LaserAnimation
SOLLINGER

proTize max

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proTize max Overview

proTize max is a plugin for 3ds max™ by Autodesk. It is a renderer that allows to render 3ds max™ scenes to a series of laser images.

proTize max requires a PC running 3ds Max™ (version 6-9, 2008-2012) and free USB port for the dongle.

A Lasergraph DSP will be supported if connected to the PC by Ethernet.
Likewise a QM2000 board will be supported.

This manual assumes your are familiar with 3ds max™ and it's concepts.

proTize max consist of:

1. A **regular renderer**. This renderer can be assigned to be the draft or production renderer in the 3ds max™ rendering dialog. This is what you will use to create the final sequence of laser images.
2. An **interactive renderer**. This is the part of **proTize max** that automatically renders all modifications directly to the viewport and/or laser. This renderer should only be enabled temporarily and for not too complex scenes. It is intended for direct feedback while you change you models, modify parameters etc. For simple scenes it will work in real-time on a sufficiently fast PC.
3. **Global parameter manager**. There are some (well actually many...) global parameters that control the interactive as well as the normal renderer. There is one set for each renderer. The global parameters control things like anchor detection, overlap removal etc. Most of the time you will not have to modify these parameters. We make this available to make sure you have full control.
4. A **modifier** that allows detailed control of the laser output of an object or even sub-object selection set. This modifier is the key to modify the appearance of objects in laser light. You can control many aspects of the **proTize** rendering process with this modifier.
5. **Flash™ (swf) output module**. This allows to create previews that can be viewed on any PC that has the Macromedia Flash™ Player installed. Useful to send overview of the work in progress to your client by email etc.
6. **Lpv output module**. Allows to create Lpv files for playback by **Lpv Player**.

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Installation

Step 1, before you install proTize max

Before you install **proTize max** make sure that your installation of 3ds max™ is fully functional. **proTize max** can not be properly installed if 3ds max™ is not working properly.

Lasergraph DSP users should Install the latest version of **LGRemote** and verify that **LGRemote** can access the Lasergraph DSP over the network. The latest Lasergraph DSP system software should be installed too. Check http://www.laseranimation.com for updates. If you received **proTize** on CDRom also check "`Support\Lasergraph DSP`".

Pangolin™ users should make sure the LD2000 installation works properly before installing **proTize max**.

Important: proTize max comes with an USB dongle. Make sure this dongle is *not* connected during the installation of proTize max!

If you are upgrading from **proTize max DSP** (demo or old version) to **proTize max** (full version) please uninstall **proTize max DSP** first! In general it is a good idea to uninstall previous/different versions of **proTize max** before installing another version.

Beginning with **proTize max** 2004/01/26 even the dongle version needs an additional license key that you must type in once after installation. Without this key you cannot use **proTize max**. Make sure you have this authorization key available. If you just purchased **proTize max** this key will be delivered with the installation CD, the dongle and accompanying documentation. If you downloaded **proTize max** we recommend you request an authorization key *before* updating **proTize max**. Otherwise you will not be able to use **proTize max**.
Please contact proTize@laseranimation.com to get information about this key before updating.

Step 2, install proTize max

If you are running Windows XP/Vista/7/8 make sure to logon with administrative privileges to install proTize max!

If you received the **proTize max** installation on CDRom, just insert the disk and the installation should start automatically. If the Autorun feature of your CDRom drive is disabled you might have to open the drive icon and double-click **Setup.exe**.

If you are installing a downloaded version (e.g **proTizeMax--2014-09-30.exe**), just double-click this file to start installation.

Note: **proTize max** may be installed on more than one computer. However, **proTize max** can only be used on one computer at a time. **proTize max** will only work on the computer that has the dongle connected.

Once the installation started **follow the instructions carefully**. Make sure to remember the location of the installed directories. This is where you will find **Samples, Documentation** etc.
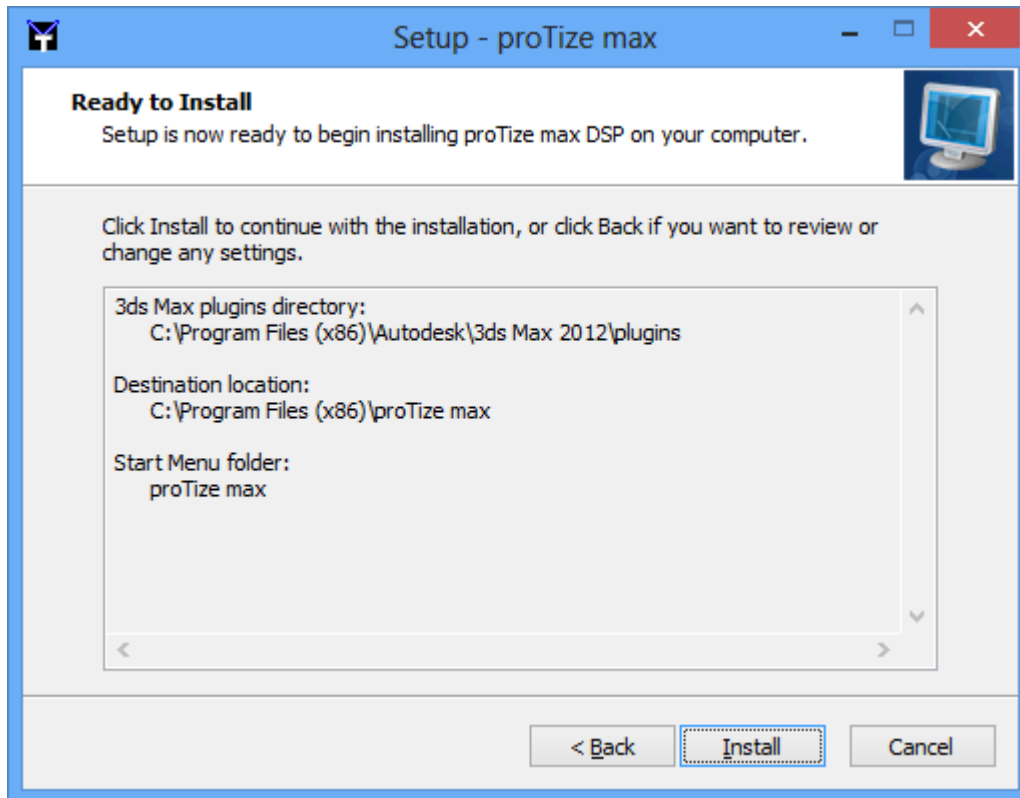
Step 3, connect USB dongle

This only applies to the standard version of **proTize max**. The Lasergraph DSP only version **proTize max DSP** does not require the dongle.

Connect the USB dongle to any of the USB ports of your PC. The system should report "`new hardware found`" and then automatically install the driver. Often this is just displayed for a short time or will not be visible at all.

Sometimes the system may ask for installation of a driver. Choose "`default`" in such cases.

Then start 3ds max™.

