes, and this tutorial will take you through many of them.

Showing Nodes

A shape's nodes may be turned on and off using a number of different methods. The first is using the node icon in the tool bar.

The second method is using the "n" keyboard shortcut. The final method is through the DISPLAY PROPERTIES window. Click on the *Display Properties* button at the left of the main window.
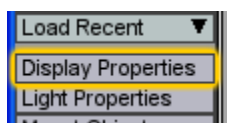
With the DISPLAY PROPERTIES window open, make sure the *Nodes* tab is selected at the top. Click on the *Show All Nodes* checkbox to toggle the node's display.
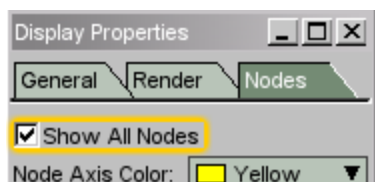
Node Display Properties

By default, the top of the *Nodes* tab of the DISPLAY PROPERTIES window looks something like this:

Draw nodes in this color

Draw parent/child connections in this style…

…and in this color

Draw sequence controlled nodes like this
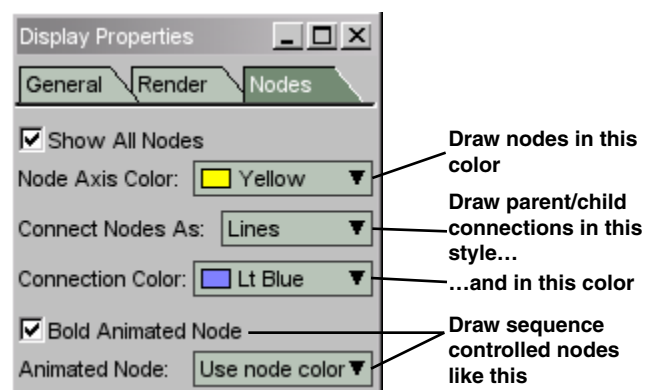
All nodes will be drawn in yellow. If a node has a child then a light blue line will be drawn between it and its child. And if a node is controlled by the currently selected animation sequence, it will be drawn bold and also in yellow. With the Orc player shape loaded from *Tutorial 2*, these settings look like the following:

Something to try changing is the color of the nodes that are controlled by an animation sequence. To do this, select a new color from the *Animated Node* popup – a green can really pop out. Then, if you ever find that there are too many colors on screen while checking out other parts of the shape, go back to the use node color option.

Changing Node Connections

The parent/child relationships of the nodes, often known as bones in 3D animation software, are an important part of any shape. To help the artist check that these connections have been exported correctly, there are a number of display modes to select from.

From the *Nodes* tab of the Display Properties window, the *Connect Nodes As* popup provides the following options:
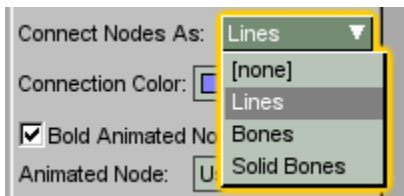
Selecting [none] from the list will force the node connections to not be drawn. This helps you to

focus on just the node points without the clutter of the connections.

The Lines option we've already seen above. It draws a simple colored line between the parent and child nodes. These lines are drawn over top of the shape so that they will always be visible regardless of the viewing angle.

The Bones option draws the node connections in a wireframe bone shape that is similar to what is used in 3D animation software. These are also drawn over top of the shape. Try out this option on our Orc friend.
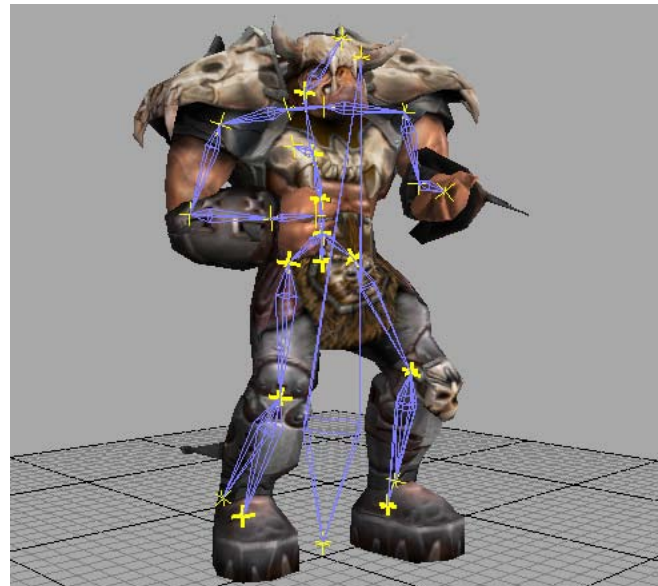
The final option, Solid Bones, draws the connections as solid bone shapes while taking into account the geometry of the shape. If the bone is within an arm for example, then it will be hidden within the arm.

This in itself may only occasionally be useful. However, when combined with the ghost rendering mode, it becomes possible to see the node skeleton in 3D within the shape. This can be quite handy when trying to visualize the skeleton, especially when playing an animation sequence.

To turn on ghost mode, click on the button in the toolbar at the top of the main window. Alternatively, it may be enabled under the *Render* tab of the DISPLAY PROPERTIES window. Try this out on the Orc while playing the run sequence.
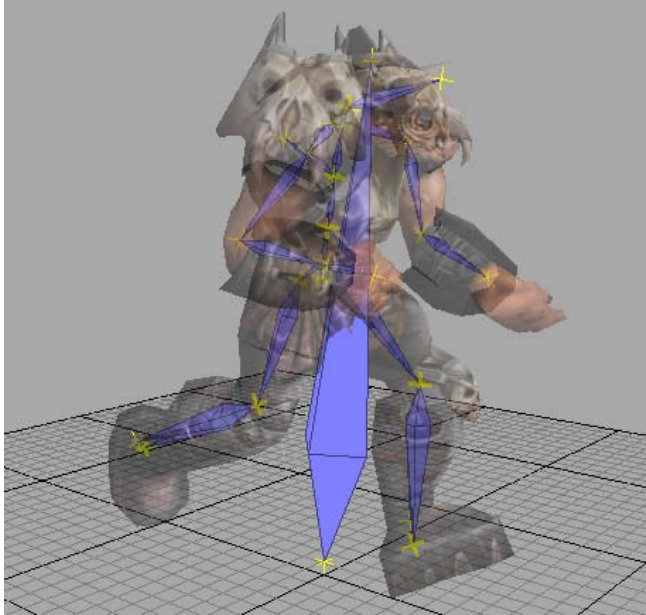
While in ghost mode, the shape's transparency may be adjusted using the *Fade Amt* slider under the *Render* tab of the DISPLAY PROPERTIES window.
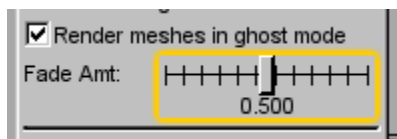
Try dragging this slider while viewing the Orc. Using this slider it is also possible to completely remove the shape's mesh and leave only the nodes and their connections. This can be useful when you want to only see the skeleton.

By default there are a couple of *Presets* that allow you to quickly change between bone displays. Pressing "F5" will change to ghost mode and solid bones. Pressing "F6" will turn off ghost mode and go back to line connections. Please see the *Reference* section for more Preset information.

Node Coordinates and Vertices

If you're interested in how a single node moves during an animation sequence, it is possible to select it and see its coordinates. If you've been following this tutorial, then turn off ghost mode on the Orc and set the node connections to Lines. Now take a look at the *Nodes* popup at the bottom of the main window.
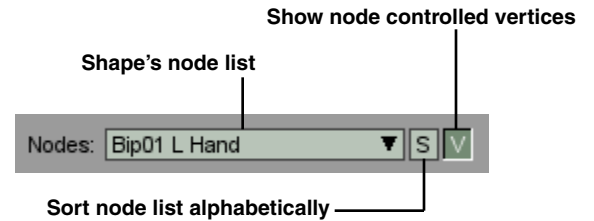
Clicking on the *Nodes* popup lists all of the nodes for the current shape. Just like the *Sequences* popup we saw in an earlier tutorial, the node listing may be alphabetically sorted using the S button. Select the Orc's Bip01 L Hand node from the list. This will show the node's axis in the 3D view as red, green and blue lines representing the X, Y and Z axis respectively.
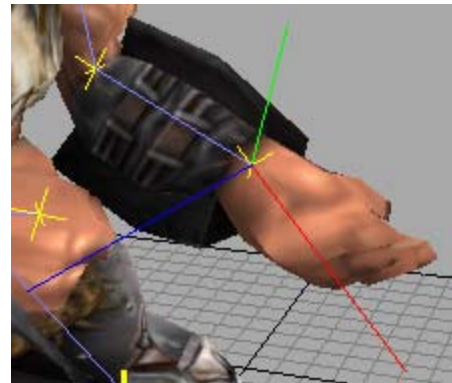
To check the actual coordinate values for the selected node, see the *Item Coordinates* popup at the bottom left of the main window. You have the option of either a world or local (parent) basis for the coordinate values:

Node Wrld Coord ▼		Node Local Coord▼
X : -0.384		X : 0.364
Y : 0.544		Y : 0.000
Z : 1.273		Z : 0.000
H : -65.472		H : -160.280
P : -38.541		P : 39.936
B : -114.976		B : 148.290

Heading, Pitch and Bank in Degrees {

World Coordinates   **Local Coordinates**
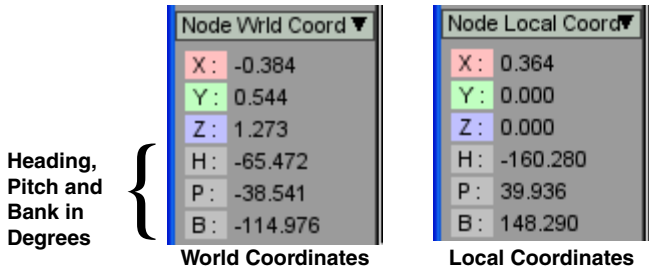
These values will dynamically update when the shape is animated, assuming that the node moves during a sequence's playback.

It is also possible to view the vertices that a node has influence over. By clicking on the [V] button beside the *Nodes* popup, all of the vertices that the selected node controls will be highlighted.
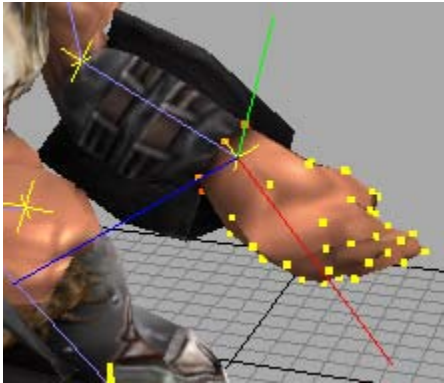
The coloring of the vertices indicates how much influence the selected node has – often called a vertex weight in 3D animation software. By default, yellow indicates that the vertex is 100% controlled by the selected node and red indicates 0% control. In the picture above, all of the hand is completely controlled by the Bip01 L Hand node while the wrist is only partially controlled (as indicated by the orange vertices).

If you find there are any red vertices (0% influence or weight) it may be worthwhile to go back to your 3D software and adjust the weight maps. The TGE still performs calculations on these vertices even though the node's influence is nonexistent.

The coloring of the controlled vertices may be modified under the *Nodes* tab of the DISPLAY PROPERTIES window. This is useful if your shape contains colors that match the default color scheme.

☑ Render node controlled vertices	
0% weight:	■ Red ▼
100% weight:	□ Yellow ▼
0% 50% 100%	
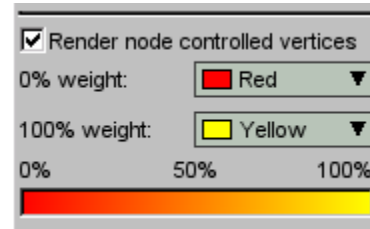
Go ahead and try changing the colors yourself. It is usually best to choose a color scheme where one of the colors is made up of the other. Otherwise the 50% mark ends up being a dark muddy color. For example, green and blue are not a good combination, but cyan and blue would work.

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That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

TUTORIAL 4:
LIGHTING AND
ENVIRONMENT

Torque ShowTool Pro matches the DTS lighting used within the TGE. This allows you to check out your models within the correct environment without having to load up your game. This tutorial steps you through the various lighting and environmental options ShowTool Pro has to offer.

Interactive Lighting with the Mouse

With a shape loaded (such as the Orc from *Tutorial 2*), the mouse may be used to rotate the directional light about the object in the same manner the camera may be rotated. There are two ways to activate the rotation of the light. The first is to hold down the "l" keyboard shortcut. You'll know that you're in light rotation mode as an outline of the light will be drawn within the 3D view. Now, with the mouse pointer within the 3D view, click
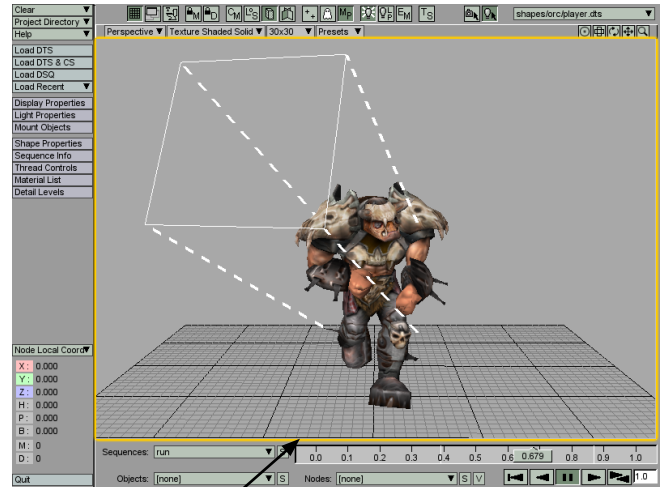
Drag mouse within 3D view to rotate the directional light

the left mouse button and drag. The light may be rotated about the shape as shown below.
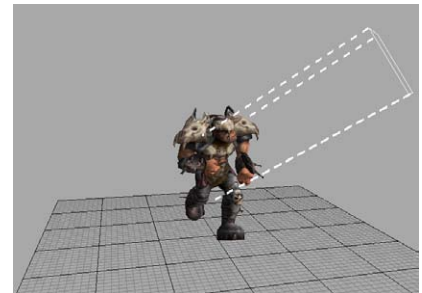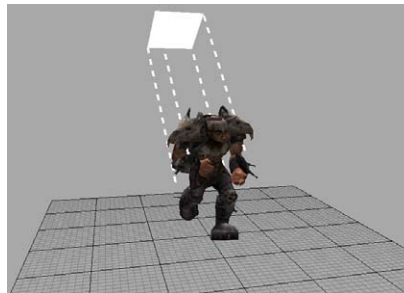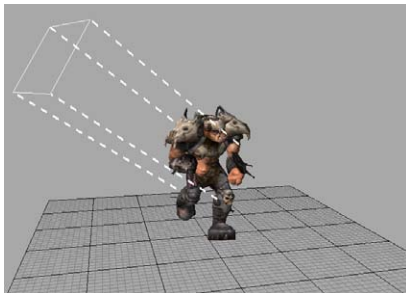
Real-time interactive lighting using the mouse to rotate the directional light
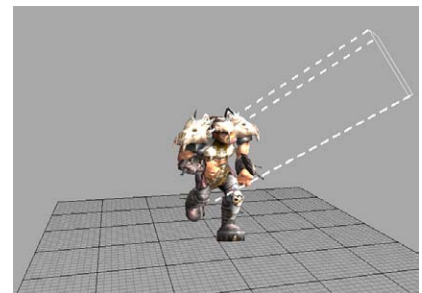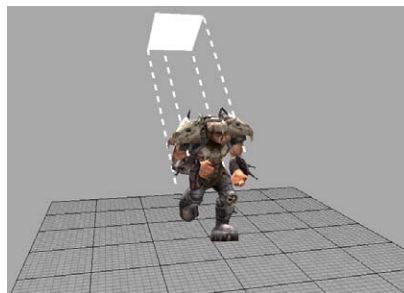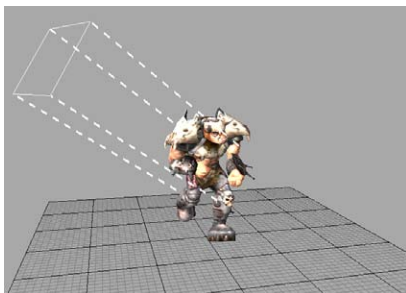
Real-time interactive lighting with the Synapse Gaming's Lighting Code Pack activated

The second method of rotating the directional light is to click on the *Mouse Controls Light* button in the toolbar at the top of the main window.

Now dragging the mouse within the 3D view will rotate the light. This mode will remain active until you click on the *Mouse Controls Camera* button in the toolbar or you press the "l" keyboard shortcut.

Turning Off the Lights

There will be times when you want to turn off the lights within Torque ShowTool Pro. This allows you to view a shape's textures without any additional shading – handy when you're painting a texture and you're using the automatic texture reloading feature.

The first method of toggling the light is to use the *Enable Lighting* button in the toolbar at the top of the main window.

The second method is through the LIGHT PROPERTIES window. Click on the *Light Properties* button at the left of the main window.
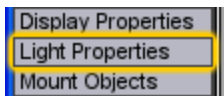
This opens the LIGHT PROPERTIES window. To toggle the light on or off, click on the *Enable Lights* checkbox.
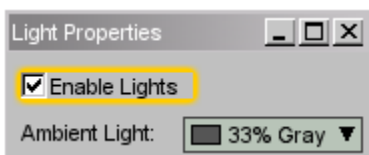
Changing the Colors

The LIGHT PROPERTIES window offers a number of options to modify the look of the lighting within ShowTool Pro. We'll focus on changing the color of the lighting in this tutorial.

At the top of the LIGHT PROPERTIES window are the controls for modifying the ambient light's color. There are two methods that may be used: select from the predefined list of colors or use a custom color.
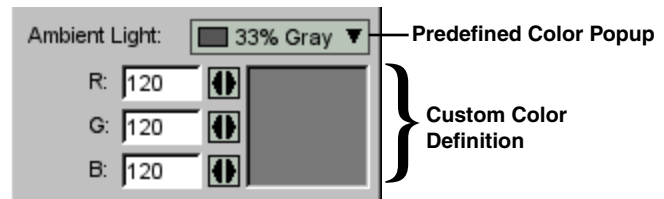
Using the *Predefined Ambient Color* popup is straightforward: select one of the colors from the list. To make use of a custom color you may either enter the RGB values directly in the text edit controls or use the arrow buttons. To use the arrow buttons, click the mouse button on one of them and drag left or right. This will change the number to the left of the button.

Something to keep in mind is if you change the ambient light color to black, it is the equivalent of turning off all ambient light. Similarly, changing the ambient light color to white is equivalent to turning off the directional light. A shape cannot be any brighter than pure white (enabling the Lighting Pack changes this rule however. See below for more information on using the Lighting Pack).

Underneath the ambient light settings are the controls for the direct light color. As with the ambient light, there are two methods that may be used to change the direct light's color: selecting from the predefined popup list or entering in a custom color.
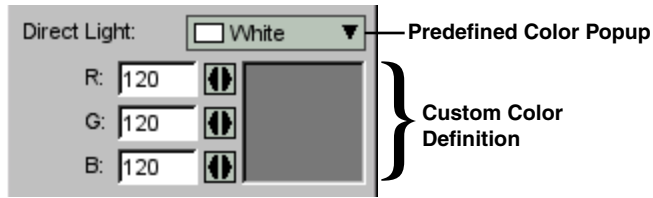
Something to keep in mind is if you change the direct light color to black then the shape will only be illuminated with the current ambient light setting. This however is not the same as turning off the lights – it will only wash the shape with the ambient light color.

Something else to keep in mind is that the ambient and direct lights are additive. For example, if you set the ambient light to green, and the direct light to red, the Orc would be green with yellow (green + red) highlights. Go ahead and give this a try with the Orc. Rotate the direct light to see the effect.
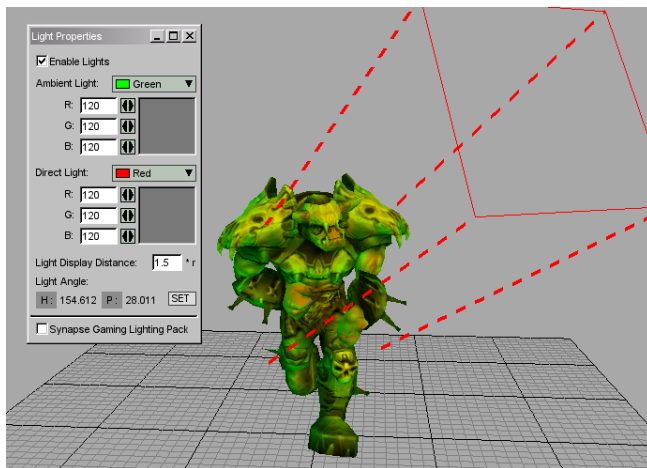
Using the Lighting Pack

The Synapse Gaming Lighting Pack greatly enhances the look of the TGE. It provides greater contrast between the light and dark areas of your shapes, as well as allowing for over-saturated light. ShowTool Pro enables you to toggle the Lighting Pack code changes on and off in real-time. Even if you don't own the Lighting Pack you may still see its affect within ShowTool Pro.