You should now have a new item on the 3ds max™ main menu: "**proTize**". Select "**About**" and check that **proTize** is active, and the dongle recognized:
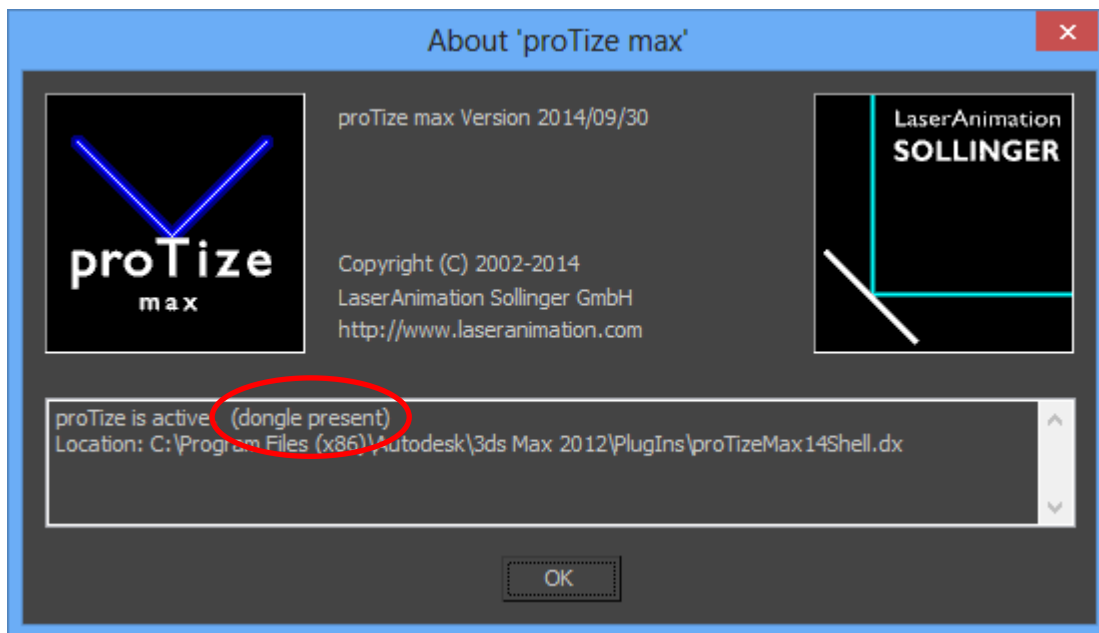
See "**Trouble Shooting the Dongle Driver**" if the dongle does not work as expected.

Step 4, authorize Lasergraph DSP for use with proTize max DSP

This only applies to **proTize max DSP**, the Lasergraph DSP only version of **proTize max**. The standard version (that comes with a dongle) does not require this step, no matter whether it is gonna be used with a Lasergraph DSP or not.

proTize max DSP will only work with a Lasergraph DSP that has been authorized for use with **proTize**. Make sure to choose a Lasergraph DSP that is accessible from the PC over the network. Remember, you can not use **proTize max DSP** without the Lasergraph DSP. So make sure you choose a Lasergraph DSP that is available all the time.

Make sure to install the latest version of the Lasergraph DSP system software. You can download this from http://www.laseranimation.com. If you received **proTize max** on CDRom check "`Support\Lasergraph DSP\Rom-Files`". The latest version might be there.

The Lasergraph DSP Mark 2 has a build-in authorization for proTize max. So if you use a Lasergraph DSP Mark 2 you don't need to authorize the Lasergraph DSP manually.

For all other Lasergraph DSPs type "`ApplyLicenseKey`" (or the short cut "`ALK`") without parameters and click OK:

Something like this will be displayed:
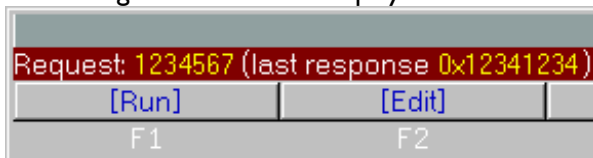
We need request key (1234567 in the example). Send this to LaserAnimation to receive an authorization key.

As soon as you have the key, apply it like this:
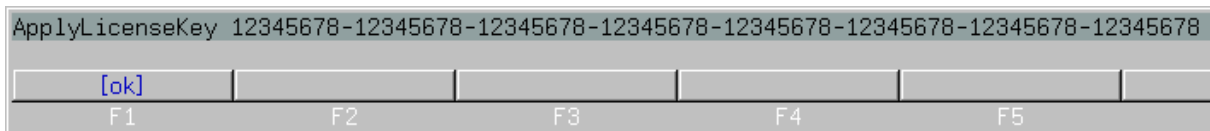
Since the key is pretty long (about 80 chars) we recommend to use **LGRemote** and cut and paste to avoid actually typing the key. Note, the key can only be applied once. The Lasergraph DSP will respond like this:
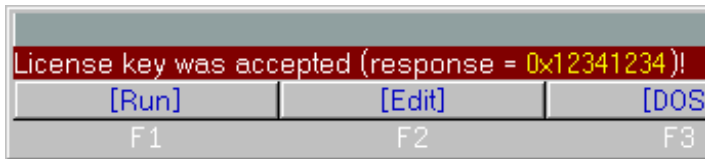
The actual response will be different for each Lasergraph DSP.

Now start 3ds max™.

After some time you should see a dialog:
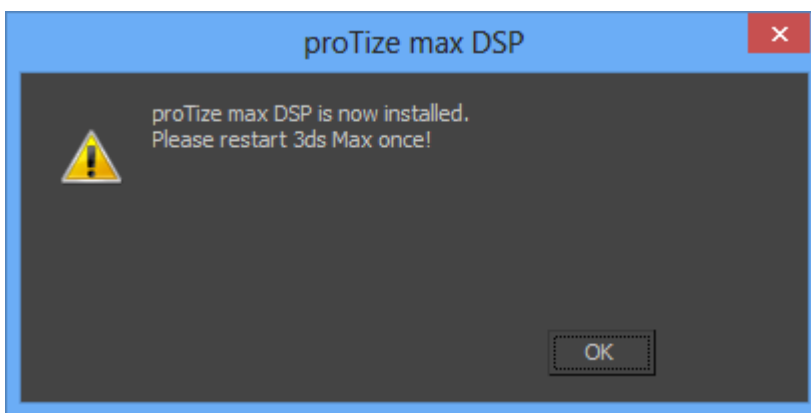
It is now required to quit and restart 3ds max™ once. After that you will have a fully functional copy of **proTize max DSP**.

Additional steps after reinstallation/update

Reboot the PC

Usually you will get informed by the installer in case a reboot is required. But if things do not work properly you should try to reboot - even if this was not requested - to check if that solves the problem.

Reset keyboard assignments

After reinstallation of **proTize max** (to update to a new installation etc.) some of the short cuts might be missing. This has to do with the way 3ds max™ handles keyboard short cuts. To make sure you get the keyboard assignment consistent with this manual you might have to reset the keyboard setup of 3ds max™:

```
Customize ⇨ Customize User Interface ⇨ Keyboard ⇨ Reset
```

Warning: This will not only reset the keyboard assignments of **proTize max**. It will reset the assignment of *all* 3ds max™ keys! If you personalized your keyboard assignments of 3ds max™ you better do not reset.

Check 3ds max™ Display Driver setup

To achieve best performance with 3ds max™ and **proTize max** – in particular in interactive mode - we recommend to check the display driver setup. You will it here:

```
Customize ⇨ Preferences ⇨ Viewports ⇨ Choose Driver...
Customize ⇨ Preferences ⇨ Viewports ⇨ Configure Driver...
```

Make sure you select the driver that has best support for you graphics card.

In the driver configuration dialog you might want to disable "`Redraw Scene On Window Expose`" as this usually slows down with **proTize max** interactive rendering without improving the display. However, this depends on you graphics card and display driver setup. If your screen is not updated correctly you might have to enable this. See 3ds max™ manual for details.