To turn the Lighting Pack on and off, you may either use the *Enable Lighting Pack* button in the toolbar at the top of the main window:

Or you could use the *Synapse Gaming Lighting Pack* checkbox in the LIGHT PROPERTIES window:

To see a comparison of the Orc with and without the Lighting Pack enabled, please see the series of pictures at the bottom of the first page of this tutorial. For tips on using the Lighting Pack, please see the *Light Properties Button and Window* section of the *Command & Properties Butons* chapter.

Using Environmental Mapping

The TGE allows you to setup a shape's materials to reflect an environmental cube map. The choice of which materials will be reflective and by how much is determined at the time of export from your 3D animation or modeling software. ShowTool Pro allows you to check a shape's materials using any bitmap as the reflection.

To enable environmental mapping we need to set which bitmap to use. Click on the *Display Properties* button at the left of the main window.

This will open the DISPLAY PROPERTIES window. Make sure you have the *Render* tab selected at the top of the window. Just under the tabs are the environmental map controls. To select an environmental map, click on the *EMap* popup.
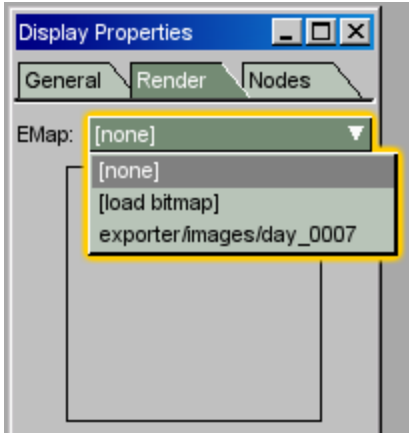
ShowTool Pro provides you with a default environmental map – it's a still from the sky of the starter.fps kit. Select the day_0007 image. The selected image will be shown below the popup.

If you were to now take a look closely at the Orc (you may need to zoom the camera in) you can see that the "metal" surfaces have changed. The emap is most apparent on the Orc's back and when the camera is in motion.

To load in one of your own images, select the [load bitmap] option from the *EMap* popup. This will open the LOAD FILE... window.
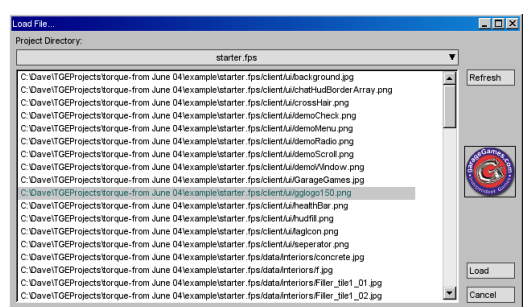
Make sure you have the appropriate project directory selected at the top of the window (please see *Tutorial 1* or the *Reference* section on how to set up project directories). Then choose the image file and click on the *Load* button. A thumbnail of the selected image is displayed to the right within the LOAD FILE... window.

The bitmap display under the *EMap* popup will change to your newly loaded image file if it was successfully loaded. When you want to turn off environmental mapping, select the [none] option of the *EMap* popup.

To toggle environmental mapping, it is also possible to use the *Environment Mapping* button in the toolbar at the top of the main window.

If this is the first time you click on the *Environmental Mapping* button in a ShowTool Pro session, then the LOAD FILE... window will open for you to select an image to use. Once you've selected an image (or you've selected the default image from the *EMap* popup), then the *Environmental Mapping* button will toggle the mapping on and off. You'll need to go through the *EMap* popup whenever you wish to load in a new image.

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That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

TUTORIAL 5: MOUNTING A WEAPON

In your game you'll very often want to place an object in a player's hand – such as a weapon – or somewhere else on their body. The TGE allows an artist to set up *mount points* within the DTS object. In Torque ShowTool Pro, these mount points are considered just another node, and it is possible to mount any loaded object to any node of the current shape. This tutorial steps you through mounting a weapon onto a player's shape to check that everything lines up.

Loading the Shapes

We'll begin by loading in the TGE Orc. Use the *Load DTS & CS* button you read about in *Tutorial 2: TSShapeConstructor Files* to load in the player.dts file and its animation sequences from the TGE demo game. Next, load in the shapes/crossbow/weapon.dts file also from the TGE demo game. You should now have both shapes in ShowTool Pro, and may switch between them either using the *Current Shape* popup in the upper right corner of the main window, or the *page up* and *page down* keyboard shortcuts.
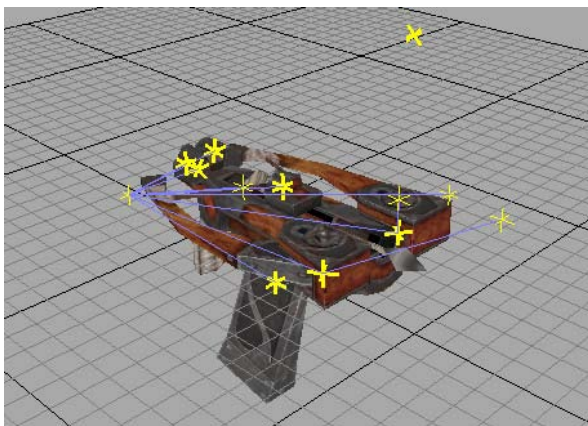
TGE Orc crossbow as it looks when first loaded in.

Mounting the Crossbow

By convention in the TGE, a player's main weapon is mounted onto a node named *Mount0*. We want to make sure that the Orc has such a node, so switch back to the Orc shape in the 3D view. Using the *Nodes* popup list at the bottom of the main window, find the Mount0 node and select it.

This will select the node in the Orc's right hand, which looks correct.
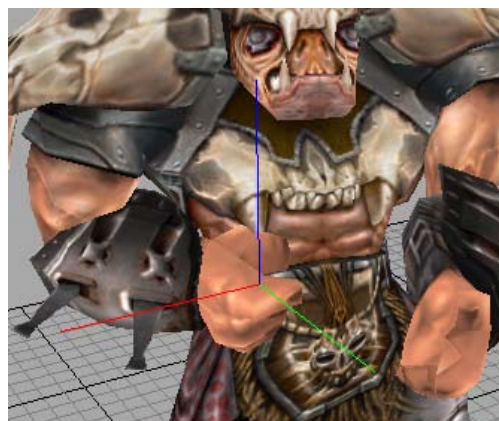
We're now ready to mount the crossbow onto the Orc's Mount0 node. All mounting operations are performed using the MOUNTING window. To open the window, click on the *Mount Objects* button at the left of the main window.

List of mounted objects

Current shape's (Orc) nodes

Nodes from object to mount (crossbow)

At the bottom of the MOUNTING window are two lists. The left listing contains all of the nodes that belong to the object to be mounted. To selected this object from all of the currently loaded shapes, use the popup above the left list – select the crossbow for this tutorial. A node from the left list should now be selected.

Usually in the TGE, an object to be mounted has a node named *mountPoint*. For a weapon, this represents the point that will be placed into the player's hand at Mount0. However, having a mountPoint node is not a requirement. If this is the case, then the object's origin in the world is used as the mount point. In the case of the Orc's crossbow, it does not have a mountPoint node (it doesn't exist in the left list), so we'll need to use the object's origin instead. To do so, select the special [origin] item in the left list.

The next step is to select the node to mount on to from the current shape. All of the current shape's nodes are in the list on the right with the heading *Current Object*. Find the Mount0 item in the list and select it.

The final step is to perform the mount itself. Between the two lists are a number of buttons, each of which performs a special type of mount depending on the circumstances. For the Orc's crossbow – and for most objects in general – we'll be using the *Mount >>>* button at the top. Using this method looks to both lists to determine the nodes to mount from and to, and attaches the mounted object without any special transforms. Clicking this button will add an entry to the top of the MOUNTING window's *Mounted Object* list. This list provides the object that was mounted and the node it was mounted to.

If you now close the MOUNTING window, the Orc will have his crossbow in-hand.

You'll notice that while the Orc is indeed holding his crossbow, it doesn't look the same as it does in the TGE demo game. This is because the crossbow is in its inactive pose, which we'll change next.

Animating the Crossbow

When Torque ShowTool Pro mounts an object, it uses whatever pose that object was last left in. In the case of the crossbow, it is in the same pose in which it was loaded – all closed up. We'll now change it to its active pose.

Switch to the crossbow shape in the 3D view. Using the *Sequences* popup at the bottom of the main window, make sure the activate animation sequence is selected – it was likely selected at load time.
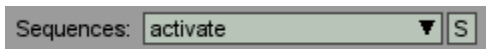
Now using the timeline slider at the bottom right of the main window, use the mouse to drag the slider itself all the way to the right. It will read with a value of 1.0.
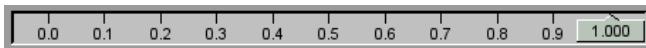
The crossbow will now have opened up in to its active pose:
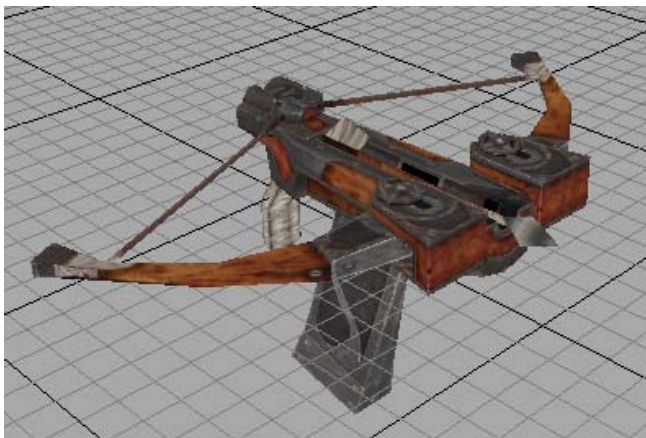
Now switch back to the Orc shape and you'll see that the Orc's crossbow looks just like it does in the TGE demo game.

Animating the Orc

All mounted objects will remain attached to their node, even if the node moves during an animation sequence. Let's play one of the Orc's sequences and make sure that the crossbow follows along.

Using the *Sequences* popup at the bottom of the main window, select the death1 animation. This is one of the many death sequences that may play during the TGE demo game when a player is shot down. It will only play through once and then stop – otherwise the poor guy would keep dying over and over.

With the death sequence selected, click on the Play Forward button at the bottom right of the main window.

As the death sequence plays, you'll notice that the crossbow remains in the Orc's hand, attached to the Mount0 node.

Unmounting Objects

When it comes time to remove the mounted object from the current shape, you'll use the unmount feature of the MOUNTING window. Underneath the *Mount Object* list are two buttons. With the
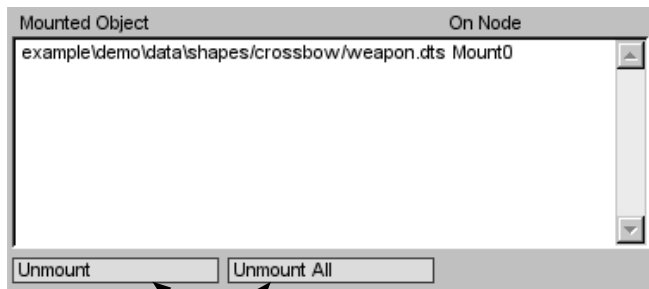
mounted object selected in the list, clicking on the *Unmount* button will remove it from the current shape's node. In our case, selecting the weapon. dts item in the list and clicking on the *Unmount* button will remove the crossbow from the Orc's hand.

Using the *Unmount All* button will remove all mounted objects from the current shape without having to select each of them.

Toggling All Mounted Objects

There will be times when you want to toggle all mounted object on and off without actually unmounting them. To do so, use the *Draw Mounted Objects* button in the toolbar at the top of the main window.

With the crossbow still in the Orc's hand, using this button will turn its drawing off and on.

❧

That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

Buttons to unmounted selected object

Tutorial 6: Mounting Wheels on a Vehicle

Within the TGE, wheeled vehicles are divided into at least two separate shapes: the body and the wheels. The body defines where the wheels are to be mounted on the vehicle chassis using a series of *hub* nodes, and may optionally add animated shocks and steering. The wheels need to be built with a special orientation that allows them to roll in-game.

Torque ShowTool Pro provides various means of mounting wheels onto TGE vehicle shapes to check that everything looks good before entering the game. This tutorial steps you through the mounting process and assumes that you've already completed all previous ShowTool Pro tutorials.

Loading the Shapes

We'll begin by loading in the TGE buggy from the TGE racing demo game. With your project directory set up to point to the starter.racing directory, load in the buggy.dts file. This is the vehicle body that we'll be mounting our wheels to.

Next, load in the wheel.dts file. This is the wheel to be mounted to each of the hubs. If you rotate the wheel in the 3D view, you'll notice that it has a front and a back – the front has an extruded hub while the back is flat. When mounting the wheel, we'll need to make sure that the front always points away from the vehicle's chassis.
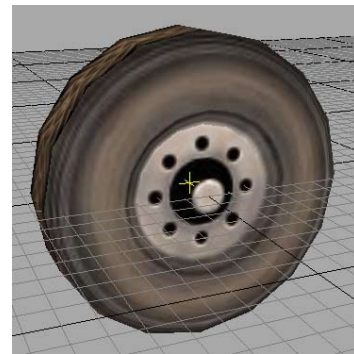
Mounting the Wheel

As with mounting a weapon to a player, all mounting of wheels to a vehicle is performed using the MOUNTING window. With the buggy as the currently viewed object, open the MOUNTING window. Select the wheel as the object to mount using the popup at the left, and [origin] as its mount node. In the *Current Object* list to the right, select the *hub0* node. Now, rather than clicking on the *Mount >>>* button, we'll choose from the buttons below it.

Mount wheel with correct orientation for the left side of the vehicle

Mount wheel with correct orientation for the right side of the vehicle

Automatically mount wheel object onto all hub nodes

The hub0 node is located on the left side of the buggy (you may find this out by selecting the hub0 node from the *Nodes* popup and see where it is in the 3D view). Click on the *Mount Left* button to attach the wheel to the hub and have it face away from the chassis.

If you were now to select the hub1 node in the *Current Object* list and click on the *Mount Right* button, the wheel will be mounted on the right side of the vehicle in the correction orientation.

You would then follow the same steps to mount the remaining wheels. Using this method, it is also possible to mount different wheel objects to each vehicle hub – such as putting large wheels on the rear.

However, if you wish to mount the same wheel object to all of the vehicle's hub nodes, then there is an easier method. With the buggy still in view, open up the MOUNTING window and click on the *Unmount All* button to remove any mounted objects. Now, with the wheel's [origin] item selected in the left list, and anything (or nothing) selected in the right list, click on the *Mount Wheels* button. Torque ShowTool Pro will search through the current object, automatically find all hub nodes and mount the wheel.
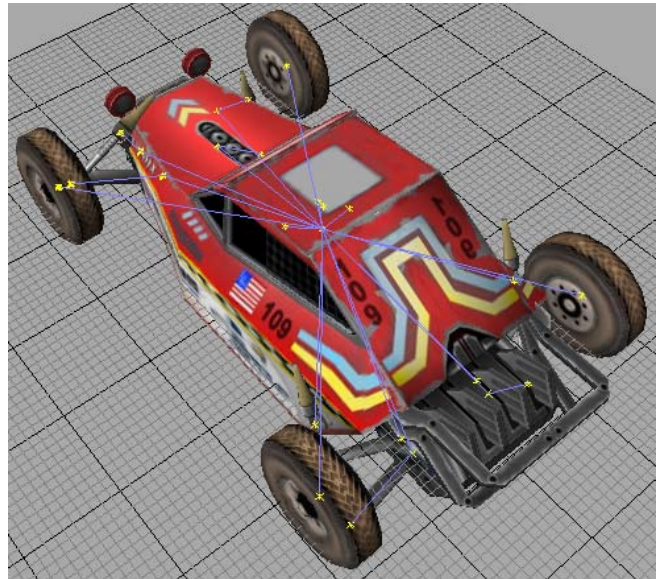
Easy peasy lemon squeezy!

❧

That covers all of the material for this tutorial. Please see the other tutorial sections for more examples on using Torque ShowTool Pro, or the *Reference* section for a detail explanation of all controls and windows.

REFERENCE SECTION

FILES AND IMAGES

Configuration Files

As you use Torque ShowTool Pro you'll make a number of changes to the installed setup. The philosophy behind ShowTool Pro is to maintain its setup between sessions, unless it would confuse the user when they come back in a couple of weeks. An example of what is stored are the lighting and background colors. An example of what is not stored is the camera's rotation and position as it may not be usable when the next object is loaded in – it may load in out of view. These between session settings are stored in the configuration files.

In general, you will not need to edit the configuration files. However, it is good to know how to go back to the default settings in case something happens to the custom file. The two files of interest are:

• exporter/cprefs.cs
• exporter/cprefs.cs.dso

To go back to the default settings, both of these files will need to be deleted while ShowTool Pro is not running. Once they have been trashed, the next time ShowTool Pro is restarted it will look to the default configuration and rewrite these files when the program is quit.

Please note that it is not recommended that the user modify any other files, even if they are stored in plain text.

Supported 3D File Formats

ShowTool Pro was written to compliment Garage-Games' Torque Game Engine and its three space file formats. This currently encompasses the DTS and DSQ file extensions.

The DTS file format is the mainstay of the TGE. It is used for the player's shape and many of the objects that players interact with. Some of the supported features include:

• Skeleton-based animation
• Vertex-based (morph) animation
• Mesh visibility changes over time
• Code and script triggered events based on animation timings
• Transparent and detail textures
• Discrete levels of detail and automatic creation of billboard detail levels
• Sub-meshes for collision detection

A DTS player shape – Gnome by David Wyand

The DSQ file format is mainly used as an external method for storing skeleton-based animation. In this way the same animation sequence may be applied to multiple DTS shapes within the game – the limitation being that the skeleton structure

between shapes must be identical. ShowTool Pro allows you to first load in a DTS object and then apply any number of DSQ files to the shape.

ShowTool Pro also supports a third file type used with 3D objects: the TorqueScript .cs file. While not a 3D file format itself, a TorqueScript file may contain a reference to the TSShapeConstructor datablock. This is used to automatically assemble a DTS file and a number of DSQ files together at load time. The *Tutorial 2: TSShapeConstructor Files* chapter goes into more detail for those that are interested.

Supported Image File Formats

Torque ShowTool Pro supports all of the same image file formats that the TGE does. The supported file extensions are: jpg, png, gif, dbm, bmp, bm8. The dbm and bm8 file formats are unique to the TGE and are rarely used. Please refer to the TGE documentation or source code for further information.

The png, gif and dbm image formats support an alpha channel (RGBA) to allow for transparency. While the jpg format doesn't directly support an alpha channel, Torque ShowTool Pro (and the TGE) will create one at load time if it finds a grayscale (1 byte per pixel) jpg with an extension of .alpha.jpg. For example, if there was a file named skin.jpg, a search would be performed at load time for another file named skin.alpha.jpg. If found, the two would be combined becoming the RGBA format.

Texture Memory Footprint

Something to keep in mind when you're creating a new texture is the amount of memory it will consume on the 3D graphics card. There is no compression applied to the texture when in memory, so file size is not a true indicator.

In addition, OpenGL uses a process known as Mip Mapping that scales a texture down for when it is to be rendered smaller on the screen. This saves processing time while rendering polygons at the expense of memory usage. All of this is stored in graphics card memory.

So, how large is that 256x256 color texture?

Base image: 196,608 bytes (256x256x3)
1st mip map: 49,152 bytes (128x128x3)
2nd mip map: 12,288 bytes (64x64x3)
3rd mip map: 3,072 bytes (32x32x3)
4th mip map: 768 bytes (16x16x3)
5th mip map: 192 bytes (8x8x3)
6th mip map: 48 bytes (4x4x3)
7th mip map: 12 bytes (2x2x3)

Total size: 262,140 bytes

And what about a 512x512 color texture?

Base image: 786,432 bytes (512x512x3)
Same mip maps as above: 262,140 bytes

Total size: 1,048,572 bytes

Many 3D graphics card support even larger texture sizes. Want to use a 1024x1024 color texture for your player?

Base image: 3,145,728 bytes (1024x1024x3)
Same mip maps as above: 1,048,572 bytes

Total size: 4,194,300 bytes

And what if you also have an alpha channel? Then each dimension is x4 instead of x3…

GRAPHICAL INTERFACE INTRODUCTION
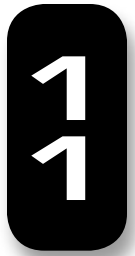
Torque ShowTool Pro has been architectured such that anyone that is familiar with typical 3D modeling and animation software should be able to immediately jump in and start using it. Its most prominent feature is the large 3D view where you may manipulate your objects using the mouse to check out every angle and detail. Its as close as you may get to seeing your shapes as they will appear in a TGE game without having to actually load them into a game.

Torque ShowTool Pro's Interface. Head DTS model by Joe Maruschak

Torque ShowTool Pro's World

As Torque ShowTool Pro is based on GarageGames' Torque Game Engine, it follows the same conventions. The world is defined by three axis: X, Y and Z. Looking down the Y axis, the X axis runs from left to right, the Y axis from back to front, and the Z from down to up.
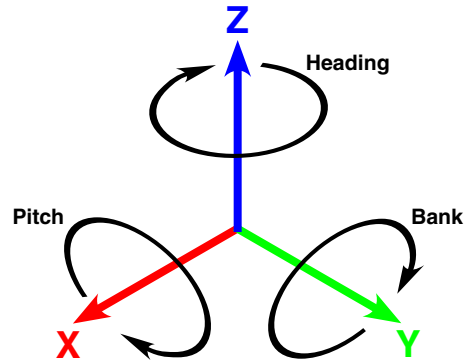
Positive directions of the world axis and the rotations about each axis.