Trouble Shooting the Dongle Driver

Note: If you are running Windows XP/Vista/7/8 make sure to logon with administrative privileges to install/modify the dongle driver!

If the dongle is not recognized properly, check the installation of the driver. It can be found in "`Start` ⇨ `proTize max` ⇨ `Dongle Driver`". Repair or reinstall the driver to correct any problems. Follow the instructions of the installer carefully. We recommend to use the full installation.

Important: Even though proTize max will only use the USB variant of the dongle, you should not uninstall the Parallel System Driver. On some systems the dongle will not work properly if the Parallel System Driver is removed. We are investigating the reasons for this.

In some cases the installation of the driver might fail due to an older version of the driver already installed. In such cases remove the old driver (`Control Panel` ⇨ `Software` ⇨ `Sentinel System Driver`), reboot if requested and reinstall **proTize** (or at least the dongle driver).

Uninstalling proTize max

To uninstall **proTize max** open the "`Control Panel`" and select "`Uninstall a program`".
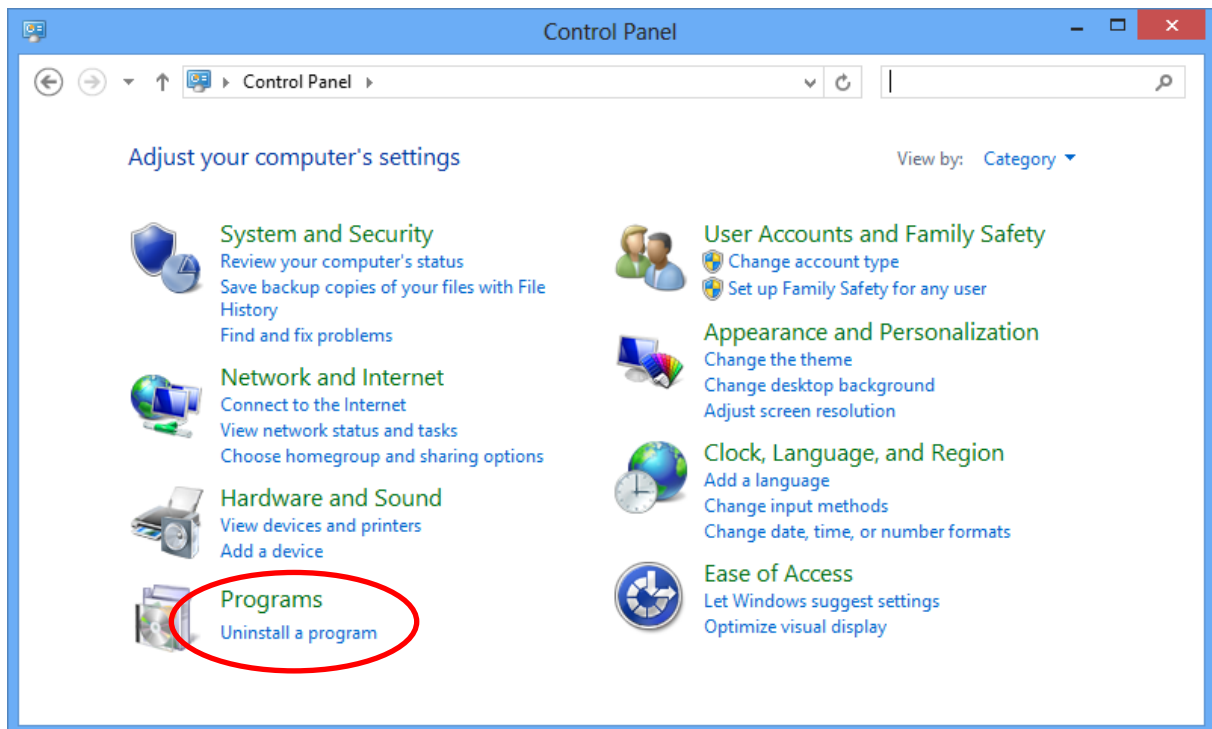
If you still want to use 3ds max™ after removal of **proTize max** you might have to delete the **proTize max** menu from 3ds max™.

The dongle driver is not automatically removed from the system by uninstalling **proTize max**. If you are sure you don't need it anymore you can manually remove the "`Sentinel System Driver`", found in "`Control Panel ⇨ Uninstall a program`".

Do not uninstall the driver if you have any other software installed that comes with a dongle (like proTize converter) - unless you are going to uninstall this too.

Getting started with proTize max

If you want to use **proTize max** with a Lasergraph DSP, load **proTize.FILM** on the Lasergraph DSP . This is a simple film that will display the images in laser light as they are rendered by **proTize max**. The film uses a default color palette setup that matches the colors as they are created by the **proTize max** renderer.

This film can be found on the PC in the directory where **proTize max** was installed. With the standard installation of 3ds max™ this would "`C:\Program Files\proTize max\DSP-Stuff`".

Once the film is loaded go to edit mode, activate the line with "`DisplayAnimation`" and let the Lasergraph DSP alone. The Lasergraph DSP will automatically capture the output of 3ds max™/**proTize max** (if enabled) and display the images in laser light.

For LD2000 it is best to close all other programs accessing the QM2000 board to avoid conflicts.

Start 3ds max™ and load the sample scene "`Teapot.max`" from the **proTize max** samples (default installation path "`C:\Program Files\proTize max\Samples`").

Now you should select the output device once. From the menu choose "`Select Laser Device`". Then for use with a Lasergraph DSP choose one of the Lasergraph DSPs listed. Or just "`DSP`" if currently no Lasergraph DSP is available. For Pangolin™ or other laser formats choose "`LD2000`".
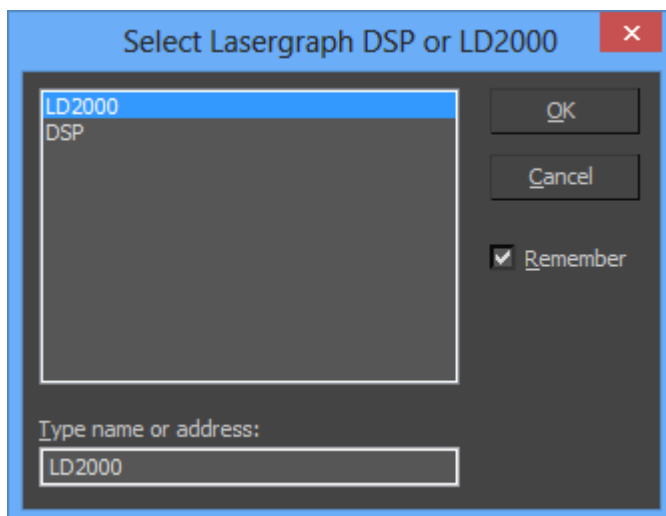
Then enable "`Interactive Rendering`" (default keyboard assignment **Alt+Ctrl+I**). Also check "`Enable Display On Laser Device`" (default keyboard assignment **Alt+Ctrl+D**):
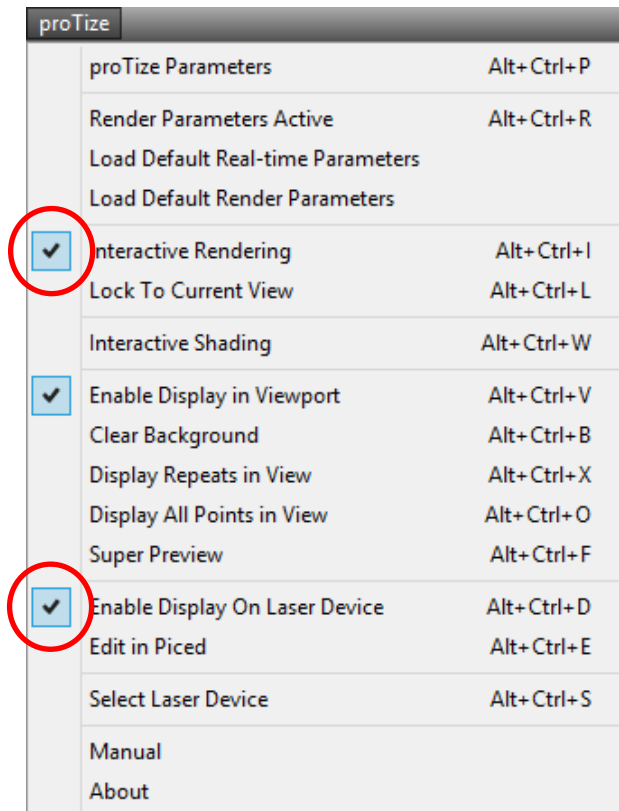
You should now be able to see the teapot rendered in laser light.