Typically you would have your player or vehicle model face down the Y axis as this is the direction of travel within the TGE. By default then, ShowTool Pro will rotate the camera such that you are looking at the shape with it facing you – just like the diagram above.

The origin (center) of the world exists at (0, 0, 0), where all three axis meet. If you have the grid enabled, it is centered on the world origin.
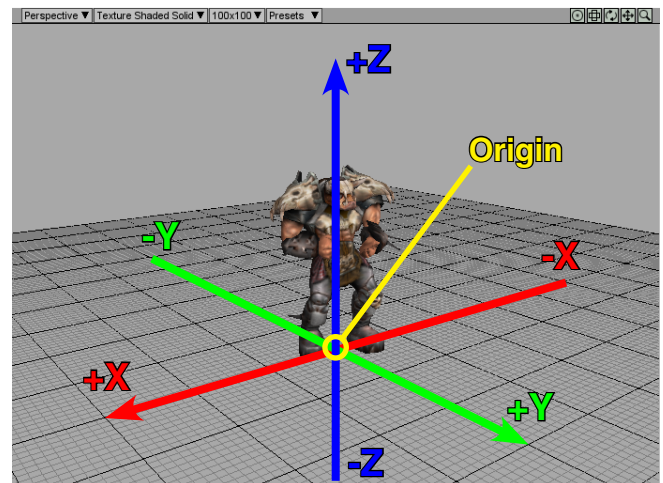
Your View of the World

Your view into the Torque ShowTool Pro world is through a camera. With a shape loaded, it is possible for you to move, rotate and zoom this camera about the object. You may also adjust the camera's field of view (FOV) – from narrow like looking through a telescope, to wide such as seeing through a fish eye lens.

When you first start up Torque ShowTool Pro, your seeing the world in a forced *perspective*. As objects move farther away from the camera, they appear smaller. This is typically the view in a 3D game so you'll spend most of your time using the perspective display.

ShowTool Pro also supports a number of *orthographic* displays. These are two dimensional representation of the world. The picture below shows the Right (YZ) camera view – a view down the negative X axis.

These orthographic displays are similar to what you would find in typical 3D modeling and animation software. They allow you to see the true form of a shape without the distortions involved in a perspective view.

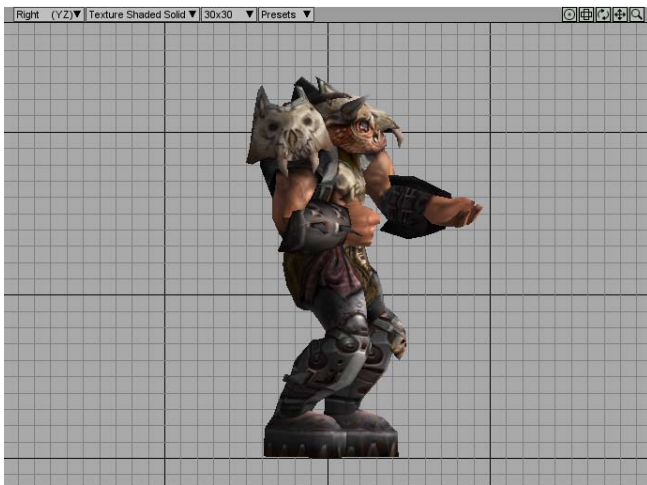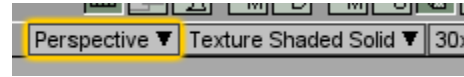To change the camera's view, or projection, use the *Camera Projection* popup at the top left of the 3D view – it is labeled with the current camera view.

The following table lists all of the available camera views:

Camera Projection Type	Description
Top (XY)	Looks down neg-Z axis
Bottom (XY)	Looks down pos-Z axis
Front (XZ)	Looks down neg-Y axis
Back (XZ)	Looks down pos-Y axis
Left (YZ)	Looks down pos-X axis
Right (YZ)	Looks down neg-X axis
Perspective	Forced perspective

The two axis designations in brackets for each orthographic display are the two axis that are visible with the chosen projection. The third, missing axis is the one that the camera will sit on. For example, the Front (XZ) projection will draw only in the X and Z axis (it is a 2D projection), and the camera will sit on and look down the Y axis.

Be aware that while viewing an orthographic projection that it will not be possible to rotate the camera; only move and zoom it. As an orthographic projection is 2D, there is nothing to rotate around.

Manipulating the Camera

The ShowTool Pro camera may be manipulated in a number of ways. It may be rotated, moved, zoomed, and its FOV may be modified. These actions may be performed using a combination of mouse buttons and keyboard modifiers, as well as through a number of buttons at the top of the 3D view. The following is a list of all possible camera controls.
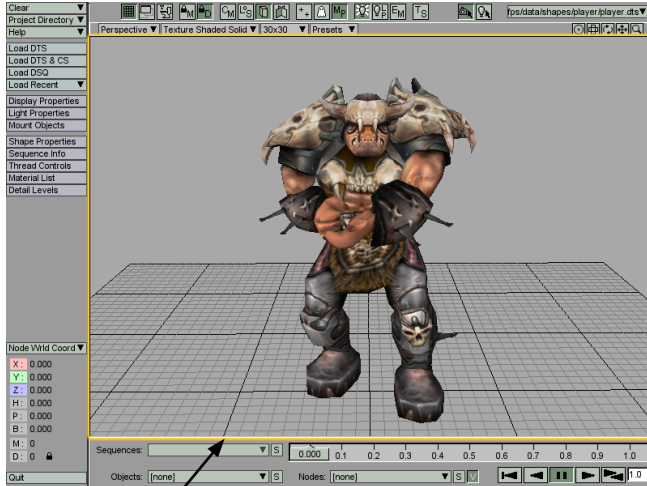
To control the camera with the mouse, hold down a mouse button and drag within the 3D view

Rotating the Camera

Perspective view: Hold down the left mouse button or the only button on a single button mouse within the 3D view and drag.

Orthographic view: The orthographic view does not support camera rotation.

Camera control button: Hold down the left mouse button on the *Rotate Camera* button and drag the mouse.

While the camera is being rotated, a colored axis will be drawn in the center of the 3D view indicating the world's orientation. This axis may be disabled from the *Render* tab of the DISPLAY PROPERTIES window.

Camera Rotation Axis

Translating the Camera

Translating, or moving the camera is done relative to the current facing of the camera.

Perspective view: Hold down the right mouse button or CTRL and the only button on a single button mouse within the 3D view and drag.

Orthographic view: Same as perspective view.

Camera control button: Hold down the left mouse button on the *Translate Camera* button and drag the mouse.

While the camera is being moved, a colored axis will be drawn in the centre of the 3D view indicating the world's orientation. This axis may be disabled from the *Render* tab of the DISPLAY PROPERTIES window.

Camera Translation Axis

Keyboard modifier: If the SHIFT key is held down while translating the camera, the camera will move faster.

Zooming the Camera

Zooming the camera actually moves it in the direction it is facing towards or away from the object rather than performing a true zoom. A true zoom would modify the camera's FOV, just like a real camera.

Perspective view: Use the mouse wheel while the mouse pointer is within the 3D view. For a mouse without a mouse wheel, hold down the Command key on the Mac or the ALT key under Windows, hold down the left mouse button in the 3D view and drag.

Orthographic view: Same as perspective view.

Camera control button: Hold down the left mouse button on the *Zoom Camera* button and drag the mouse.

Keyboard modifier: If the SHIFT key is held down while zooming the camera, the camera will zoom faster. If the SHIFT and CTRL keys are held down while zooming, the camera zooms even faster.

Recenter the Camera

If the object has been moved off screen and you cannot find it again, or you've zoomed out too far, you may recenter the object in the camera's view.

Camera control button: Click the left mouse button on the *Recenter Object* button.
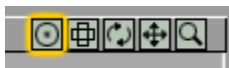
Keyboard shortcut: Pressing the "a" keyboard shortcut is the same as clicking on the *Recenter Object* button.

Modifying Camera FOV

The camera's field of view (FOV) may be changed from a wide angle (like a fish eye lens) to a narrow angle (like a telescope). To modify the FOV, click on the *Modify Field of View* button and drag the mouse.

While modifying the camera's FOV, its current value, in degrees, is displayed underneath the camera control buttons. This allows you to match ShowTool Pro's FOV to the one in your game.

Rendering Modes

Torque ShowTool Pro allows you to view your shapes using a number of rendering modes. These range from what your shape will look like in your game to a number of utility modes to check that your shape has been exported correctly from your 3D application. Use the *Rendering Mode* popup at the top of the 3D view to change how your shapes will be drawn – it is labeled with the current rendering mode. What follows is a description of each of the rendering modes.
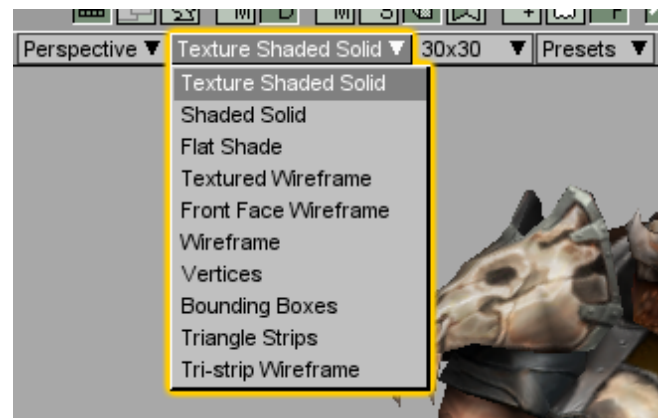
Texture Shaded Solid

This rendering mode matches exactly how the TGE draws its objects, which makes it the most widely used.

Shaded Solid

The Shaded Solid rendering mode draws the shape without any textures applied. This helps to give a sense of the vertex shading over the object without the texturing getting in the way.

Flat Shade

This rendering mode also draws the shape without any texturing applied. It draws each triangle in the object without any smoothing, giving it a faceted look.

Textured Wireframe

The Textured Wireframe rendering mode is similar to the Texture Shaded Solid mode with the addition of drawing the polygon edges onto the shape.

Front Face Wireframe

This rendering mode is similar to the Shaded Solid mode with the addition of drawing the polygon edges over the shape.

Wireframe

The Wireframe rendering mode draws only the polygon edges of the shape, allowing you to see through to the back.

Vertices

This rendering mode only draws the vertices of each of the polygons.
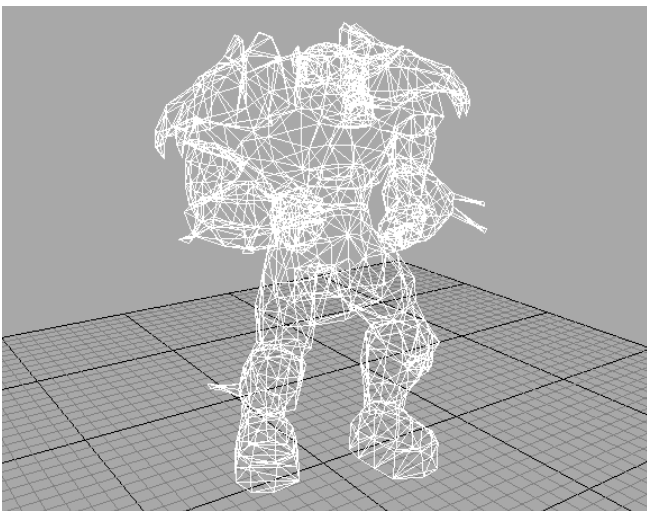
Bounding Boxes

This rendering mode draws each of the individual object's bounding volumes. It is most effective when the shape is segmented, like the Torque Guy below (texture shaded and bounding boxed).
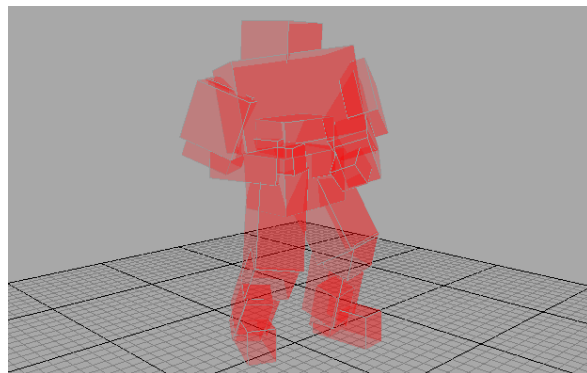
Triangle Strips

If the viewed shape makes use of triangle strips to improve rendering performance, the Triangle Strips rendering mode shows how the shape has been strippified. Each strip is drawn in its own color. If the shape does not contain triangle strips then each polygon will be given its own color.
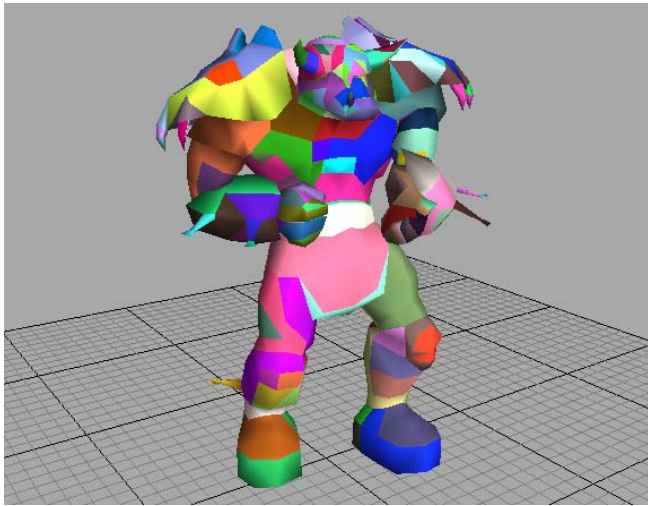
Tri-strip Wireframe

This rendering mode is the same as the Triangle Strips mode with the addition of the polygon edges being drawn over the shape.
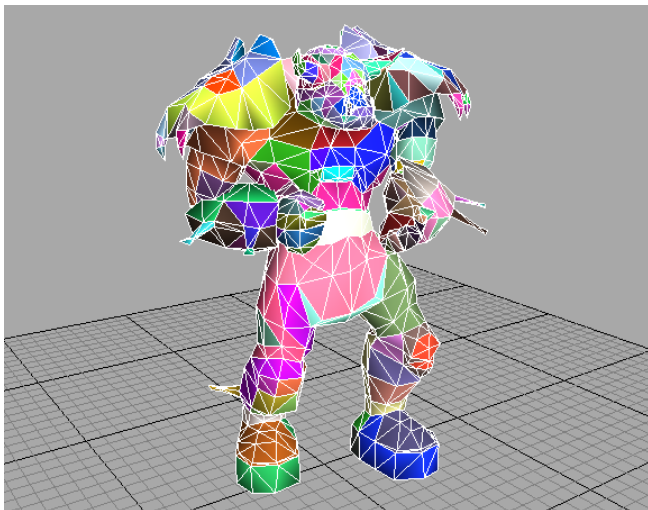
Rendering Mode Properties

Some of the drawing methods used in the rendering modes may be modified. These parameters may be found under the *Render* tab of the DISPLAY PROPERTIES window.
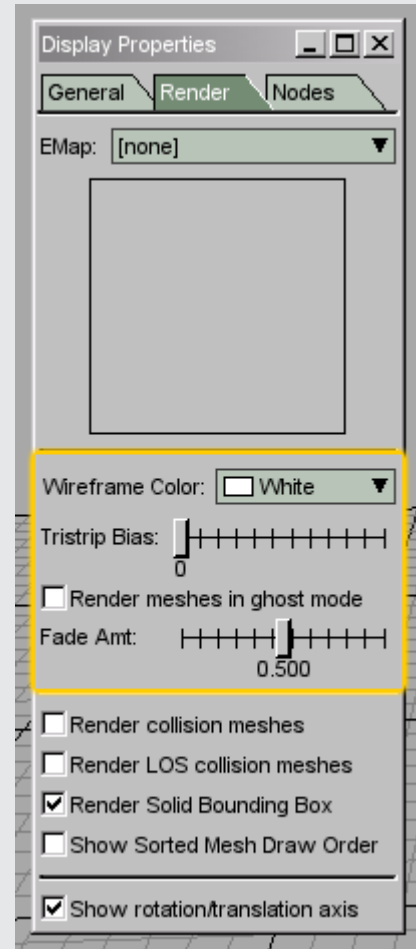
Please see the section dealing with the DISPLAY PROPERTIES window for more information.

Rotating the Light

Lighting within Torque ShowTool Pro is performed by ambient (background) light and a single directional light, both of which may be turned on or off from the LIGHT PROPERTIES window (Please see the *Command & Properties Buttons* section for more information on the LIGHT PROPERTIES window). The directional light may be rotated about the center of the viewed shape using the mouse within the 3D view.
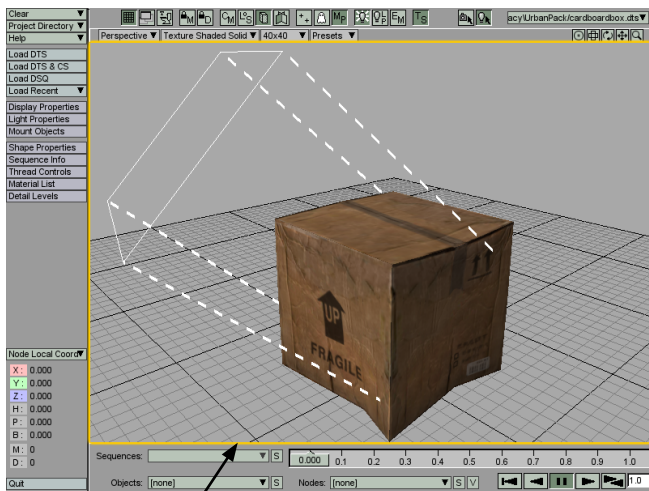
To control the directional light with the mouse, hold down the mouse button and drag within the 3D view while light manipulation mode is active. DTS object courtesy of Weston Tracy: Urban Pack.

Normally the mouse controls the camera's rotation when its left button is held within the 3D view. To instead rotate the directional light, light rotation mode must be turned on.

There are two methods that may be used to turn on light rotation. The first is to hold down the "l" keyboard shortcut. With this key held down, the directional light's *lightbox* is drawn within the 3D view in the same color as the light. The mouse may now be used to rotate the light rather than the camera. Releasing the "l" key returns mouse control to the camera.

The second method used to rotate the directional light is to activate the *Mouse Controls Light* button in the toolbar at the top of the main window:

With this mode active, the mouse will now rotate the light rather than the camera. Please note that it is still possible to translate and zoom the camera while in light rotation mode. To switch back to controlling the camera, either press the "l" keyboard shortcut to turn off the light mode, or use the *Mouse Controls Camera* button in the toolbar at the top of the main window:

Resizing the Graphical Interface

Torque ShowTool Pro first opens itself with a size of 800x600 pixels. This may be too small or too large for the work at hand so it allows you to resize its window just like any other application.

Running under both Mac OSX and Windows, the OS minimize and maximize buttons in the Show-Tool Pro's window title bar are functional. This is a quick method to make the display as large as possible. For more control over the size of the window the method depends on the operating system you are using.

Under Mac OSX, the bottom right corner of the window is used to resize the window with the mouse, just like any other OSX application.

Hold mouse button down in this corner to manually resize the window.
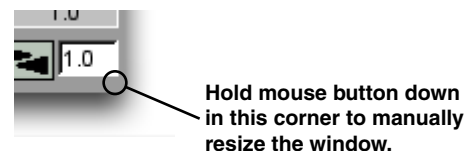
Under Windows, any of the edges may be used to resize the window, just like any other Windows application.

If the Torque ShowTool Pro window is made too small, some of the controls will no longer be visible. When this occurs, the word "more" appears where the controls became hidden.
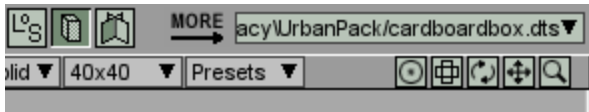
The window has been made smaller and some of the toolbar's buttons are no longer visible, as indicated by the "more" text.
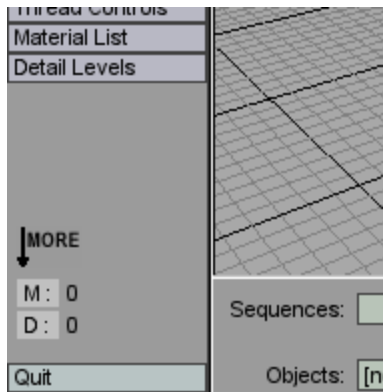
The window has been made smaller and the item coordinates controls are no longer visible, as indicated by the "more" text.
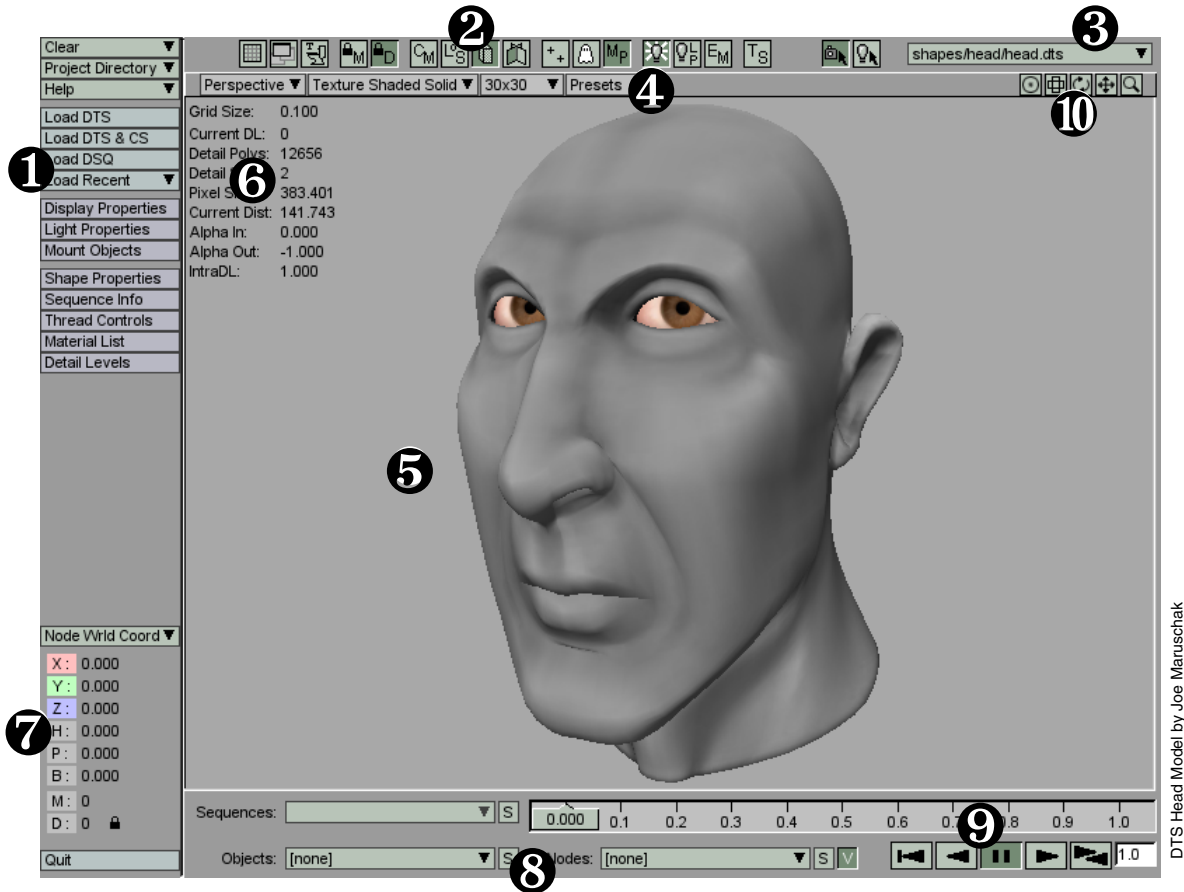
DTS Head Model by Joe Maruschak

Graphical Interface Layout

The Torque ShowTool Pro graphical interface may be divided into a number of sections. While some of these controls have already been covered, following chapters will focus on the remaining areas.

❶ Command & Properties buttons

❷ Toolbar buttons

❸ Current Shape popup – lists all of the loaded shapes and may be used to switch between them.

❹ Presets popup

❺ 3D view – where your shape is drawn

❻ Heads-up display (HUD)

❼ Item Coordinates popup, Mip Map lock, and Level of Detail lock

❽ Object and Node popups

❾ Animation sequence selection and playback

❿ Camera Control buttons

COMMAND & PROPERTIES BUTTONS

12

The command and properties buttons reside at the upper left of the main window. They are used to load and inspect objects and animation sequences, and to change the settings of Torque ShowTool Pro. This section steps through each of the buttons and discusses the various windows that are open by them.

Command & Properties Button's Location. Abrams tank courtesy of the BraveTree: Tank Pack.

Clear Popup

Clicking on the *Clear* popup presents its list of options.
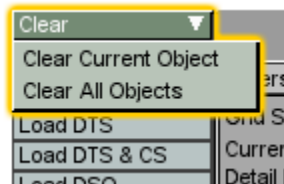
Selecting the Clear Current Object choice will unload the currently displayed object and display the next shape in the *Current Shape* popup's list.

Choosing the Clear All Objects item will unload all shapes from Torque ShowTool Pro.

Project Directory Popup

The *Project Directory* popup is used to create and select from a list of locations that contain your shapes.

Select to create a new project directory

Your project directories

A project directory could be the topmost level of your game directory hierarchy or a directory that contains only a few shapes. Whatever directory you select, ShowTool Pro will look in all subdirectories for objects when it comes time to load them in.

Selecting the [modify] item (the only choice available if this is the first time you've started Show-Tool Pro) will open the MODIFY PROJECT DIRECTORIES window.
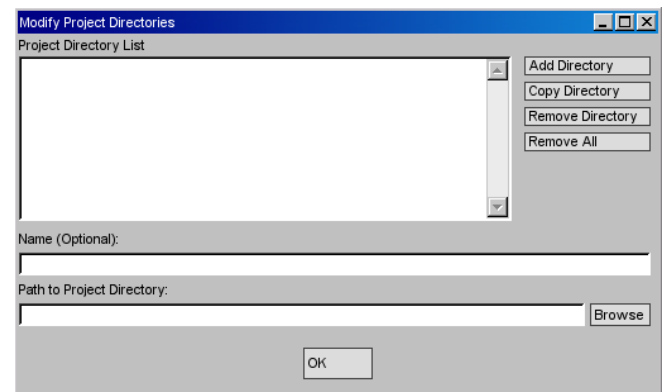
Below is a description of each of the controls on the window:

Project Directory List: This contains a listing of all user defined project directories. It shows the OS pathway to the directory and the optional name if one was given.

Add Directory: This button will add a new directory to the list and give it the default pathway of "new directory project" in the *Path to Project Directory* text field, which you'll want to change.

Copy Directory: This button will copy the selected project directory and place it at the bottom of the list.

Remove Directory: This button will delete the selected directory from the list.

Remove All: This button will delete all directories from the list. A window will open to confirm that you wish to do this.

Name (Optional): This text field is used to enter an optional name for the selected project directory. This is useful if the directory pathway itself is too long or not descriptive.

Path to Project Directory: This text field is used to enter in the OS specific pathway for the selected project directory. Alternatively, you may also use the *Browse* button to the right. This will open an OS standard window allowing you to select the directory pathway from the list.

Please see the *Getting Started with Torque ShowTool Pro* section for an example walk-through of setting up a project directory.

Help Popup

The *Help* popup provides access to a number of resources to help in using Torque ShowTool Pro.
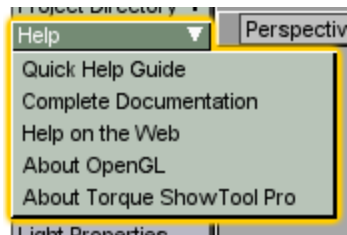
Quick Help Guide: Selecting this item will open your web browser to a quick reference guide that is located in the Torque ShowTool Pro directory.

Complete Documentation: Selecting this item will open the manual you are now reading.

Help on the Web: Choosing this item will open your web browser to the Torque ShowTool Pro message board at the GarageGames site. Here you may ask any questions you have regarding the product.

About OpenGL: Selecting this item will open a new window displaying various properties about
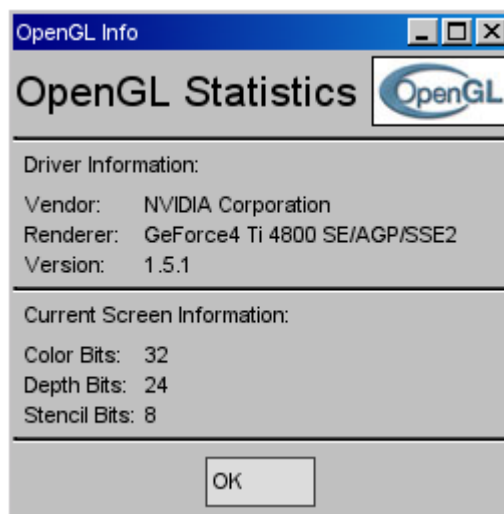
Sample About OpenGL window from a computer using a nVidia video card. OpenGL logo used with permission.

your computer's OpenGL setup, such as graphics card type and the driver's supported OpenGL version.

About Torque ShowTool Pro: Choosing this option will open a new window displaying information about the ShowTool Pro product.

Load DTS Button

The *Load DTS* button is used to load in a DTS file from a predefined project directory.
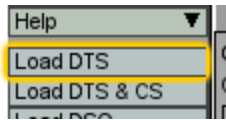
Using the *Load DTS* button will open the LOAD FILE... window.
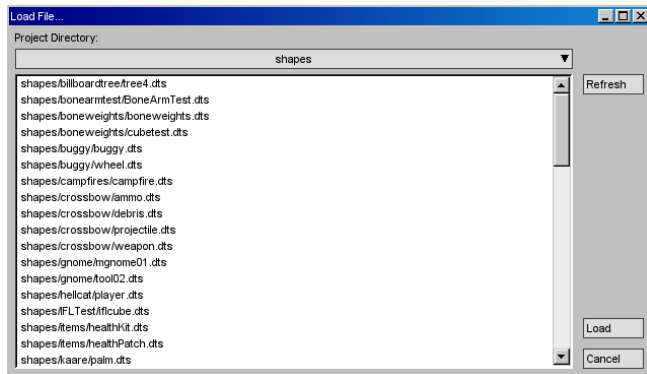
From this window, select one of the listed DTS files and click on the *Load* button. To dismiss the window without loading a file, click on the *Cancel* button.

If you're currently viewing the wrong project directory, you may use the *Project Directory* popup at the top of the window to select the correct one. Finally, if you've created a new DTS file in the current project directory while ShowTool Pro was running, click on the *Refresh* button to reload the file listing (the file listing is cached during the session).

Load DTS & CS Button

The *Load DTS & CS* button is used to run a DTS file's script prior to loading in the DTS file.
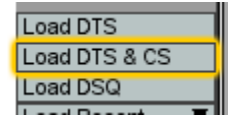
Clicking on this button will open the same LOAD FILE... window as using the *Load DTS* button does. The difference is that before loading in the DTS file, ShowTool Pro searches for a script file with the same base name as the DTS file within the same directory. If this script file is found it is compiled and executed. If it is not found, a window will open warning the user of the situation and then continue to load just the DTS file.

For example, if the player.dts file is selected and the Load button clicked, ShowTool Pro will search for a script file named player.cs, compile and execute it, and then load in player.dts.

Typically a DTS's script file contains a TGE TSShapeConstructor datablock. This datablock defines a list of DSQ files that are automatically loaded with the DTS file. Within Torque ShowTool Pro, this saves the user from having to manually load them. It is also how DTS and DSQ files are tied together within the TGE. Please see *Tutorial 2: TSShapeConstructor Files* for more information and examples.

Load DSQ Button

The *Load DSQ* button is used to load in individual DSQ files and apply them to the currently viewed shape.
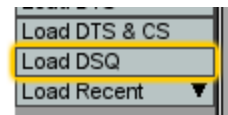
Clicking on the *Load DSQ* button will open the Load File... window displaying a list of DSQ files from the current project directory.
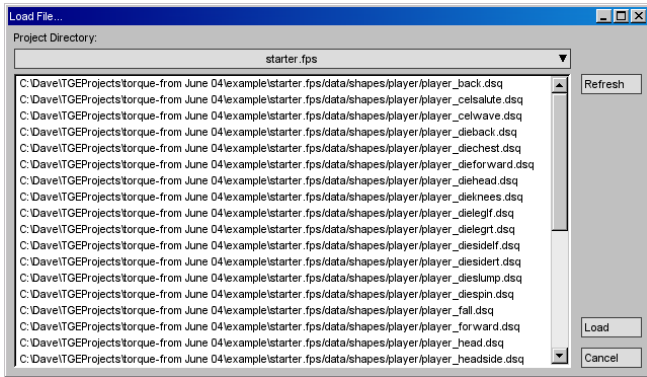
Select a DSQ file from the list and click on the *Load* button to attach it to the currently viewed shape. To close the window without loading a DSQ file, click on the *Cancel* button.

If the current project directory is not the one you want, use the *Project Directory* popup at the top of the window to select a different one. If you've created a new DSQ file while Torque ShowTool Pro is running, click on the *Refresh* button to reload the file list.

If you attempt to load a DSQ file without first having a DTS file in the 3D view, ShowTool Pro will warn you that you first need to have a DTS file loaded.

Load Recent Popup

The *Load Recent* popup lists the last five DTS files that were loaded.

This list is sorted with the most recently loaded shape at the top. Selecting one of the list's items will load it into ShowTool Pro as if the *Load DTS* button were used. If a [cs] tag appears to the right of the DTS's file name, then it will be loaded as if you clicked on the *Load DTS & CS* button. There's no need to worry about project directories when using the *Load Recent* popup – the correct project directory will be used.

Display Properties Button and Window

The *Display Properties* button is used to open the Display Properties window. From here, a number of display settings may be modified.
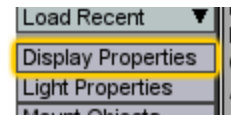
The Display Properties window has three tabs along its top: *General*, *Render* and *Nodes*.
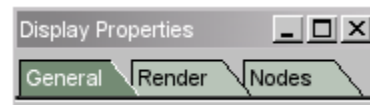
Each of these tabs and their controls is described in detail below.

General Tab

The *General* tab contains a number of controls that modify various areas within Torque Show-Tool Pro. These controls are divided into four categories from top to bottom: grid, background, HUD, and miscellaneous.

General Tab – Grid

The grid within ShowTool Pro is very similar to what is available in typical 3D applications. It is used as a reference point within the world – starting at the origin – drawn within the 3D view on the plane defined by the XY axis.
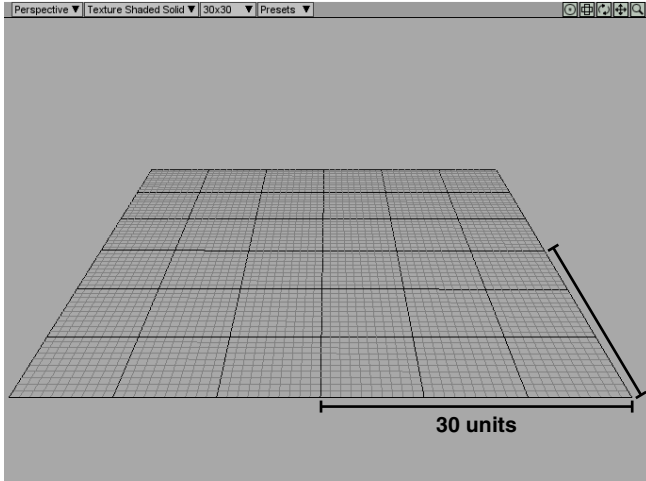
A 30x30 grid in the 3D view

The grid's controls reside at the top of the *General* tab.
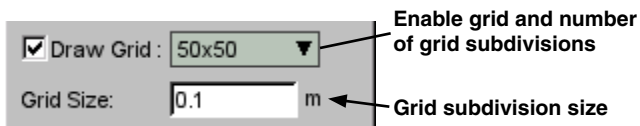
The *Draw Grid* checkbox is used to toggle the grid on and off. A button also exists in the toolbar to toggle the grid's display:

The popup to the right of the *Draw Grid* checkbox is used to modify the grid's size. The grid is made up of blocks of 10 subdivisions, with each square of 10 outlined with a dark line. The number in this *Grid Subdivisions* popup is the number of subdivisions that will be drawn along each axis. For example, selecting the 30x30 item will draw 30 subdivisions along the pos-X axis, 30 along the neg-X axis, 30 along the pos-Y axis, and 30 along the neg-Y axis.

The *Grid Size* text field sets the number of units each subdivision represents. Usually these units are meters, but in reality it doesn't matter – they are TGE units and it really depends on the scale

of your game. However, as meters are the most common unit measurement, it is used for distances within Torque ShowTool Pro.

For example, if the *Grid Size* were set to 0.1m, then every 10 subdivisions would be a meter. A 30x30 grid would show 3 meters along each axis (a 3 meter radius).

General Tab – Background Color & Bitmap

Underneath the grid section of the *General* tab are the controls for changing the 3D view's background color and bitmap.

To change the 3D view background's color, use the *Background Color* popup. It provides a number of predefined colors to choose from. If one of these colors is not appropriate, a custom color may be used by selecting the Custom option in the popup. The custom color's RGB values may be set using either the text fields below the *Background Color* popup, or using the arrow buttons beside the RGB text fields. To use the arrow buttons, hold the mouse button on one of them and drag left or right. This will change the value of the text field to the left of it, limiting the range to 0-255. The large box to the right of the arrow buttons shows the results of the custom color text fields.

Using the *Bitmap* popup, it is possible to load an image into the background of the 3D view. From the popup, select the [load bitmap] option. This will open the Load File... window listing all of the bitmaps in the current project directory.
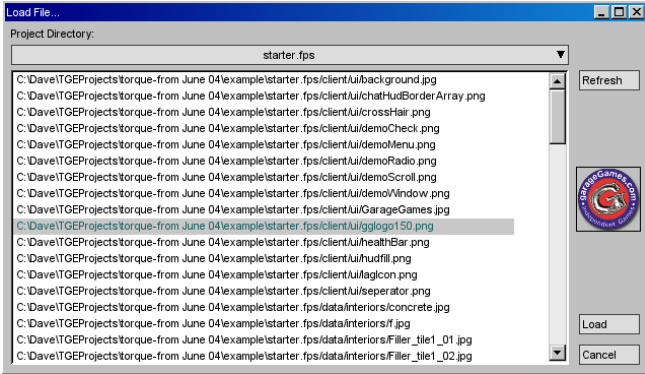
This window is similar to the other Load File... windows discussed earlier, but with the addition of an image thumbnail preview to the right. When a bitmap is selected, it will be drawn here. To make the selected image the backdrop bitmap, click on the *Load* button. Please note that the list of images is determined by the current project directory shown at the top of the window (and may be changed using the *Project Directory* popup).

A bitmap loaded into the background. DTS file courtesy of the BraveTree: Girl Pack. Backdrop image courtesy of the Brave-Tree: Tree Pack.

Every time a new image is loaded using the *Bitmap* popup, it is added to the popup's list. To disable the background image and return to the solid color, select the [none] choice from the popup.

General Tab – Heads Up Display

The heads up display (HUD) is drawn over top of the 3D view to provide the user with information on the currently viewed shape. Most of this information is available through the various properties buttons in ShowTool Pro, but having it within the HUD helps keep the window clutter down.

All possible shape information displayable by the HUD

The *HUD Location* popup is where the HUD may be toggled on or off and its location within the 3D view may be chosen (upper left or lower left). The "h" keyboard shortcut may also be used to toggle the HUD on and off.

The *HUD Color* popup is used to select the color of the HUD text – useful if the HUD text is hard to read over the current background color.

The remaining four checkboxes are used to select the type of information that will be present on the HUD. The *Show FPS on HUD* checkbox will display Torque ShowTool Pro's frames per second and number of milliseconds per frame. It doesn't really show what frame rates you'll get with the displayed object within your game, but is more for entertainment purposes only. ☺

The *Show grid size on HUD* checkbox will display the unit size of each grid subdivision as defined in the grid section of the DISPLAY PROPERTIES window's *General* tab.

The *Show detail level on HUD* checkbox displays a number of statistics for the currently viewed level of detail (LOD). The *Current DL*, *Detail Polys*, *Detail Size*, *Pixel Size*, and *Current Dist* are available from the DETAIL LEVELS window and are described within that section of the Reference chapters. The remaining three – *Alpha In*, *Alpha Out* and *IntraDL* – are only displayed on the HUD and as they are not well understood, are described in detail below. If you're familiar with how these parameters work, feel free to skip to the next page.

Alpha In: Defines the point at which the next detail level will begin to fade in.

Alpha Out: Defines the point at which the current detail level will begin to fade out.

IntraDL: A scale from 1 (current LOD just fully displayed) to 0 (current LOD is about to change to the next LOD) over which the two Alpha values above are measured against. This value changes as the viewed shape's pixel size changes, and is reset each time a detail level changes.

The standard TGE formulae for calculating the change in LOD are as follows:

```
CurrentIntraDL > AlphaIn + AlphaOut
  → render current DL

else

CurrentIntraDL > AlphaOut
  → render next DL with alpha, then
    render current DL

else

  → Render current DL with alpha, then
    render next DL
```

By default, the *Alpha In* and *Alpha Out* parameters are determined by the TGE at run time according to built-in rules.

The following diagram summarizes the above formulae with an example. Given that *Alpha In* is 0.25 and *Alpha Out* is 0.25:

IntraDL decreases as shape gets further away

1   0.5   0.25   0

Render shape at current LOD

Render current LOD and fade in next LOD

Render next LOD and fade out current LOD
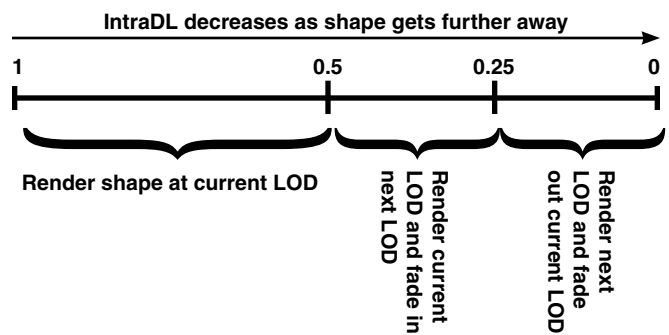
When the TGE calculated *IntraDL* is between 1 and 0.5, the current detail level is rendered normally. When the *IntraDL* is between 0.5 (*Alpha In + Alpha Out*) and 0.25 (*Alpha Out*), the current LOD is rendered followed by a faded rendering of the next LOD whose opacity increases as the *IntraDL* approaches *Alpha Out*. Finally, when the *IntraDL* is between 0.25 and 0, the next LOD is rendered followed by a faded rendering of the current LOD whose opacity decreases as the *IntraDL* approaches 0.