If you move the camera or the teapot around you should see real-time feedback on screen as well as in laser light.

Next step is to render a scene and transfer it to the Lasergraph DSP or the QM2000 board. First you need to assign the **proTize max** renderer to be the draft renderer or the production renderer.
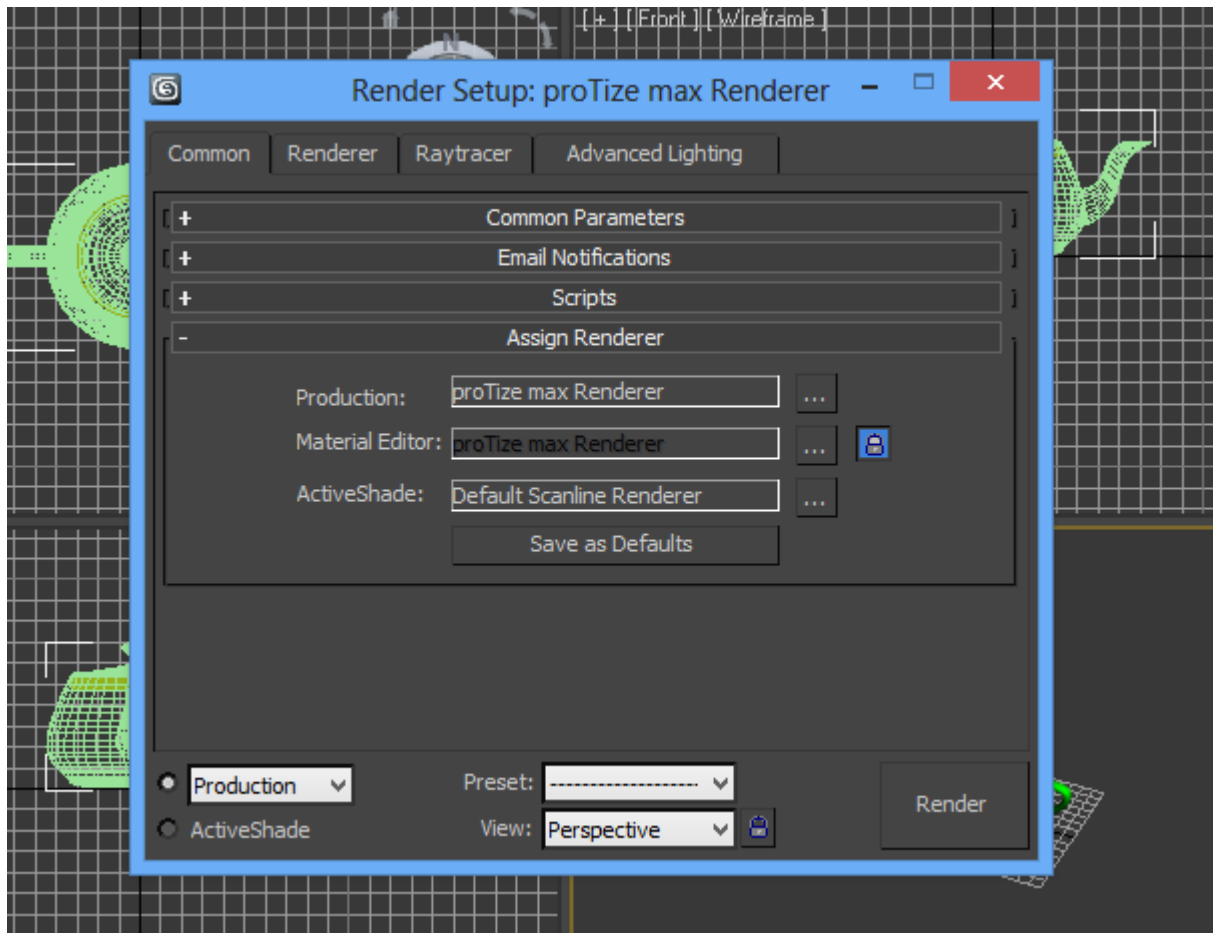
The parameters of **proTize max** need some attention:

- Depending on the output format you want check "`Dsp`", "`ILDA`", "`LDS`", "`SWF`" and/or "`Lpv`".
  (LDS will only be available if a QM2000 board is installed.)
- click "`File`" to select the destination path and filename. For the Dsp format **proTize max** will save the frames into a catalog that is created in the specified destination path. And an animation is generated with the specified filename. It is recommended to choose a directory that is shared in the network, so that the Lasergraph DSP has direct access to it.
- Check "`Load directly into DSP/LD memory`". This will load the frames directly into the Lasergraph DSP or the QM2000 board as they are rendered. This means there is no need to load them explicitly after rendering.
  If the current laser device is a lasergraph DSP somewhere in the network this option should only be checked if the Lasergraph DSP is not currently in use by someone else.
- Check "`Display with laser while rendering`". This will display the frames as they are rendered.
  This requires the Lasergraph DSP to be in edit mode, **proTize.FILM** recommended.
  In case of a QM2000: make sure no other programs are accessing the QM2000 board to avoid conflicts.
- Enable "`Render dynamic`". See explanation below.
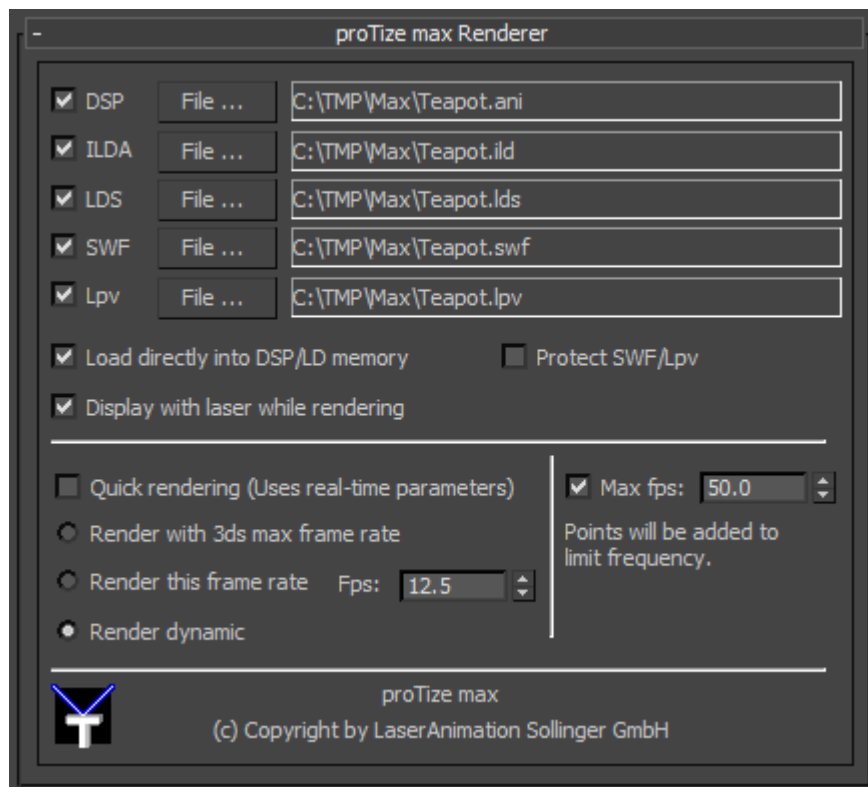
Everything is now setup for your first rendering - click Render and watch the renderer while computing the laser frames. The frames are automatically loaded into the Lasergraph DSP (or QM2000).
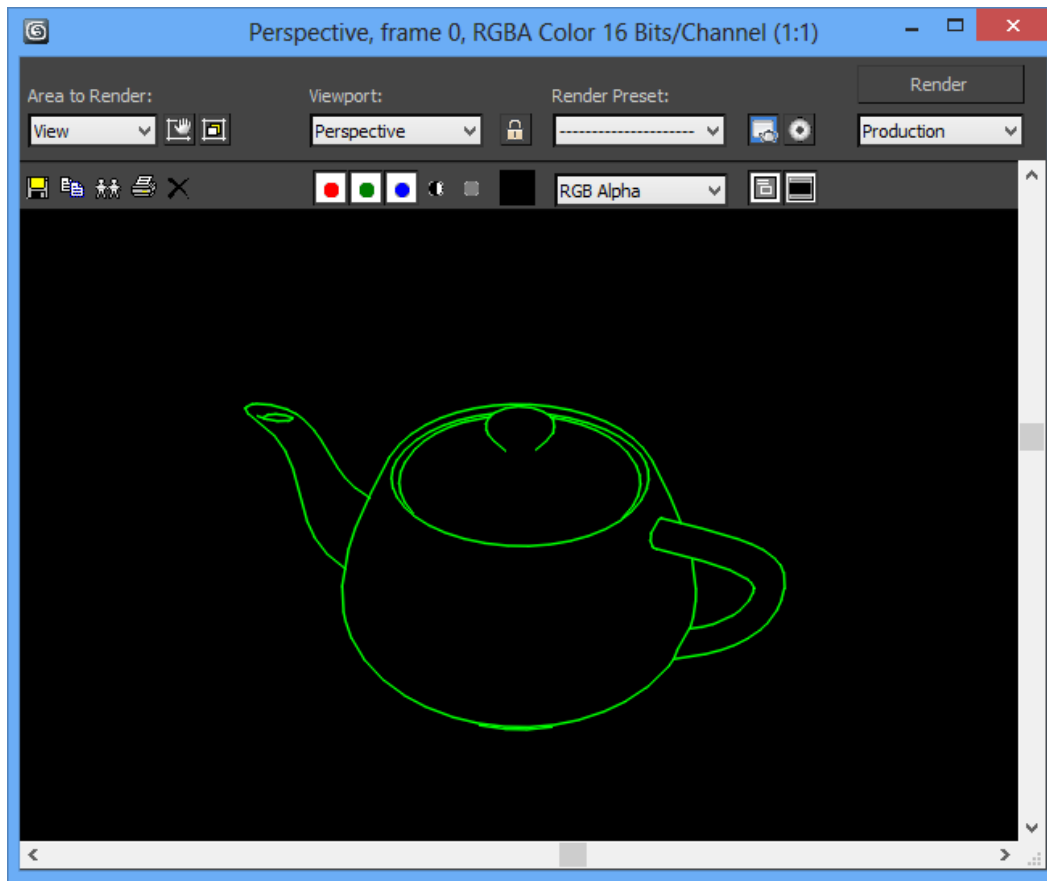
Play with all the samples in the **Samples** directory (default installation path "`C:\Program Files\proTize max\Samples`").

The proTize menu

This is a detailed description of the **proTize max** menu. It is found in the main menu bar of 3ds max™. Since 3ds max™ allows to reconfigure the menu and the keyboard short cuts, your menu might look slightly different.

proTize	
proTize Parameters	Alt+Ctrl+P
Render Parameters Active	Alt+Ctrl+R
Load Default Real-time Parameters	
Load Default Render Parameters	
Interactive Rendering	Alt+Ctrl+I
Lock To Current View	Alt+Ctrl+L
Interactive Shading	Alt+Ctrl+W
✔ Enable Display in Viewport	Alt+Ctrl+V
Clear Background	Alt+Ctrl+B
Display Repeats in View	Alt+Ctrl+X
Display All Points in View	Alt+Ctrl+O
Super Preview	Alt+Ctrl+F
Enable Display On Laser Device	Alt+Ctrl+D
Edit in Piced	Alt+Ctrl+E
Select Laser Device	Alt+Ctrl+S
Manual	
About	

proTize Parameters

This opens the main parameter window of **proTize max**. See "**The Global Rendering Parameters**".

Render Parameters Active

Default: unchecked.
This shows/changes which of the two parameter sets is active. If checked the Render Parameter set is active. If unchecked the Real-time Parameter set is active. Usually the Real-time Parameter set is active, so this is unchecked by default. However, to modify the parameters used for rendering or to verify the output generated by the rendering parameters this must be checked. An in depth discussion of the global parameters can be found in "**The Global proTize max Parameters**".

Load Default Real-time Parameters

This loads the current set with the default values for real-time rendering. Note that this does not change which set of parameters is currently active. So if the Render Parameters are active by the time you click "`Load Default Real-time Parameters`", the parameter set used for rendering will be overwritten with the default values actually intended for real-time rendering.

Load Default Render Parameters

This loads the current set with the default values for normal rendering. Note that this does not change which set of parameters is currently active. So if the Real-time Parameters are active by the time you click "`Load Default Render Parameters`", the parameter set used for interactive (real-time) display will be overwritten with the default values actually intended for normal rendering.

Interactive Rendering

Default: unchecked.
This shows/changes if interactive (real-time) rendering of the **proTize max** plugin is enabled. If checked interactive rendering is enabled. Interactive (real-time) rendering means that all changes of the current viewport are intercept by **proTize max** and directly rendered to laser. The result of this will optionally be displayed in the viewports and/or in laser light. This depends on the other options below.
Note that for complex scenes rendering can be slow. So this is recommended only for not too complex scenes.

Lock To Current View

Default: unchecked.
The interactive **proTize max** renderer usually renders the current viewport. If you switch between viewports, but want the interactive rendering to stay in a certain viewport, first activate that viewport, then select "`Lock To Current View`" from the menu. (or press **Alt+Ctrl+L**). Uncheck to unlock.