The exception to these rules is if *Alpha In* or *Alpha Out* is -1, in which case no fading between detail levels occurs.

The *Show Billboard LOD on HUD* checkbox display statistics for automatically generated billboard detail levels, commonly referred by their internal TGE name, TSLastDetail. Often a TSLastDetail is the last LOD for the given shape, and it is generated at run time according to parameters stored within the DTS file. It builds a number of billboards – rectangles made up of two triangles – from various angles of the shape and selects which one to draw based on the camera's angle. This is very useful for distant objects that don't require much detail as this technique can save quite a bit on the number of polygons rendered per frame.

These automatic billboard statistic are only available from the HUD and are described below. Note that if the currently display LOD is not a TSLastDetail that these parameters will all display with a '–'.

Equator Steps: These are the number of snapshots taken around the equator of the object. Twelve

snapshots would equate to one billboard every 30 degrees.

Polar Steps: The number of snapshots taken above and below the equator, not including the equator itself. The total number of bitmaps that will be generated is equal to:

```
equator steps * (polar steps * 2 + 1)
```

Polar Angle: A value greater than zero will compress the polar snapshots closer to the equator. For example, a polar angle of 30 degrees would force the polar snapshots within the first 60 degrees either side of the equator.

Inc. Poles: Should the poles themselves (the top and bottom of the shape) be included when generating the billboard bitmaps? If this is yes, then add two more bitmaps to the equation above.

Render DL: When building a billboard LOD, it is possible to use any of the available detail levels that are stored within the DTS file. Usually the
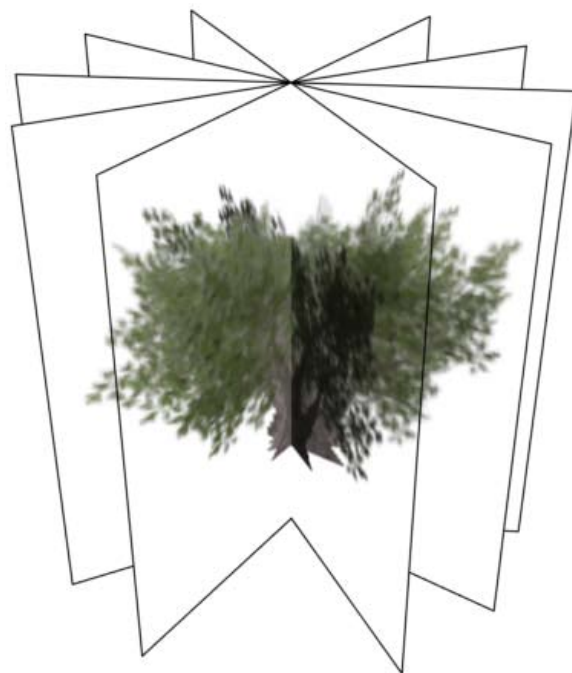
A 3D tree on the left converted to a number of billboards taken with the camera around the equator (Bitmap RotX: 0.0) DTS tree object courtesy of BraveTree: Tree Pack

bitmaps are generated using the highest quality detail level, number 0.

Render Dim: The dimensions of each generated bitmap. Keep this in mind when calculating the number of generated bitmaps above.

Bitmap Index: The bitmap number for the currently displayed billboard.

Bitmap RotX: The angle in degrees about the X axis (polar angle) at which the currently displayed billboard was generated.

Bitmap RotZ: The angle in degrees about the Z axis (equatorial angle) at which the currently displayed billboard was generated.

General Tab - Miscellaneous

The bottom of the General tab contains a few miscellaneous settings.

Some 3D applications rotate their display in the opposite direction to ShowTool Pro when dragging the mouse, which can be a difficult adjustment when rapidly switching between applications. The *Invert view's mouse rotation* checkbox does exactly as it says: invert the 3D view's direction of rotation when using the mouse.

Sometimes, especially when you are creating texture maps and are making use of the automated image reload feature of ShowTool Pro, it is handy to have the ShowTool Pro window always display on top of other applications. Use the *Main windo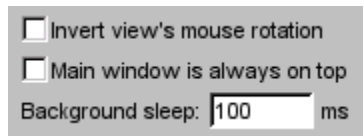w is always on top* checkbox to activate this mode. You may also use an icon in the toolbar at the top of the main window to toggle this feature:

Torque ShowTool Pro is based on the TGE – a game engine. As such, the display is constantly being re-rendered. On most modern computers the CPU time spent in always redrawing is not noticeable. However, on slower systems, when ShowTool Pro is placed into the background and another application is brought forward, the system may appear slow.

To help alleviate this, the *Background Sleep* text field allows you to enter in the number of milliseconds ShowTool Pro will pause between redraws when it is not the foreground application. By default, this is set to 100ms. You'll notice this if you are playing an animation sequence within ShowTool Pro and bring another application forward that does not completely cover the screen – the animation sequence will appear jerky. If this is not a desired affect and your computer doesn't slow down, then you may safely set this text field to 0ms and never worry about it again (I have Torque ShowTool Pro running in the background while I type this documentation, for example, and don't have a problem with speed).

Render Tab

The *Render* tab contains controls that are used for modifying how objects in the 3D view are drawn. These controls may be divided into four categories from top to bottom: environmental mapping (EMap), display mode options, mesh options, and axis display.
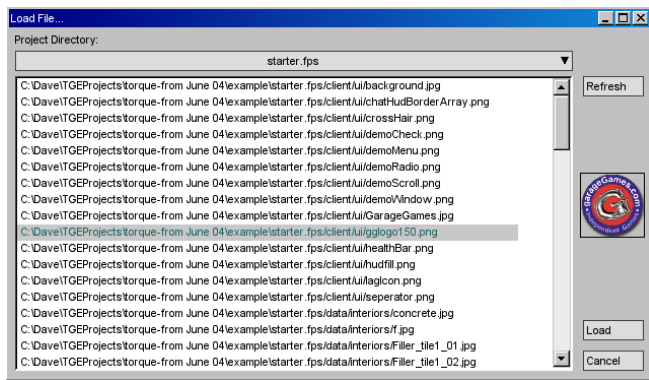
Render Tab – EMap

The TGE supports a form of reflection known as environmental mapping. If a shape's materials have been set up appropriately, Torque ShowTool Pro allows you to see this mapping in effect by selecting a bitmap to use.

Selecting the [load bitmap] item in the *EMap* popup will open a standard LOAD FILE... window that has been discussed in previous sections.

Selecting a bitmap by clicking on the *Load* button will add it to the *EMap* popup's list, make it the current environmental map, and display it in a box just below the popup. To disable the emap, select the [none] option from the popup's list.

ShowTool Pro comes with a sample bitmap that may be used if you don't have one available. Select the exporter/images/day_0007 item in the popup's list to use a sample image that comes with the TGE.

Environmental mapping may also be toggle on and off using a button in the tool bar at the top of the main window:
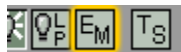
If you click on the toolbar button for the first time during a ShowTool Pro session and haven't

yet chosen a bitmap to use, then the LOAD FILE... window will open asking for you to select one. If you'd like to use the sample image instead, click *Cancel* in the window and select it from the *EMap* popup.

Render Tab – Display Mode Options

Underneath the environmental mapping section of the *Render* tab are controls for modifying some of the 3D view's display modes.
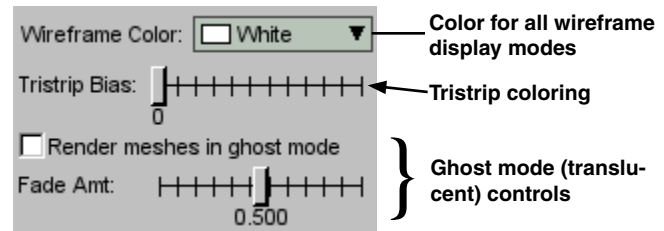
The *Wireframe Color* popup is used to change the polygon edge color in the various wireframe display modes. The list includes a number of predefined colors to choose from to help the wireframe standout – especially over a textured mesh.

The *Tristrip Bias* slider is used to modify the colors of the Triangle Strips and Tri-Strip Wireframe display modes. In ShowTool Pro when using either of these display modes, each triangle strip is assigned a random color. Sometimes two strips that are side-by-side are assigned a very similar color by chance. The biasing slider allows the user to shift the colors in the random color look-
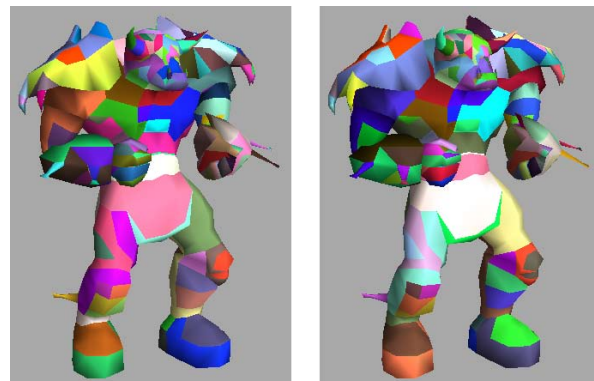
The Orc DTS object with tri-strip biasing set to 0 (left) and 1.

up table, hopefully allowing for more distinction between strips. There are no real rules to using the slider – just drag it until you have colors that help you with your shape inspection.

The last two controls in this section work together. The *Render meshes in ghost mode* checkbox toggles the drawing of the current shape as transparent – like a ghost – on and off. This is most useful when used in conjunction with the Solid Bones node connection option under the *Nodes* tab as it allows you to see through the shape to the bones underneath the mesh.

While rendering in ghost mode, the *Fade Amt* slider controls how transparent the shape is. The default is 0.5 which renders the shape with 50% transparency. Setting it to 0 will make the mesh completely transparent, leaving only the node connections – useful if you only wish to see the skeleton while playing back an animation sequence.

Ghost mode enabled with 50% transparency (left), 25% and 0%. DTS file courtesy of the BraveTree: Girl Pack

Ghost mode may also be toggled on and off using a button in the toolbar at the top of the main window:

Render Tab – Mesh Options

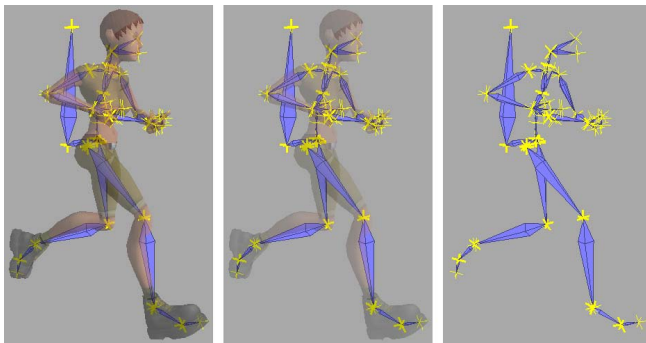The mesh options controls modify what additional information is to be drawn within the 3D view.
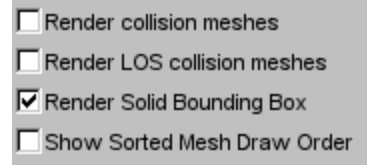
The *Render collision meshes* checkbox toggles the rendering of a shape's collision meshes, if it contains any. Collision meshes are drawn in a semi-transparent blue.
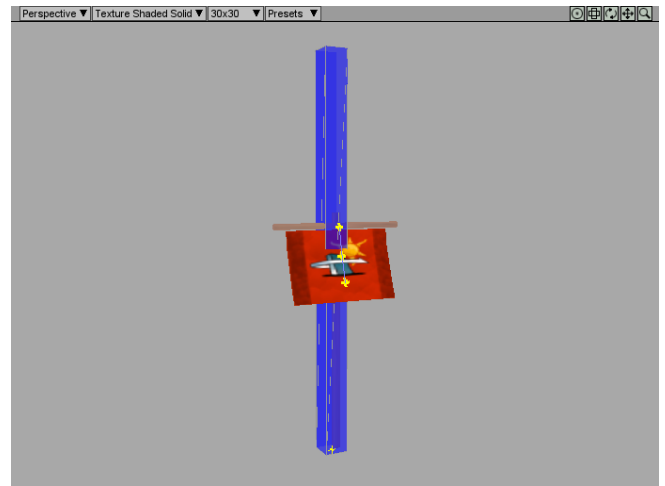
A flagpole from the TGE starter.fps game with its collision mesh shown.

There is also a button in the toolbar at the top of the main window that may be used to toggle collision meshes on and off:

The *Render LOS collision meshes* checkbox toggles the rendering of a shape's line of sight (LOS) collision meshes, if it contains any. These are drawn in a semi-transparent green.

LOS collision meshes are usually used to detect collisions with projectiles while regular collision meshes are used to detect collisions with players and vehicles.
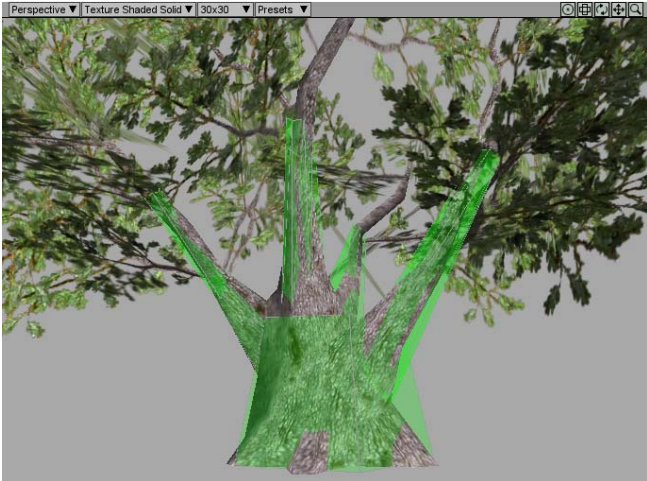
Line of sight collision meshes rendering enabled. DTS tree courtesy of the BraveTree: Tree Pack

There is also a button on the toolbar at the top of the main window to toggle LOS collision meshes on and off:
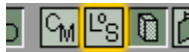
The *Render Solid Bounding Box* checkbox is used to toggle if object bounding boxes should be drawn as outlines or in a semi-transparent red.
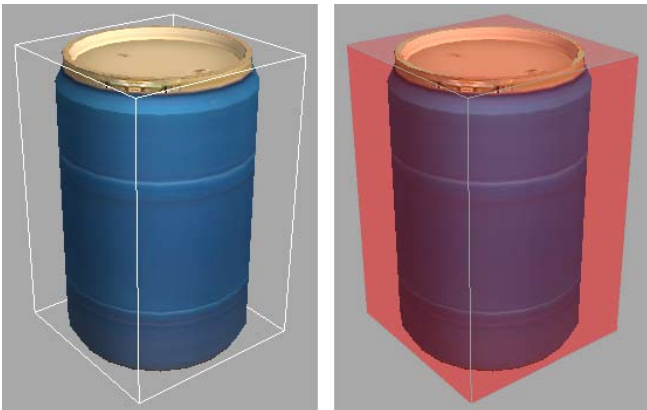
Solid bounding boxes disabled (left) and enabled. DTS object courtesy of Weston Tracy: Urban Pack

A button on the toolbar at the top of the main window may also be used to toggle solid bounding boxes on and off:

The *Show Sorted Mesh Draw Order* checkbox toggles a special rendering mode for DTS files with sorted meshes. With this mode enabled, each cluster of primitives will be drawn in a shade of gray depending on its drawing order – the first cluster will be very dark and the last cluster will be very light. It is usually best to use this mode with lighting disabled so that the shading due to lights doesn't conflict with the cluster coloring. And while this mode may be used with texturing turned on, it may be easiest to view in a display mode that does not include textures.
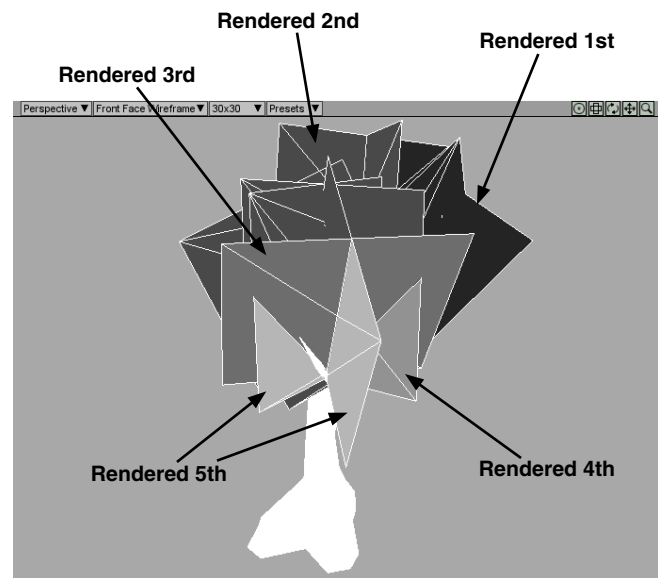
A tree from the TGE starter.fps game drawn with texturing turned off and sorted mesh rendering enabled. The trunk of the tree is a standard mesh while the translucent leaves are a sorted mesh drawn in shades of gray.

A button on the toolbar at the top of the main window may also be used to toggle the special drawing of sorted meshes:
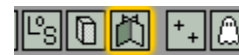
Render Tab - Axis Display

The last control under the *Render* tab toggles the display of the reference axis when rotating or translating the 3D view.

Nodes Tab

The *Nodes* tab contains controls that modify how nodes and node-related geometry is displayed. These controls may be divided into two categories from top to bottom: colors & connections, and node vertices.

Nodes Tab – Colors & Connections

At the top of the *Nodes* tab are controls for enabling nodes, changing various colors, and modify node-to-node connections.

Toggle node drawing

Draw nodes in this color

Modify parent/child relationship drawing

Modify sequence controlled nodes drawing
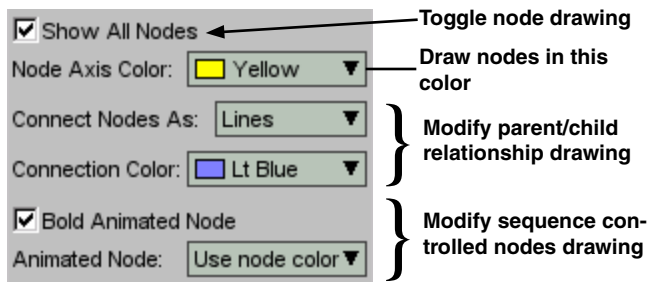
The *Show All Nodes* checkbox toggles the display of all nodes within the currently viewed DTS object. Nodes are drawn as small 3D '+' symbols. A button on the toolbar may also be used show nodes:
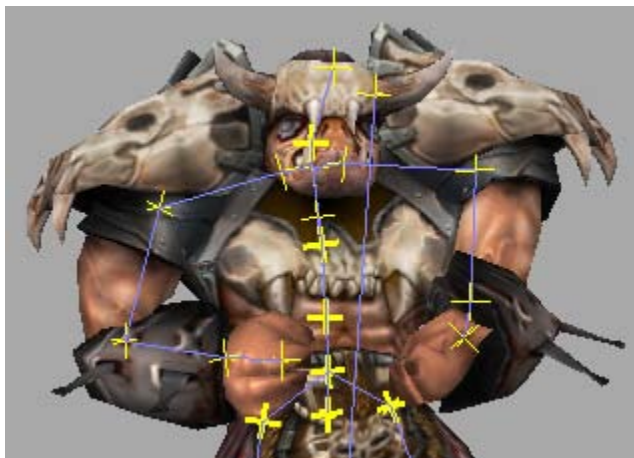
TGE Orc with its nodes drawn in yellow and light blue connecting lines. Nodes that are used during the selected animation sequence are drawn in a bold yellow.

Finally, the keyboard shortcut 'n' may be used to turn the rendering of nodes on and off.

The *Node Axis Color* popup is used to set the color that nodes will be drawn in. It provides a list of predefined colors to choose from.

The *Connect Nodes As* popup sets how the node parent/child relationships are to be drawn.
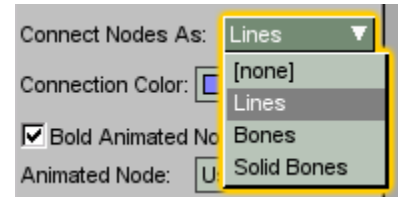
The [none] choice will disable all node connections leaving on the nodes themselves. The Lines choice will draw the node connections as simple lines. The Bones item draws the node connections as wireframe bone shapes – similar to what is used in typical 3D applications. Both the Lines and Bones drawing methods will draw the connections overtop of the shape. This makes them always visible regardless of the viewing angle.

The last choice, Solid Bones, draws the node connections as filled in (solid) bone shapes which take the object's mesh into account. They are drawn within the object rather than on top of it. For example, if there is a node connection within
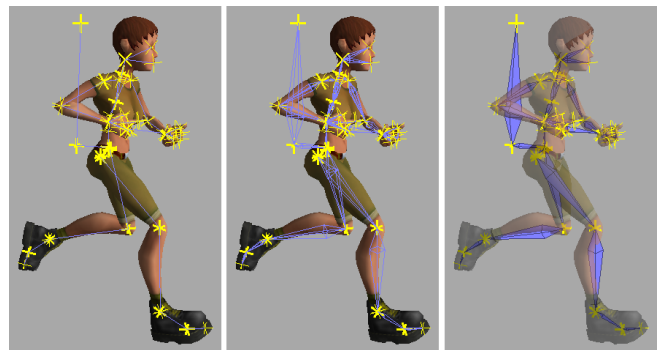
Node connections as lines (left), bones, and solid bones with ghost mode enabled. DTS file courtesy of the BraveTree: Girl Pack

an arm, then a solid bone would be drawn inside of the arm and not be visible. The Solid Bones method is usually best used in combination with the ghost mode found under the DISPLAY PROPERTIES window's *Render* tab. Enabling ghost mode allows the solid bone connections to be visible through the mesh.

The *Connection Color* popup is used to select the color in which the node connections will be drawn. In the pictures above, the light blue color had been chosen.

Nodes may be modified by an animation sequence, and when they are, ShowTool Pro may highlight them within the 3D view. The *Bold Animated Node* checkbox toggles the drawing of animation controlled nodes with a double thickness. The picture on the previous page shows the Orc's controlled nodes in a thick (bolded) yellow color.

The color of an animation sequence controlled node may also be different from other nodes. Select a predefined color from the *Animated Node* popup to help see these nodes in the 3D view. If you wish the controlled nodes to be in the same color as the non-controlled nodes, choose the Use node color item at the top of the popup's list.

Nodes Tab – Node Vertices

When a node has been selected from the *Nodes* popup at the bottom of the main window, it is possible to see the vertices that are influenced by the node. A node's influence (or weight) on a vertex may range from 100% to 0%.
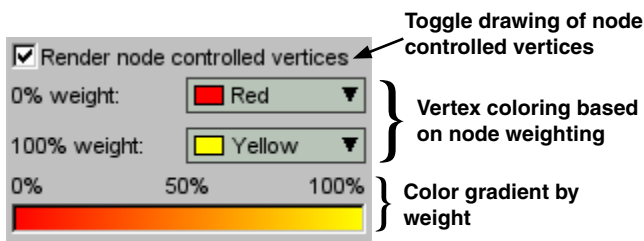
To toggle the display of node controlled vertices, use the *Render node controlled vertices* checkbox. It is also possible to use a button beside the *Nodes* popup at the bottom of the main window:

When a node's vertices are drawn in the 3D view, they are colored according to how much influence the node has on them. These colors may be modified with the next two controls.
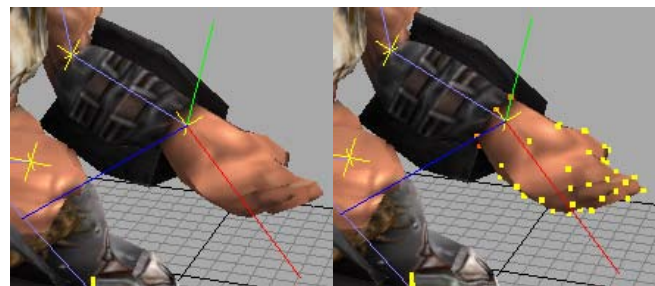
TGE Orc's hand node selected with vertices disabled (left) and enabled.

The *0% weight* popup defines the color when the selected node has no influence on the vertex but it is still associated with the node. The *100% weight* popup defines the color when the node has complete control over the node. A color gradient underneath these popups displays the color scheme for the nodes at 0%, 50% and 100% control.

Light Properties Button and Window

The *Light Properties* button is used to open the LIGHT PROPERTIES window.
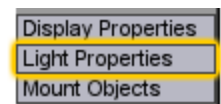
From the LIGHT PROPERTIES window it is possible to toggle the light on and off, change its various

Toggle drawing of node controlled vertices

Vertex coloring based on node weighting

Color gradient by weight

colors and angle, as well as toggle the Synapse Gaming Lighting Pack.

At the top of the window is the *Enable Lights* checkbox that is used to turn the distance light source on and off.
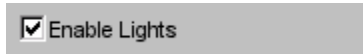
In addition, there is a button in the toolbar at the top of the main window that may be used:

Finally, the keyboard shortcut 'L' (shift-l) may be used to toggle the light.

Underneath the *Enable Lights* checkbox are the color settings for the ambient (background) light.
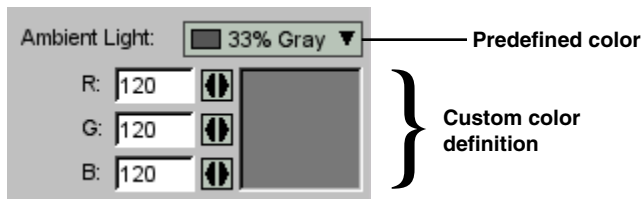
The *Ambient Light* popup is used to select the ambient lighting color for the 3D view. Choosing the color Black effectively disables all ambient light. Selecting the color White will effectively disable the direct light (the same as turning off the lights), unless the Synapse Gaming Lighting Pack is enabled – see the section on enabling the Lighting Pack at the end of the LIGHT PROPERTIES window documentation.

Underneath the popup are a series of text fields for entering in a custom color if the predefined ones in the popup are not appropriate. Simply enter in a new RGB value and the rectangle to the right will display the custom color – the *Ambient Light* popup will also change to Custom. Each of the

arrow buttons beside the custom color text fields may be used instead by holding down the mouse button on each and dragging the mouse left and right. Valid values for the text fields are in the range of 0-255.

The next set of controls are for modifying the direct light source.
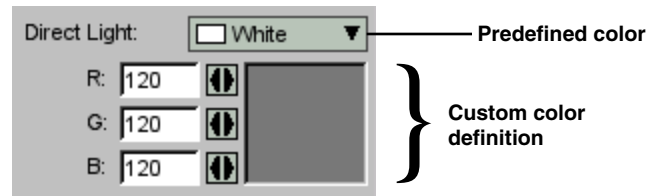
The *Direct Light* popup is used to select the direct lighting color for the 3D view. This is the light that may be rotated around the object. Choosing the color Black will effectively disable the direct light, leaving only the ambient light source.

Underneath the popup are a series of controls for using a custom color rather than one of the predefined colors. These controls are used in the same manner as those for the ambient light.

The next two controls are related to the rotation of the direct light about the object – please see the *Graphical Interface Introduction* for more information on rotating the direct light.
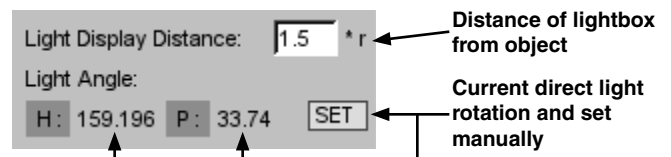
The *Light Display Distance* text field refers to the distance the lightbox will be drawn from the viewed shape while the direct light is being rotated with the mouse. The number entered is a multiple of the viewed shape's radius – hence the *r* beside the text field. A value of 1.5 will draw the lightbox 1.5 times the shape's radius from the object.
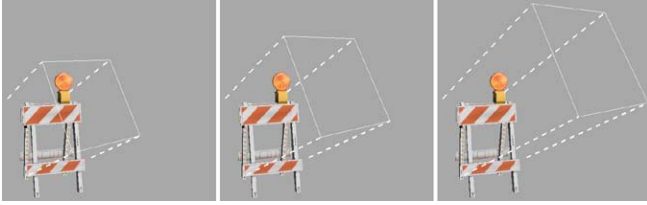
The lightbox drawn 1.0 (far left), 1.5 and 2.0 times the shape's radius away from the object. DTS object courtesy of Weston Tracy: Urban Pack

The *Light Angle* text fields display the current heading and pitch (in degrees) of the directional light. When rotating the direct light about the viewed shape with the mouse, these values will update in real time. If it is important that the direct light's angle be exact – such as to match a mission's lighting – then the *SET* button may be used to open a new window.
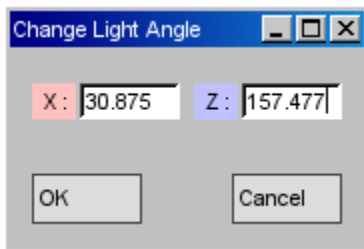
The CHANGE LIGHT ANGLE window is where the direct light's rotation may be manually set. The two *X* and *Z* text fields are used to enter in the light's angle about the X (Pitch) and Z (Heading) axis respectively. Once an appropriate angle has been entered, click on the *OK* button to accept the new rotation.

The final control on the LIGHT PROPERTIES window is used to toggle the state of the Synapse Gaming Lighting Pack.
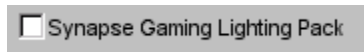
Using the *Synapse Gaming Lighting Pack* check-box enables the enhanced lighting of the Lighting Pack within Torque ShowTool Pro. This allows for overexposure, giving a higher contrast image.

It is also possible to use a button in the toolbar at the top of the main window to toggle the Lighting Pack:
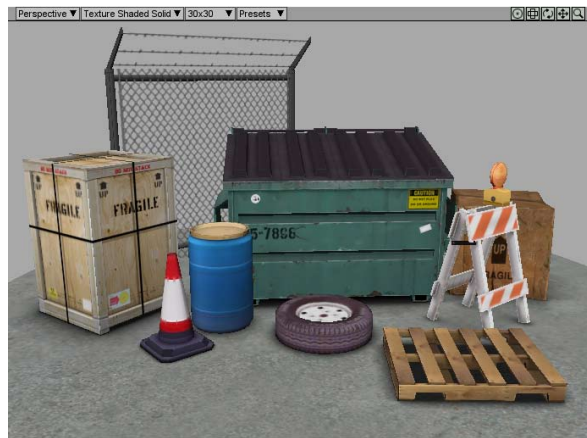
Lighting Pack disabled, white direct light and 33% gray ambient
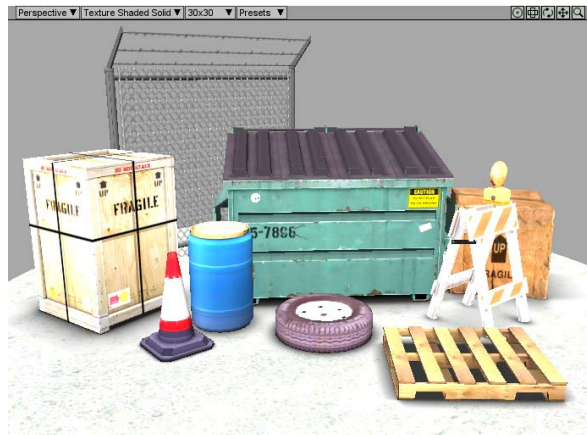
Lighting Pack enabled, white direct light and 33% gray ambient
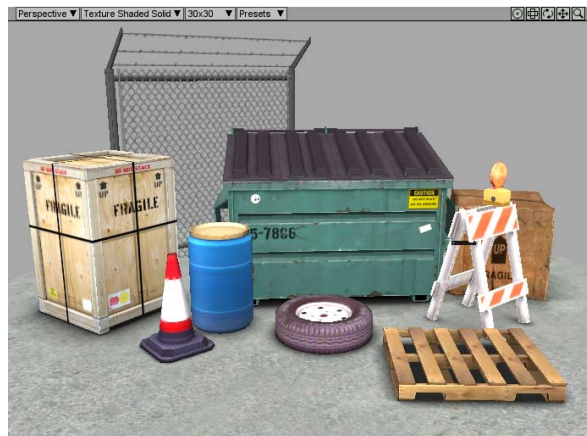
Lighting Pack enabled, 50% gray direct light and 33% gray ambient. All images courtesy Weston Tracy: Urban Pack

Something to keep in mind when using the Lighting Pack is that the dynamic range of the direct and ambient lighting is effectively doubled – this is what allows for the overexposure and higher contrast. If you have the direct light set to White and then enable the Lighting Pack, your object will look over bright. If you were to select the 50% Gray value instead (and similarly cut the ambient light in half) then you would approach a normal lighting level but with higher contrast. The series of images of urban clutter on the previous page demonstrate this by cutting the direct light's intensity in half with the Lighting Pack enabled

Mount Objects Button and Mounting Window

The *Mount Objects* button is used to open the MOUNTING window.
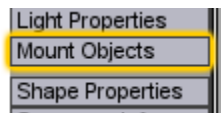
From the MOUNTING window it is possible to mount – or place – any loaded shape onto any node in the currently viewed object.
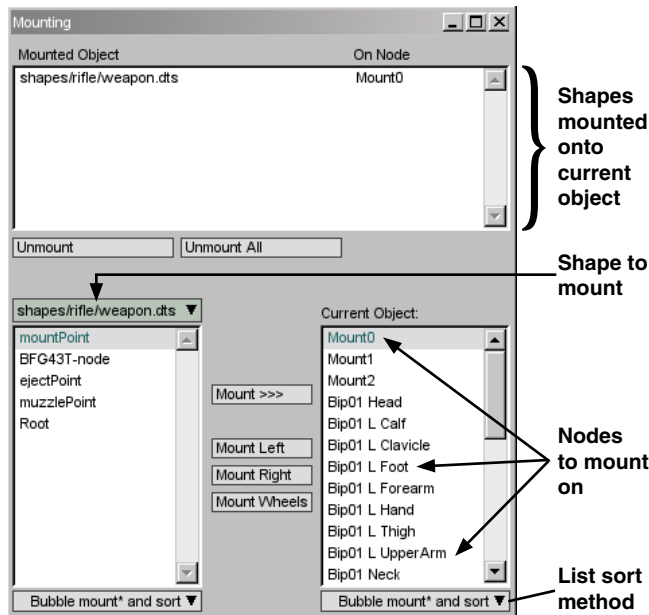
The top half of the window is a list of currently mounted shapes. It lists the name of the mounted shape and the node it is attached to. When a shape is mounted, it inherits the position and rotation of the node it is mounted to and will animate along with it.

Directly underneath the list are two buttons. The *Unmount* button will remove the selected shape in the list from the current object. The *Unmount All* button will remove all shapes from the current object at once.

At the bottom of the MOUNTING window are two lists and a bunch of buttons. The popup above the list at the left is where the shape to be mounted is selected. The left list then presents all of the nodes for that shape that may be used to mount from. One of these nodes will need to be selected. Of special note is the [origin] entry. With this selected, the shape's origin in the world will be used as the mount location rather than a node.

The list on the right contains all of the nodes from the current object that may be mounted to. A node from this list will also need to be selected. With an item selected from each list, one of the mounting buttons between the two lists is selected. These buttons are described below.
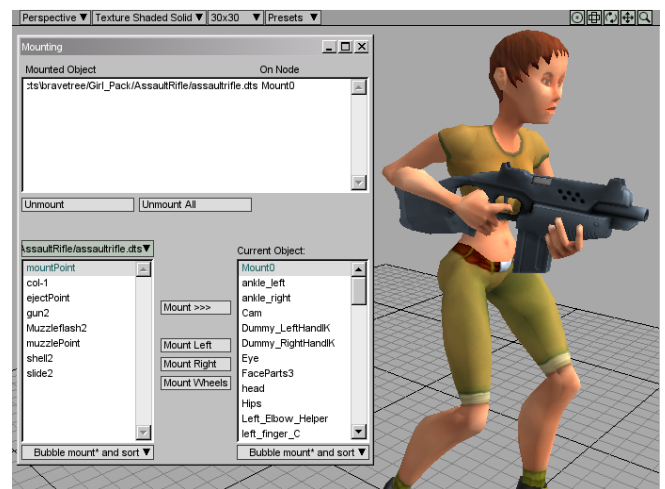
An assault rifle is mounted to a player's shape. DTS objects courtesy of the BraveTree: Girl Pack

Mount >>>: Using this button will mount the shape on the left directly onto the shape on the right. The orientation of the mounted shape's node and the current object's mount node will be taken into account, just as with the TGE.

Mount Left: This button is used when the object being mounted to is a standard TGE wheeled vehicle wheel. TGE wheeled vehicle wheels have their mounting nodes oriented differently than those of a player's weapon, and so must be specially rotated to match how they will appear within the TGE. In addition, a left wheel is oriented differently than a right wheel – to make sure the wheel's hub faces outwards. So, if you're mounting a wheel onto the left side of a vehicle then this is the button to use.

Mount Right: This button is just like the *Mount Left* button but is used to place a wheel on the right side of a vehicle.

Mount Wheels: If the same wheel shape is to be placed on all hub nodes of a vehicle then this button may be used. With the wheel's node selected on the left, each of the vehicle's hub nodes (regardless if they are selected in the right list or not) will be populated with a correctly oriented wheel. This makes quick work of setting up a

All wheels automatically mounted using the Mount Wheels button. DTS objects courtesy of the BraveTree: Car Pack

wheeled vehicle for inspection. Please note that the vehicle's hubs must follow the standard naming convention of "hub*x*" where *x* starts at 0.

Underneath each list at the bottom of the window are two popups that are used to change how the node lists will be sorted.

The Leave list unsorted choice will leave the node list ordered just as it was saved within the DTS file. The Sort list choice will alphabetically sort the list of nodes. Finally, the Bubble mount* and sort selection will alphabetically sort the node listing and make sure that any nodes what begin with "mount" will appear at the top of the list. As this is the most common naming convention for nodes that are to be mounted to, this is the default sorting method when Torque ShowTool Pro is first started up.

Shape Properties Button and Window

The *Shape Properties* button is used to open the SHAPE PROPERTIES window.

The SHAPE PROPERTIES window is used to view your DTS file's structure including parent/child relationships to ensure that everything has been exported correctly. Along the top of the window are a series of tabs, each of which are described below.

Tree Tab

Tree Tab

Under the tree tab is a hierarchical listing of the currently viewed shape's contents. This includes all detail levels, nodes, meshes and materials.
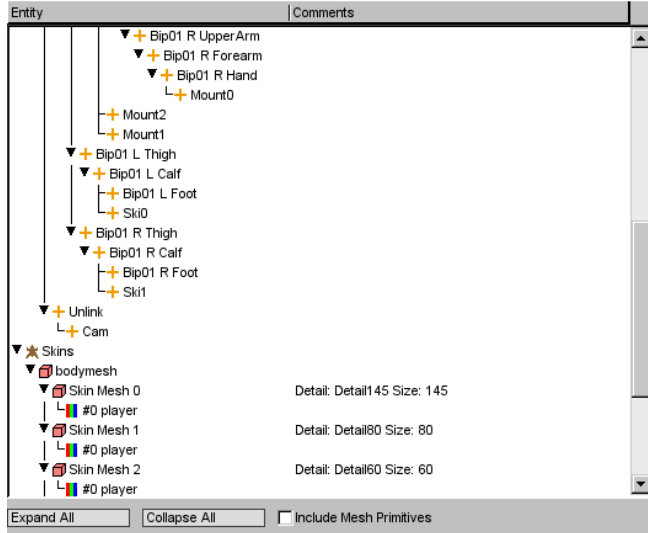
Part of the shape hierarchy for the TGE Orc object. In view are some of the nodes at the top, followed by the "skin" meshes and their materials at the bottom.

By default the entire hierarchy is expanded so all levels are visible. The two buttons at the bottom of the listing, *Collapse All* and *Expand All* are used to respectively collapse or expand the entire listing.

The listing is divided into two columns: *Entity* and *Comments*. The *Entity* column contains the shape's hierarchy and the ▶ or ▼ arrows may be used to expand or collapse any particular line. The *Comments* column contains any auxiliary information such as a detail level's minimum size or the detail level a mesh belongs with. If either of the columns is too small, they may be resized by placing the mouse pointer over the dividing line between them, holding down the mouse button, and dragging the mouse. The SHAPE PROPER-TIES window itself may be resized to provide a larger view to the information.

At the very bottom of the *Tree* list is the *Include Mesh Primitives* checkbox. If this checkbox is

selected, then each of the primitive entries under each mesh will be displayed. This provides access to the number of primitives each mesh is composed of and how many vertices each primitive contains. If a primitive has more than three vertices (a triangle) then it is likely a tri-strip.

Below is a listing of all of the symbols used in the *Tree* list and their meaning.

Entity Image	Description
	Detail Levels including minimum pixel size
	Sub shapes (nodes and possibly objects)
	Nodes
	Objects and object meshes. This includes standard, skin and sorted meshes.
	Mesh materials whose number matches that used in the Materials window.
	Primitives and their vertex count.
	Collision objects and meshes
	Line of sight collision objects and meshes
	Root for all skin meshes if any exist in the shape

TSDump Tab

TSDump Tab

The TGE contains code to produce a text dump of a shape's properties and hierarchy, like the *Tree* tab, although it is not directly available. Torque ShowTool Pro provides access to this function, known as TSDump, under this tab as a text listing that may be viewed directly or saved to a text file.
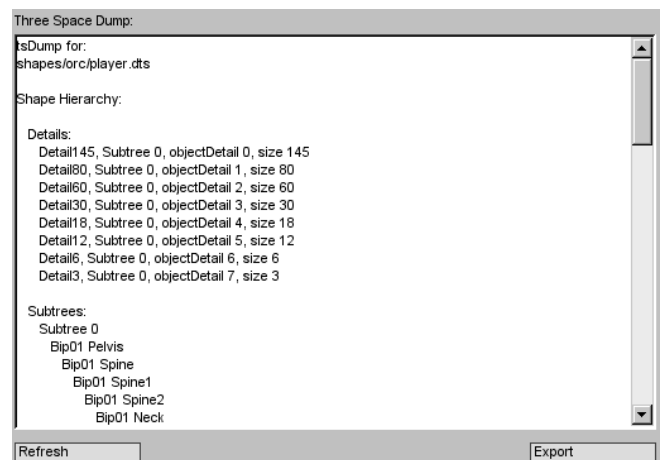
To generate the text listing at the top of the *TSDump* tab, click on the *Refresh* button. This will generate a TSDump for the currently viewed object. If you switch to a different object, you'll need to click the *Refresh* button again to regenerate the display.