Interactive Shading

Default: unchecked.

By default lighting, shadows, maps and vertex colors are not evaluated by the interactive renderer for performance reasons. However, for relatively simple scenes shading might be fast enough for interactive work. In such cases interactive shading might be enabled. Be careful, rendering with lights, shadows and maps can be very slow.

disabled: enabled:
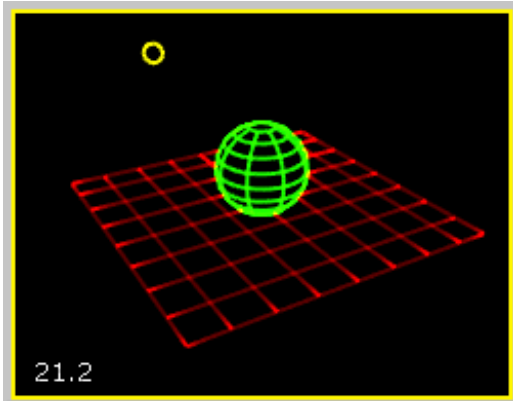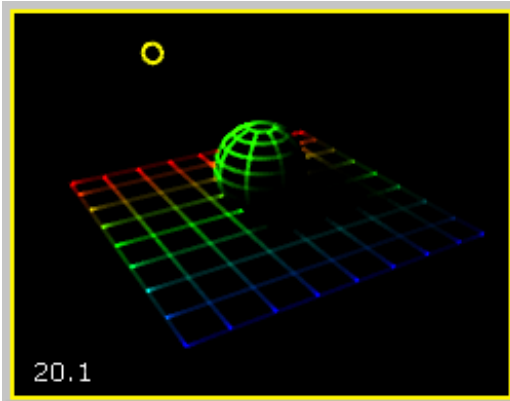
Enable Display In Viewport

Default: checked.

This enables/disables display of the **proTize max** output in the viewport. Note that this only has effect if interactive rendering is enabled.

Enabled: Disabled:
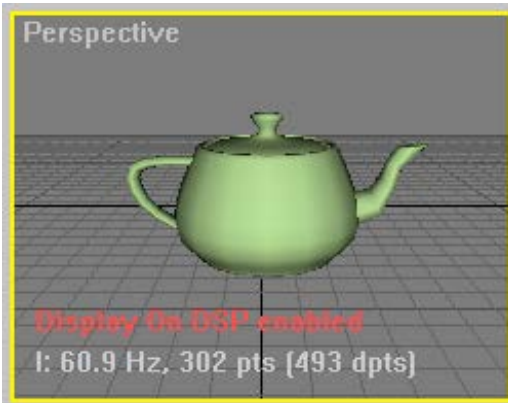
Clear Background

Default: unchecked.
This enables/disables clearing the background when displaying the interactive rendering result in a viewport. When enabled, this hides the shaded surfaces and all helpers like the grid and forces the background to black. Useful to get an impression of the rendered lines without all the other stuff.

Disabled:
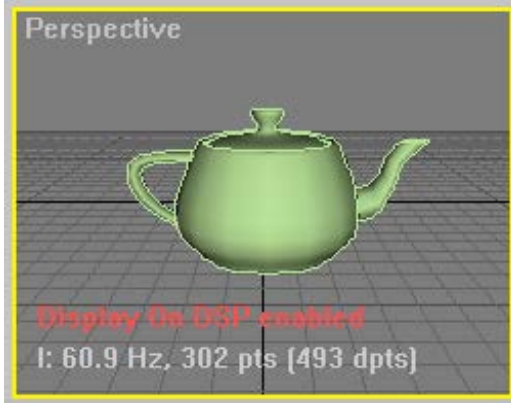
Enabled:
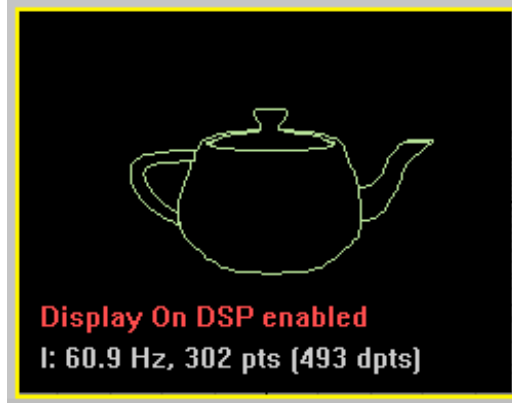
Display Repeats in View

Default: unchecked.
With this enabled the repeats generated at anchor points and beginning/end of lines are displayed with little cross marks. Useful when adjusting parameters without laser output.
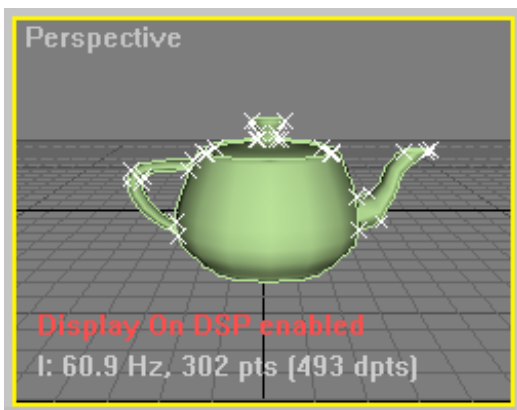
Display All Points in View

Default: unchecked.
Enables/disables display of all points. Allows to verify where **proTize max** places points.
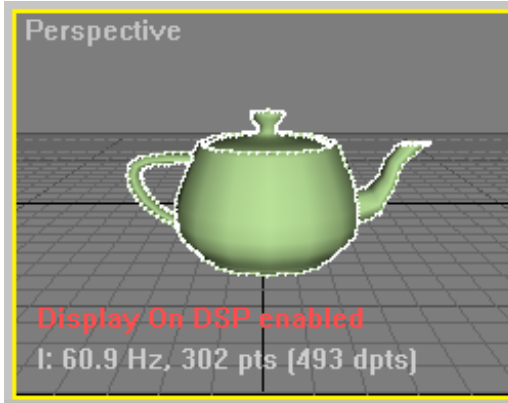
All Points   All Points + Repeats
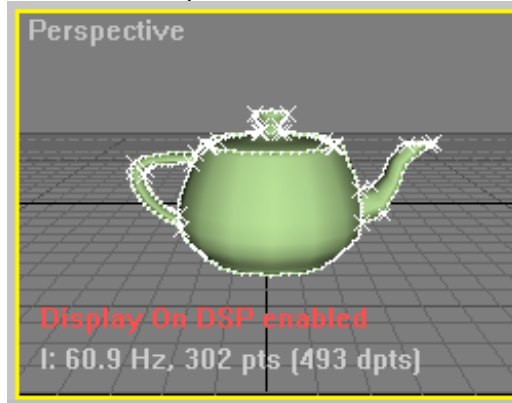
Super Preview

Default: unchecked.
Enables/disables the Super Preview. The Super Preview is an extra window that provides a very realistic simulation of the actual laser output, including the scanner dynamics.

See "Super Preview" for more info on how to adjust the way the images are displayed by the Super Preview.

Enable Display On Laser Device

Default: unchecked.

Enables/disables display of the current image by the current laser device.