To save the text listing to a file, click on the *Export* button. A new text file named dtsdump.txt will be created in the same directory as the Torque ShowTool Pro application. This file may be passed along to someone else if you need assistance in troubleshooting a shape problem.

Rendering Tab

The *Rendering* tab simulates the process used to render a shape. Within the TGE, the TSShapeInstance class is used for rendering the geometry, among other things. The hierarchical listing at the top of the tab presents the order in which meshes are rendered based on the TSShapeInstance's code, and allows you make sure your shape is behaving as expected.
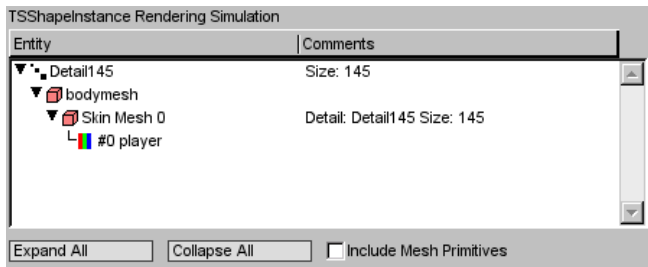
Rendering simulation for the TGE Orc. Detail145 (the first detail level) is currently being rendered. It contains a single skin mesh which itself references a single material (material #0).

The remainder of the controls under this tab are identical to those of the *Tree* tab, as are the symbols used in the hierarchical listing. Please see the *Tree* tab description for more information.

Sequence Info Button and Window

The *Sequence Info* button is used to open the SEQUENCE INFO window.
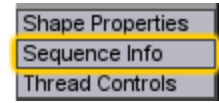
The SEQUENCE INFO window provides access to various parameters that make up loaded animation sequences. This aids in checking that a sequence has successfully been exported from a 3D application.
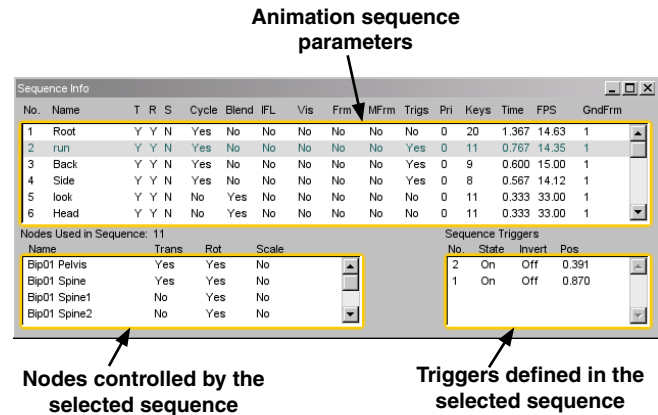
Sequence List

The list at the top of the window contains every sequence that has been loaded with the currently viewed shape – either from the DTS or through a DSQ file. The various columns for this list are described below.

No.: The order in which the sequences have been loaded.

Name: The name of the sequence. If the sequence came from the DTS file or loaded from an individual DSQ file, then this is the name of the sequence as defined within the file. If the sequence was loaded through a TSShapeConstructor datablock, then this is the sequence's name as defined within

the datablock, which may be different from the name in the DSQ file.

T R S: These three columns are the translation, rotation and scaling of nodes within the sequence. If a sequence contains a node that has one of these animation methods applied then a "Y" will appear in the respective column. If all three columns contain a "N" then the sequence does not control any nodes. A listing of all nodes that are controlled by the sequence is at the bottom left of the SEQUENCE INFO window.

Cycle: Indicates if the sequence will play continuously. If this column contains a "N" then the sequence will stop once it reaches the end.

Blend: Indicates if the sequence will be blended with other playing sequences. Please see the *Thread Controls Button and Window* section for more information on blended animation sequences.

IFL: Does this sequence use an Image File List? An IFL is a text file that lists a series of images that will be flipped between with the sequence – this provides for texture animation.

Vis: Indicates if there are any objects within the sequence that will change their visibility. An object's mesh may become transparent during the course of an animation sequence – such as a gun's muzzle flash.

Frm: If the animation sequence modifies an object's vertices' positions directly (a morph) then this column will contain a "Y".

MFrm: Indicates if the animation sequence modifies an object's vertices' texture coordinates (animation of the uv coordinates).

Trigs: Indicates if there are any triggers in the animation sequence. If any have been defined, they are in the list at the bottom right of the SEQUENCE INFO window.

Pri: The priority of the sequence. If two sequences control the same node and neither sequence is a blend, then the sequence with the higher priority will take control.

Keys: The number of key frames defined for the sequence.

Time: The amount of time in seconds for the animation sequence to play – assumes a time scale of 1.0 and is based on the number of keys above and the FPS below.

FPS: The number of frames per second for the sequence.

GndFrm: The number of ground frames used in the sequence. Ground frames may be used to change the playback speed of an animation sequence based on distance travelled.

Nodes Used

At the bottom left of the SEQUENCE INFO window is a list displaying all of the nodes that are controlled by the selected sequence. Directly above this list is a count of the number of nodes involved in the sequence. Below is a sample listing of the nodes used in the TGE Orc's run animation sequence, and a description of the column headings follows:

Four out of the eleven nodes that are controlled by the TGE Orc's run animation sequence.

Name: The name of the node that is controlled by the selected animation sequence. This name comes from the DTS file.

Trans: Indicates if the node will be translated (moved) during playback of the selected sequence.

Rot: Indicates if the node is rotated by the selected animation sequence.

Scale: Indicates if the node is scaled during playback of the selected animation sequence.

Sequence Triggers

At the bottom right of the SEQUENCE INFO window is a listing of any triggers defined by the selected animation sequence. A trigger is used to cause some event within the game at a particular time during animation playback, such as placing footprints on the ground as a character is running. Below is a listing of the triggers defined within the TGE Orc's run sequence and a listing of the columns follows:

No.	State	Invert	Pos
2	On	Off	0.391
1	On	Off	0.870

Two triggers are defined for the TGE Orc's run animation sequence. The first trigger fires event #2, followed by a trigger that fires event #1.

No.: This is the event number within the TGE that will be triggered. This event could tie to anything within the TGE's code/script.

State: Will this trigger turn on the event or turn it off? Some events only need to be set to "On" as the TGE code will automatically turn them off.

Invert: If the animation sequence is played backwards, should this trigger's state be inverted from what is listed? Useful if an event needs to be sent both an on and off trigger.

Pos: The time position within the selected animation sequence that the trigger will occur. A sequence's time position is scaled to the 0.0–1.0 range.

Thread Controls Button and Window

The *Thread Controls* button is used to open the THREAD CONTROLS window.
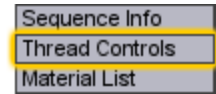
Torque ShowTool Pro allows you to build up a number of simultaneous animations sequences, called threads, just like the TGE. These sequences may control different parts of a character or vehicle, or may interact with each other and blend together. And when a sequence in a thread changes, it may either smoothly transition or abruptly switch. The THREAD CONTROLS window is where all of this is set up.
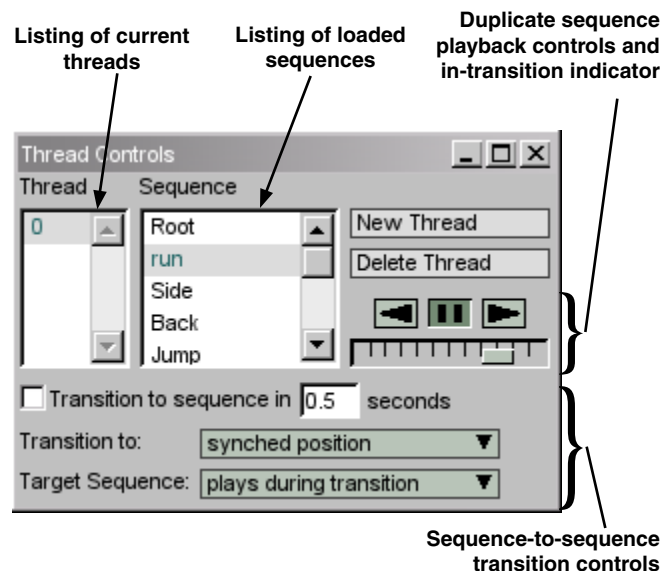
If there are any animation sequences loaded for the viewed shape then there will always be at least one thread in the *Thread* list, thread 0. When an animation sequence is selected in the *Sequence* list, the viewed shape will immediately switch to that sequence – unless transitioning is enabled as described below. In the figure above, the run sequence has been selected for thread 0 causing

the player shape to be shown in the run pose in the 3D view.

To add a new thread to the viewed shape, click on the *New Thread* button. The new thread will automatically be selected in the *Thread* list and a sequence may be chosen for it. When there is more than one thread, the animation sequences will interact as follows:

• If both threads control different nodes then there will not be any conflicts.

• If one of two threads is a blend sequence then the two sequences will be added together.

• If both threads control the same nodes and neither is a blend sequence, then the thread with the highest priority as defined in the DTS or DSQ file will gain control over the nodes.
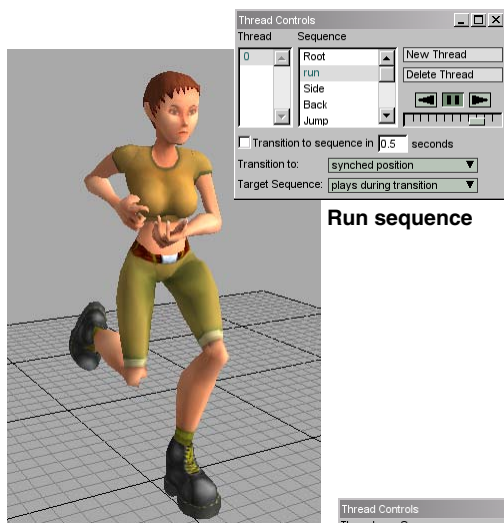
Run sequence
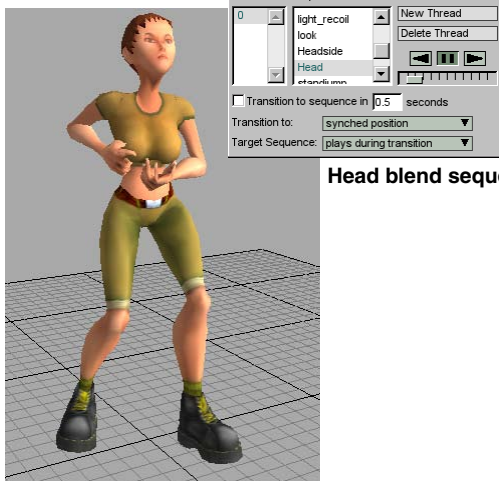
Head blend sequence

• If both threads control the same nodes, neither thread is a blend sequence and they both have the same priority, then the thread with the highest number will gain control over the nodes.

To remove the selected thread, the *Delete Thread* button is used.

Underneath the thread new and delete buttons are a series of duplicate animation sequence playback controls that mirror those located at the bottom right of the main window. They are there for convenience so you don't have to mouse too far to test out a new thread. The mini-timeline slider is also used to indicate sequence transition information.

When a sequence within a thread is changed, it may either pop to the newly selected one or perform a transition. A transition will smoothly change from one sequence to the next – such as going from a stand still to a full run.

The *Transition to sequence* checkbox underneath the *Thread* list will enable transitions. There is
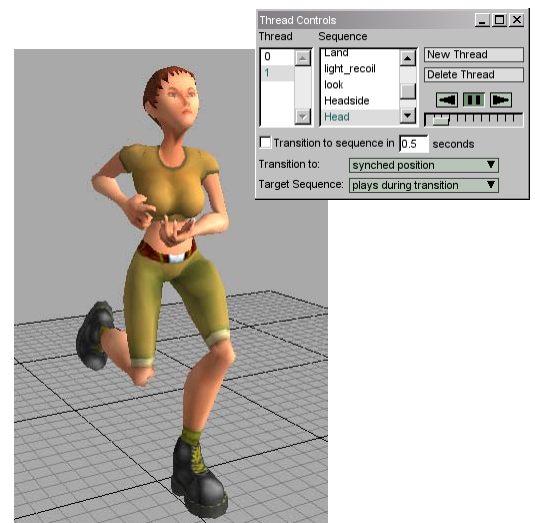
Run sequence on thread 0 and Head blend sequence on thread 1. The head tilt is added to the full body run motion. DTS object courtesy of the BraveTree: Girl Pack.

also a button on the toolbar to enable and disable sequence transitions:

The text field beside the checkbox is used to control how many seconds it takes to fully change from one animation sequence to another. The TGE standard is 0.5 seconds and is the default within Torque ShowTool Pro.

When transitioning between sequences, it is possible to choose how the animation being transitioned to will play. The *Transition to* popup is used to select how the transition will proceed.
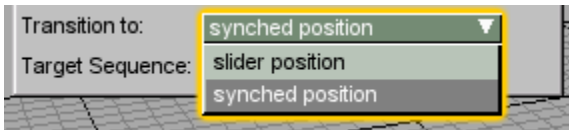
If the slider position item is selected the mini-timeline slider on the THREAD CONTROLS window will turn blue. The sequence being switched to will begin where ever the mini-timeline slider has been set and play from there when the transition begins. The TGE defaults to having the new sequence start at position 0.0 so it is likely that you'll want to keep the mini-timeline slider all the way to the left when in this mode.

With the synched position choice, the new sequence will start playing at the same position along the time line as the currently playing sequence. While in this mode, the mini-timeline slider will change from yellow to red while the transition is playing.

The last option when transitioning between sequences is choosing if the sequence being transitioned to will play during the transition. The *Target Sequence* popup is used to select the transitioning method.
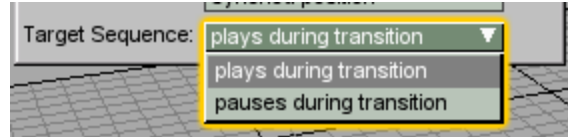
With plays during transition selected, both the current and the transitioned to sequences will play during the transition. With the pauses during transition choice selected, the sequence being transitioned to will not play during the transition, but will start once the transition has ended.

Material List Button and Materials Window

The *Material List* button is used to open the MATERIALS window.

The MATERIALS window provides access to all DTS material properties for the viewed shape as well as controls for modifying how materials are viewed and reloading them from disk.

List of shape's materials   **Preview of selected material**
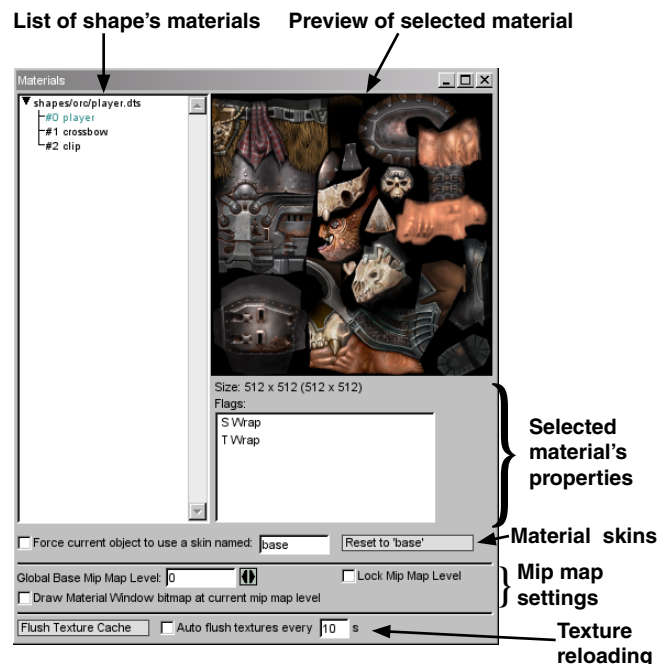
Along the left of the MATERIALS window is a list of

all loaded shapes and their materials. The currently viewed shape has its materials list expand and the first material selected when the window is first opened. Any of the materials from any of the shapes may be selected for inspection.

To the right of the material list is a 256x256 preview of the selected material – the texture is scaled to fit the preview. Beneath the preview is the textures size as loaded and in brackets the size of the texture as sent to the graphics card. These two sizes should be identical unless scaling was required on the original image for it to work within OpenGL.

Just below the texture size are the flags for the selected material. What follows is a table listing all of the possible flags that are displayed in ShowTool Pro.

Flag	Description
S Wrap	Wrap to the opposite side if 's' value is greater then 1 or smaller than 0
T Wrap	Wrap to the opposite side if 't' value is greater then 1 or smaller than 0
Translucent	Transparent material based on texture's alpha channel
Additive	Transparent material that adds its colors to what is behind it
Subtractive	Transparent material that subtracts its colors from what is behind it
Self Illuminating	Direct and ambient light will not affect the material
Never Env Map	Material will not show environmental reflections when they are enabled in ShowTool Pro
No Mip Map	Mip maps will not be generated for this material
Mip Map Zero Border	Clears the border of all mip map levels for this material
Ifl Material	Material is a placeholder on the shape for IFL frames
Ifl Frame	An individual IFL frame that has been created when the shape was loaded
Detail Map Only	This material is to be used as a detail map
Bump Map Only	This material is to be used as a bump map
Reflectance Map Only	This material is to be used as a reflectance map

Material Skins

Directly underneath the material list are controls to change a shape's textures using the TGE's reskinning system. This system requires that any materials within the DTS file that are to be reskinned begin with the "base." suffix. For example, an image file named base.player.png.

When material skins are enabled, this suffix may then be replaced at any time and all materials will change to a new texture. For example, using a skin named "red" (possibly used for the red team's uniform) would change the example image above to red.player.png. Any materials that do not follow this naming convention will not change.

The *Force current object to use a skin* checkbox toggles reskinning on and off. The text field beside the checkbox is where the skin's name is entered. The *Reset to 'base'* button to the right will reset the skin name to "base" to load back in the base texture.

Mip Maps

Mip maps are smaller versions of the original material textures that are used as an object is further away from the camera. Within Torque ShowTool Pro it is possible to force a change in mip mapping while the object is up close and to lock the current mip map level in place. This allows the texture artist to find any seams that may become apparent while traversing through the various mip map levels down to the smallest size.

TGE Orc with various mip map levels: mip map #0 512x512 (far left), mip map #2 128x128, mip map #4 32x32. A seam down the middle of the object becomes more apparent as the texture is scaled smaller for the various mip maps.

There are various ways to change and lock down the mip maps. From the MATERIALS window, the *Global Base Mip Map Level* text field is where the desired minimum mip map level may be entered. The double arrows button to the right may also be used by holding the mouse button and dragging.

The final method is to use the keyboard *up* and *down* arrow keys, which doesn't require the MATERIALS window to be open. Using any of these methods will update the display in the bottom left of the main window, showing what the current mip map base is set to:

This does not necessarily represent the mip map level that is currently being rendered – it may still change as the object becomes smaller unless it is locked down (see below). It represents the highest quality image that is possible. For example, a value of 0 (what the TGE is set to) allows the original image to be texture mapped; a value of 1 uses the next smaller power-of-2 mip map as the base; and so on.

If you wish to see the actual image that is being used for the base mip map, select the *Draw Material Window bitmap at current mip map level* checkbox on the MATERIALS window. This will force the material preview at the upper right of the MATERIALS window to draw the selected material at the base mip map level. Of course, it will still be scaled to fit the size of the preview control.

The final mip map manipulation that ShowTool Pro may perform is to lock down the base mip map. This means that if mip map level 0 were to be locked, no matter how small the object becomes on screen, it will always use the original image. Through a combination of mip map locking and modifying the base mip map, the artist

may see all of the OpenGL mip maps regardless of the actual size of the object in the 3D view.

There are a number of methods that may be used to lock the mip map. The first is the *Lock Mip Map Level* checkbox on the Materials window. The second method is a button on the toolbar at the top of the main window:

The last method available is to use the "m" keyboard shortcut. Using any of these methods will produce a lock symbol at the bottom left of the main window to indicate that mip map locking is enabled:

Mip map is locked

Texture Reloading

At the very bottom of the MATERIALS window are controls for reloading all of the textures in Torque ShowTool Pro. These are useful when you are working on a shape's texture in a paint program and wish to periodically reapply the modified image onto a loaded shape.

The first control is the *Flush Texture Cache* button. Using this button will unload all textures from memory and load them back in from disk. The "t" keyboard shortcut may also be used. This provides a manual means to refresh all images.

The second control is the *Auto flush textures* checkbox. With this selected, ShowTool Pro will automatically reload all textures every few seconds. The time between these reloads is determined by the text field beside the checkbox (with a default of 10 seconds). This allows for the unattended reloading of images, perhaps with

your paint program on one monitor and Torque ShowTool Pro on another.

There is also a button on the toolbar at the top of the main window to toggle automatic texture reloading on and off:


Detail Levels Button and Window

A DTS object may contain a number of discrete levels of detail (LOD) that are to be used as the size of the object on screen becomes smaller. These LOD's are created in the artist's 3D application and the parameters for each LOD are set at time of export. Within Torque ShowTool Pro, detail levels may be manipulated with the window opened by the *Detail Levels* button.
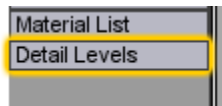
Using the *Detail Levels* button will open the DETAIL LEVELS window.