If the current device is a Lasergraph DSP, it must be in edit mode. We recommend to load one of the films supplied with **proTize max**. Go to edit mode and make "`DisplayAnimation`" the current line:

```
X  W0 Film1: proTize
 |  ◄                           ►  |
      < Begin of film >           ▲
 Entry                      0
┌SetColorBuffer             0
├CopyColorBuffer          0->0
├CopyColorBuffer          0->1
├CopyColorBuffer          0->2
├CopyColorBuffer          0->3
└SetVariables
┌Loop                       0
├InitCamera
├InitPosition              0
├SetSoftBlanking
├DisplayAnimation
└SetVariables
 LoopEnd
 End of film                ▼
```
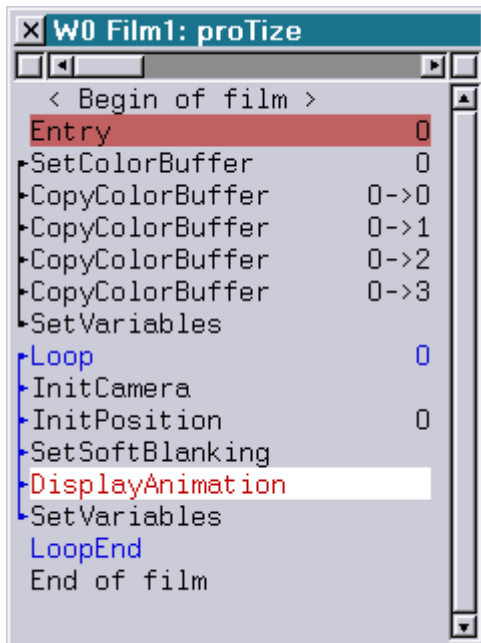
The film contains the standard palette configuration that is assumed by **proTize max** and has some softblanking applied so that overlapped contours have best quality.

With the QM2000 board it is a good idea to close all other programs that might access the QM2000 board to avoid conflicts.

Edit in Piced

Directly loads the current view into the Lasergraph DSP Piced. Not available if the current device is not a Lasergraph DSP.

Manual

Opens the **proTize max** manual (pdf). This is what you currently read...

About

Shows information about installed version of **proTize max**.
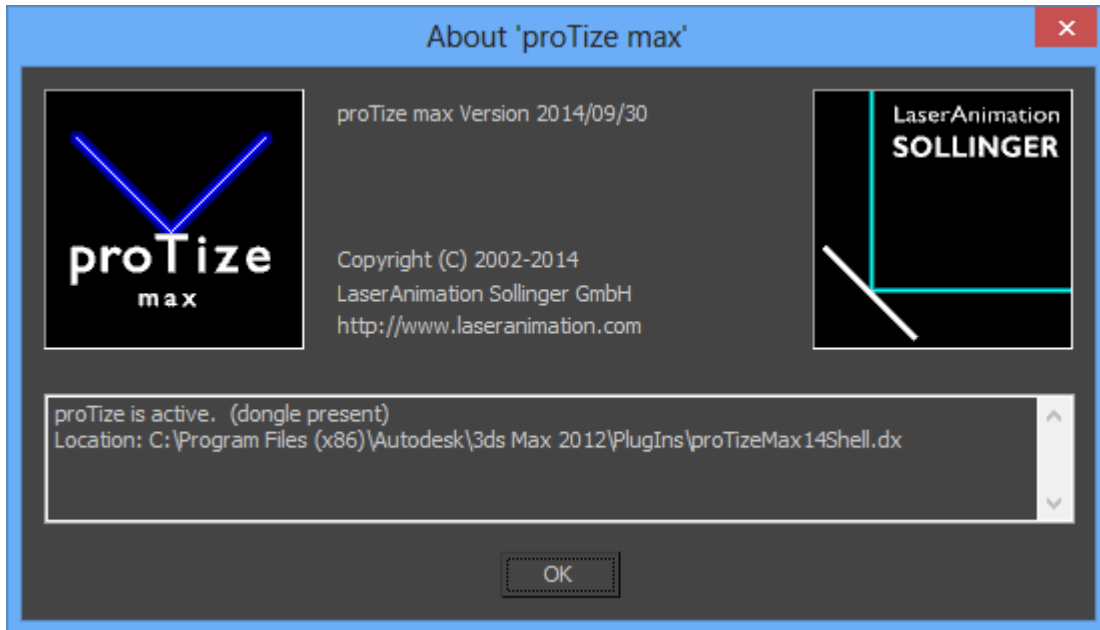
The Global Rendering Parameters

Overview

The global rendering parameters control the way the renderer (the normal renderer as well as the interactive renderer) optimizes the vector data so that it is suitable for conversion into laser images. To open a window that allows to review and modify the parameters click "`proTize Parameters`" from the **proTize** menu or press **Alt+Ctrl+P**.

For all values in the global rendering parameters you can get the default value by pressing **Ctrl+D**. Values that are different from the default are displayed in a different color. That way it is easy to see which parameters have been changed from the defaults.
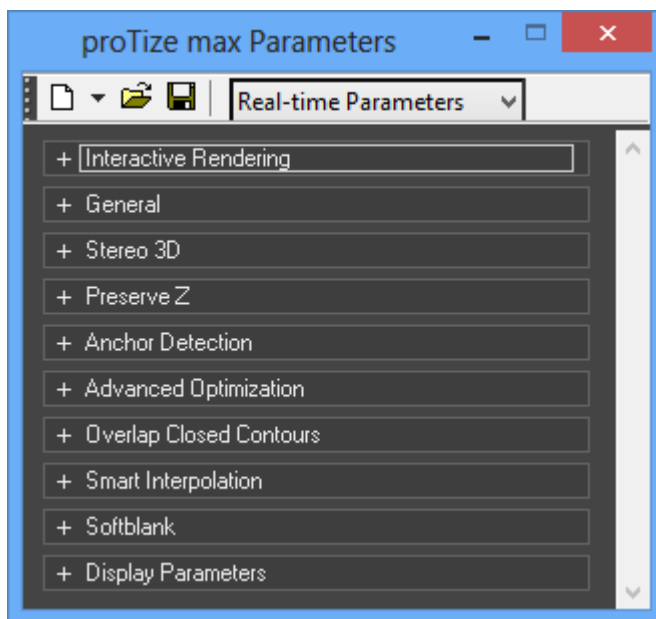
Default, Load & Save

The toolbar of the parameter window allows to load the defaults for the current parameter set. You can load the system defaults for the current set or explicitly select the default Real-time or Render Parameters.
Load and Save are provided to load/store the current setting from/to disc. The parameters are automatically stored with the 3ds max™ file. So you do not usually have to save this explicitly. However, if you adjusted a setting to achieve a special effect and want to apply this to many different scenes, you might find the save/load useful.

Real-time vs. Rendering Parameters

It is important to understand that there are two settings available for work with **proTize max**. The Real-time setting is usually what is intended for the interactive renderer. The Render Parameters setting is automatically used by the normal renderer. Some of the very sophisticated algorithms that are used by **proTize max** to optimize the laser image for best quality are computationally expensive and are by default not enabled for interactive rendering. This helps to speed up interactive work. Still when rendering the final sequence with the normal renderer the system will automatically switch to the Render Parameters and achieve perfect quality without extra intervention.

While you work with the scene you might temporarily switch to the rendering parameters from the menu or with the keyboard (default **Alt+Ctrl+R**).

We recommend that you get used to the default shortcuts of **proTize max**. Or modify the assignment to something more suitable for you. That way you can efficiently switch between the different display modes.