Manually select displayed detail level
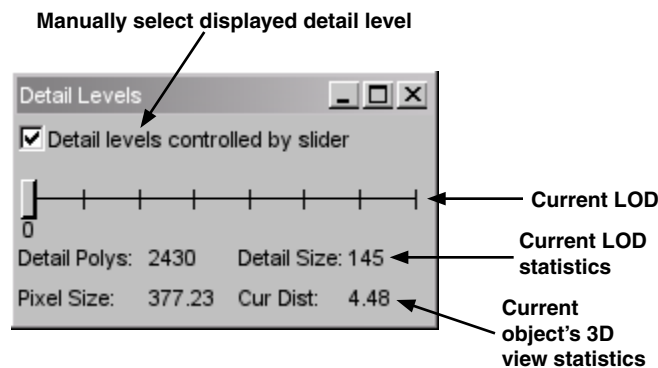
The *Detail levels controlled by slider* checkbox will enable manual control over the displayed LOD. Normally a LOD is selected based on its *Detail Size* parameter and the current shape's *Pixel Size* within the 3D view. With this option enabled, the slider below the checkbox may be used to select the drawn LOD.

TGE Orc drawn at various levels of detail: LOD #0 with 2430 polys (far left), LOD #2 with 2203 polys, LOD #4 with 1259 polys, and LOD #6 with 353 polys.

Another method of changing the drawn LOD is to use the keyboard *left* and *right* keys. If the above checkbox is not currently enabled, it will be with the first arrow key press.

In addition to the slider on the DETAIL LEVELS window, the bottom left of the main window shows the currently selected LOD and if it was manually or automatically selected :

Lock indicates LOD was manually changed

Currently drawn LOD
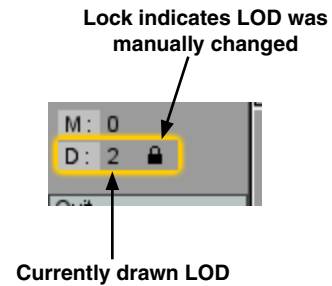
The *Detail levels controlled by slider* checkbox may also be toggled using either the "d" keyboard shortcut, or a button on the toolbar at the top of the main window:

At the bottom of the DETAIL LEVELS window are a number of parameters. Some of these refer to the currently selected detail level, while others are information for the shape itself. These parameters are described below.

Detail Polys: This is the number of polygons that are rendered with the current detail level. Usually this number will decrease with each LOD.

Detail Size: This is the size – in pixels – at which the current LOD will switch to the next, lower LOD – assuming that manual LOD switching is disabled. Depending on the *Alpha In* and *Alpha Out* values for the current LOD, this change may be abrupt or the next detail level will be slowly faded in. Please see the section on the Heads Up Display (HUD) for more information on the alpha values for each detail level.

Pixel Size: This is the current size of the viewed shape in pixels. As the ShowTool Pro camera is zoomed and possibly rotated, this value will change. Once this value drops below the *Detail Size* of the current LOD, the next detail level will be chosen (if manual LOD switching is disabled).

Cur Dist: This is the current distance (in TGE units, usually meters) that the camera is from the viewed object's center. This value is not used in the LOD process, but is displayed to get a sense of how far away the player in your TGE game will need to be from the viewed object to see the current detail level.

Please note that the camera's field of view (FOV) setting will also change the object's pixel size. Changing the camera to a narrower (telescopic) view will draw the shape larger than a wide FOV while the camera remains at the same distance from the shape. For the ShowTool Pro current distance parameter to be most accurate, its camera's FOV will need to match that of your own TGE game. Please see the *Graphical Interface Introduction: Manipulating the Camera* for more information on changing the camera's FOV.
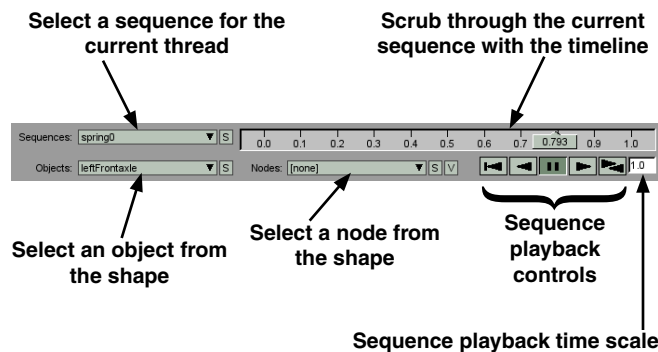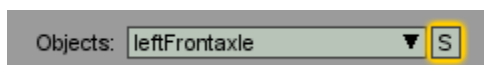
OBJECTS, NODES AND SEQUENCES

Along the very bottom of Torque ShowTool Pro's graphical interface are a number of popups, a timeline slider, and VCR-like buttons. These are used to select objects, nodes and sequences from the currently viewed shape and to playback a selected sequence.

When an object is selected from the list, its bounding box is drawn in the 3D view. The bounding box may be either an outline or a translucent fill depending on the bounding box settings under the *Render* tab of the DISPLAY PROPERTIES window. The bounding box will move along with the selected object during animation playback.

The left front axle object on the car has been selected from the Objects popup. It has been highlighted in the 3D view as a translucent red bounding box. DTS car object courtesy of the Brave-Tree: Car Pack.
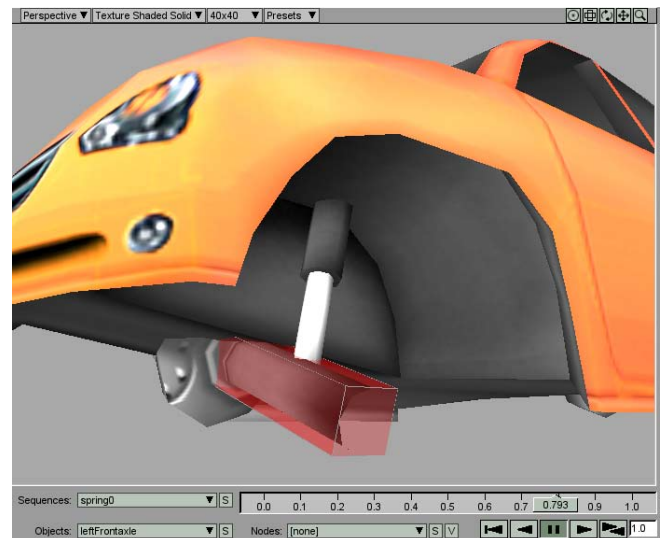
Objects Popup

The *Objects* popup lists all of the separate objects that make up the currently viewed shape. If the shape is made of a single mesh, then it is likely that only one object will be listed. In the case of a vehicle however, there may be a separate object for each axle, the windshields, the body, shocks, etc.

Each of the objects listed in the popup derive their names from the DTS file and are listed in the same order as they were exported. To change the list to be alphabetically sorted, the sort button beside the popup may be used.

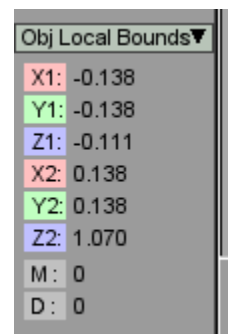With an object selected, the *Item Coordinates* display at the lower right of the main window can show the actual values for the object's bounding box. To see these values, select the Obj Local Bounds item from the *Item Coordinates* popup.

Item Coordinates Control

The values with the "1" suffix (X1, etc.) are one corner of the bounding box while the values with the "2" suffix are for the opposite corner. These values are in a local coordinate space and do not change as the object is animated.

To stop drawing a selected object's bounding box, select the [none] item from the *Objects* popup. This will also reset the *Item Coordinates'* bounding box values to zero.

Nodes Popup

The *Nodes* popup lists all of the nodes that are within the currently viewed shape. The listing's node names come from the DTS file and by default they are listed in the same order they were loaded. The list may be alphabetically sorted using the sort button beside the popup.

When a node is selected, its axis is drawn in the 3D view. The axis presents the node's final rotation and uses the RGB color scheme for the XYZ axis, respectively. The node's axis will be drawn regardless of the *Show All Nodes* setting under the *Nodes* tab of the DISPLAY PROPERTIES window.
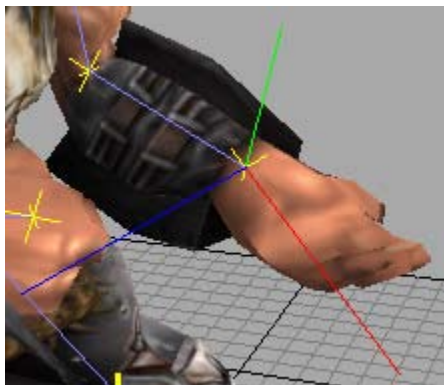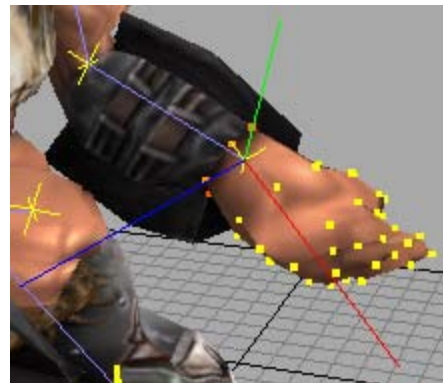

TGE Orc's "Bip01 L Hand" node selected from the Nodes popup causing its axis to be drawn. The RGB colors respectively correspond to the XYZ axis.

When a node is selected from the *Nodes* popup, and the object that is associated with it is a skin mesh, it is possible to see what vertices are controlled by the node. To enable this display, use the Render node controlled vertices button beside the *Nodes* popup.

Turning this feature on will render all vertices that are controlled by the selected node in a color that is dependant on their weighting. Please see the *Node Tab* section of the *Command & Properties Buttons* chapter for more information.

The "Bip01 L Hand" node selected from the Nodes popup with node vertices enabled. The yellow vertices are completely controlled by the node, while the orange ones are only partially controlled.

It is also possible to view the selected node's coordinates using the *Item Coordinates* control at the bottom left of the main window. The *Item Coordinates* popup provides two relevant entries:

Node Wrld Coord: Provides the node's position and rotation in world coordinates (after all parent transforms have taken place).

Node Local Coord: Provides the node's position and rotation in local coordinates (also know as the parent's coordinates).

Heading, Pitch and Bank in Degrees {

World Coordinates   **Local Coordinates**
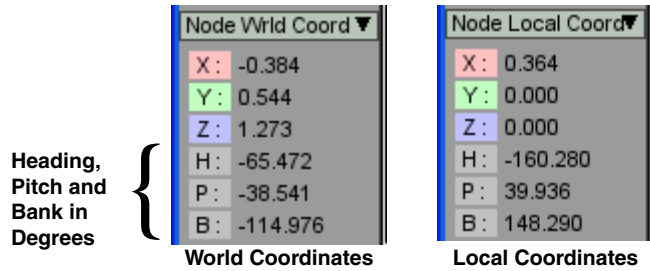
Regardless of which mode the *Item Coordinates* display is in, if the node's position and rotation change during an animation sequence, these reported values will also change in real time.

To stop drawing a select node's axis in the 3D view, select the [none] item from the *Nodes* popup. This will also set the *Item Coordinates* node displays to zero.

Sequences Popup and Playback

The *Sequences* popup lists all of the loaded animation sequences for the currently viewed shape. These sequences may either come from the DTS file itself, or are loaded from a DSQ file. The sequences are listed in the order they have been loaded and may be alphabetically sorted using the sort button beside the popup.


If a sequence was loaded from the DTS file or manually from a DSQ file, then the name displayed in the popup comes from the file. If a sequence was loaded through a TSShapeConstructor datablock, then the name may either be from a DSQ file or from the datablock itself. Please see the *Tutorial 2: TSShapeConstructor* chapter for more information on this datablock.

The current animation sequence may also be selected from the *Thread Controls* window using its *Sequence* list. If the current sequence is changed using this method, then the *Sequences*

popup will also change. The opposite is also true: selecting a different sequence from the *Sequences* popup will change the animation sequence for the currently selected thread. For more information, please see the *Thread Controls Button and Window* section within the *Command & Properties Buttons* chapter.

To the right of the *Sequences* popup is the animation timeline that runs from 0.0 on the left to 1.0. This value is the current animation "position" being viewed. Regardless of the actual run length of a sequence, it is scaled to the 0–1 position, just as it is in the TGE.

The slider within the timeline may be dragged using the mouse to manually scrub through the current sequence. The currently viewed sequence position is written within the slider. If the mouse is clicked anywhere on the timeline, the slider will jump to that position.

Slider at the current sequence position
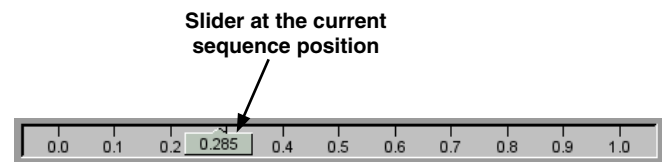
The sequence timeline with a scaled range of 0.0 to 1.0, known in the TGE as the sequence's position.

If the currently selected sequence contains any triggers, they are drawn as white vertical lines on the timeline at the appropriate positions. The SEQUENCE INFO window may be used to find out more information on a sequence's triggers.

Underneath the sequence timeline are a series of VCR-like controls that are used to play the selected animation in real time. Each of these buttons is described below.

Pause
Rewind ──────── **Ping Pong**
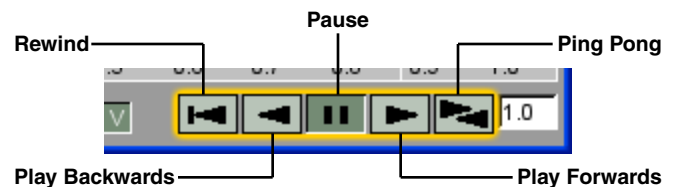
Play Backwards ──────── **Play Forwards**

Rewind: Will rewind the sequence back to position 0.0.

Play Backwards: Will play the sequence backwards. It is equivalent to setting the sequence's timescale to -1.0.

Pause: Pauses a sequence that is playing.

Play Forwards: Will play the sequence normally.

Ping Pong: This is a toggle button to enable ping pong mode. With this enabled, when a playing sequence reaches the end, it will reverse direction and continue to play, even if the sequence is not set to cycle.

To the right of the playback buttons is a global animation timescale text field.

This timescale is usually kept at a value of 1.0 which will play back all sequences at the same speed they were exported with. Changing this value will increase or decrease the speed at which all sequences are played.

To change the timescale value, enter a new number into the text field and press *return* or *enter*. The new value will take affect immediately. For example, entering a value of 2.0 will double the playback speed, while a value of 0.25 will play back all sequences at one quarter their normal speed.

GRAPHICAL INTERFACE PRESETS

Torque ShowTool Pro allows the user to set up a number of presets that will modify the user interface when selected. It is also possible to tie a preset to a function key for instant access. Some of the things presets may do is change the rendering mode, modify the light coloring, and change node drawing modes. ShowTool Pro comes with a variety of presets already built that the user may use as a starting point.

Using a Preset

All presets may be accessed using the *Preset* popup located just above the 3D view.
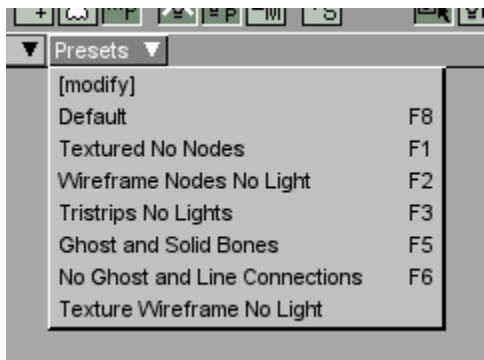
To activate a preset, select it from the popup's list. For example, clicking on the Default preset above will reset ShowTool Pro's interface to the state it was installed in.

It is also possible to use a function key to activate a preset. To the right of the preset's name in the *Preset* popup is the function key to press to activate that preset.

Adding and Changing Presets

To add and modify presets, select the [modify] item from the *Presets* popup. This will open the MODIFY PRESETS window.

List of existing presets   Preset list commands
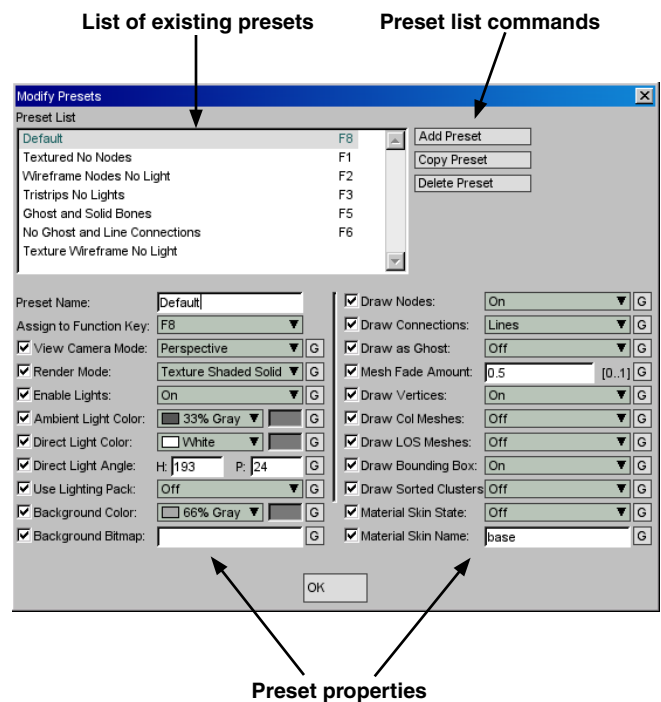
Preset properties

At the top left of the MODIFY PRESETS window is a list of all defined presets. Select a preset from the list to display its properties in the various controls below the list.

To the right of the list are buttons for working with the list. The *Add Preset* button will add a new preset to the bottom of the list with a default name of "preset". The *Copy Preset* button will create a copy of the selected preset and add the word "copy" to the end of its name. Finally, the

Delete Preset button will permanently remove the selected preset from the list.

Underneath the list are all of the properties for the selected preset. It contains all of the graphical interface parameters that a preset may modify. At the top left of these properties is the *Preset Name* text field where the name of the selected preset may be changed, and the *Assign to Function Key* popup – used to select an optional function key to current the preset.

The remainder of the properties refer to various settings found throughout the rest of ShowTool Pro. All of these properties share some common controls which are described in the diagram

Checkbox indicates if the selected preset should change this interface parameter. Unchecked indicates that the preset will leave this parameter alone.
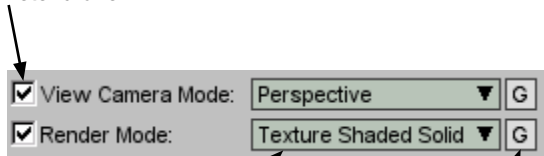
The value that the selected preset will change the interface parameter to. This may be a popup or a text field.

When this button is clicked, it will grab the current value for this interface parameter.

below.

One special case is interface parameters that may be assigned a color, including a custom one. In this case, the property's popup may be used to select a color from the predefined list, but a custom color must be created elsewhere and then the G button may be used to get it.

For example, to assign a custom color to the *Background Color* property, it must be set up using the DISPLAY PROPERTIES window, and then the G button is used to get the color for the preset.

When you are finished adding and changing presets, click on the *OK* button at the bottom of the window to close it.

APPENDIX A: TOOLBAR AND KEYBOARD SHORTCUTS

Toolbar Button Descriptions

Display Grid

Timed Texture Flush

Lock Detail Level

Display Line of Sight Collision Meshes

Render Sorted Mesh Drawing Order

Render in Ghost Mode

Turn On Directional Lighting

Enable Environmental Mapping

Mouse Controls Camera

Window Always On Top

Lock Mip Map Level

Display Collision Meshes

Render Solid Bounding Boxes

Show Nodes

Draw Mounted Objects

Activate Synapse Gaming Lighting Pack

Activate Transition Sequence

Mouse Controls Light

Translate Camera

Recenter Object

Zoom Camera

Modify Field of View

Rotate Camera/Light

Keyboard Shortcuts

Key	Description
a	Recenter the 3D view around the current shape
t	Manually flush the texture cache (works even if the timed texture flush is enabled)
l	Held down to change the angle of the directional light with the left mouse button and will display the lightbox
shift-l	Toggles the lights on and off
up arrow	Increase the mip map base level
down arrow	Decrease the mip map base level
m	Toggles the maximum mip map level to be the same as the base, effectively disabling mip mapping
left arrow	Manually lowers the detail level and enables the LOD lock
right arrow	Manually raises the detail level and enables the LOD lock
d	Toggles the detail level controls (LOD lock) from manual to the standard TGE pixel size determination
page up	Changes the 3D view to the previously loaded shape
page down	Changes the 3D view to the next loaded shape
h	Toggles the heads up display (HUD)
n	Toggles the display of nodes and their connections (if connections were enabled under the Display Properties window)
w	Toggles the main window to always be on top of other OS application windows
g	Toggles the display of the grid
1	Change the 3D view to orthographic, top down
2	Change the 3D view to orthographic, bottom up
3	Change the 3D view to orthographic, front facing
4	Change the 3D view to orthographic, back facing
5	Change the 3D view to orthographic, left facing
6	Change the 3D view to orthographic, right facing
7	Change the 3D view to perspective, free camera
F1–F8	Activate a user defined preset