Interactive (real-time) Parameters: Render Parameters:

Display On DSP enabled   Display On DSP enabled
I: 33.0 Hz, 495 pts (910 dpts)   R: 32.7 Hz, 495 pts (918 dpts)

Note: In Lasergraph DSP mode the number of points in the image and the number of displayed points are both shown in the viewport. In LD2000 mode only one number is displayed as the numbers are always the same. This is due to the attributes like repeats etc. that allow Lasergraph DSP images to be stored with less point that required for display.

Rollup: Interactive Rendering
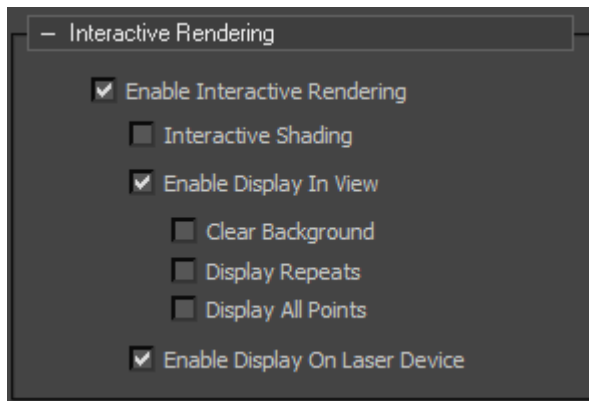
Overview

The parameters here are a mirror of the state of the interactive renderer. They are here for completeness only. See The **The proTize menu** for details.
Note: These parameters are not loaded from the 3ds max™ file. They will remain unchanged when loading 3ds max™ files. All parameters are reset to default when 3ds max™ is started.

Enable Interactive Rendering

Default: disabled.

Interactive Shading

Default: enabled.

Enable Display In View

Default: enabled.

Clear Background

Default: disabled.

Display Repeats

Default: disabled.

Display All Points

Default disabled.

Enable Display On Laser Device

Default disabled.

Rollup: General
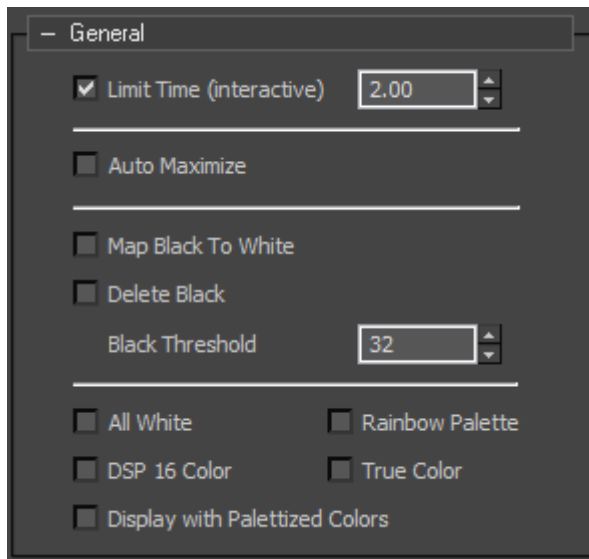
Limit Time (interactive)

Default: enabled, 2.00.
Allows to limit the rendering time of the interactive renderer. This helps to avoid user interface lockups while editing complex scenes that can not be rendered fast enough. Ignored by the normal renderer.

Auto Maximize

Default: disabled.
Allows to maximize the laser images individually. Not recommended for normal use.

Map Black To White

Default: disabled.
The color for the laser images are by default converted from the material diffuse color. While it makes perfectly sense for bitmap images to have black (or very dark) colors this is for obvious reasons nonsense for laser displays. Therefor **proTize** can automatically map black and dark colors to white. Note that this is just how colors are mapped by default. With the **proTize** Parameters modifier the colors can individually be adjusted for laser output independent of the material color.

Delete Black

Default: disabled.
If enabled black lines will be deleted.
Note: This option shows no effect if "Map Black To White" is enabled.

Black Threshold

Default: 32.
Allows to adjust the black threshold used by "Map Black To White" and "Delete Black".

All White

Default: disabled.
This tells **proTize** (when enabled) to ignore all colors and display all laser lines in white. This is useful if the color of materials shall be ignored or temporarily if no color control is available by the laser output. (E.g. a green laser that is just controlled by the green output etc.)

DSP 16 Color

Default: disabled.
This allows to limit the generated colors to the 16 default colors used by the Lasergraph DSP. By default **proTize max** generates the colors to match the palette setup with **proTize.film**. This uses all 4 palettes. This only makes sense for Lasergraph DSP operation. Leave this disabled for LD2000 operation.

Display With DSP Palettized Color

Default: disabled for LD2000 mode, enabled for Lasergraph DSP mode.
Enable this to display colors on screen and in SWF files like with the Lasergraph DSP standard palette. Should be disabled for true color operation. As LD2000 does not have support for palettized colors leave this disabled for LD2000 mode.

Rainbow Palette

Default: disabled.
If enabled the default Rainbow palette of the LD2000 will be used.

DSP True Color

Default: disabled.
Enable this to allow support for Lasergraph DSP true color operation instead of palettized mode. Leave always off for LD2000 operation.

Rollup: Stereo 3D
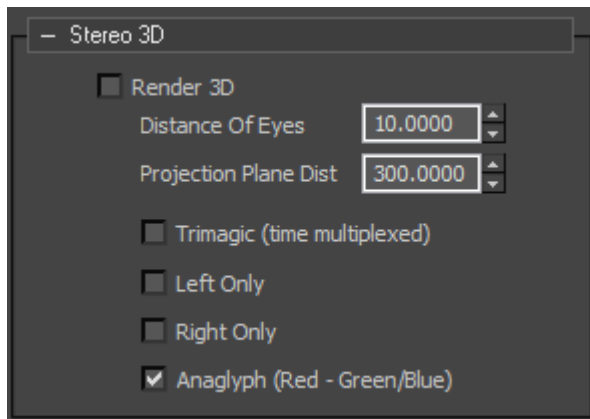
Overview

proTize max supports rendering for stereoscopic display. In general this means two images will be created, one for the left and one for the right eye. For display of 3D content special hardware (like shutter glasses, polarized glasses etc.) might be required to make this work. Either separate projectors are used to project the left and right image or a single projector with specific 3D support is used. Alternatively a standard laser projector can be used with the Anaglyph method which uses different colors to separate left/right.

Render 3D

Default: disabled.
This is the global enable/disable for 3D rendering.

Distance Of Eyes

Default: 10.0
This define the distance of the two virtual cameras that are used to compute the image for the left and right eye in world space coordinates. The proper value depends on the current scale of the scene.

Projection Plane Dist

Default: 300.0
This define the distance of the virtual projection plane in front of the cameras. The proper value depends on the current scale of the scene. Objects that are closer than this value will appear to be in front of the screen, objects that are further away will appear to be located behind the screen.

Trimagic

Default: disabled
Enable to compute images for time multiplexed display with a Trimagic projector. Leave unchecked to compute two images to be displayed by two projectors.

Left Only

Default: disabled
Enable to compute only images for the left camera. Useful if two separate projectors are used to display the left/right image.

Right Only

Default: disabled
Enable to compute only images for the right camera. Useful if two separate projectors are used to display the left/right image.

Anaglyph

Default: enabled
Enable to compute images for the Anaglyph method. Images will be colored red/green/blue to be viewed with red-green/red-blue glasses. This method has the advantage of working without special display hardware (on screen as well as in laser).

Rollup: Preserve Z
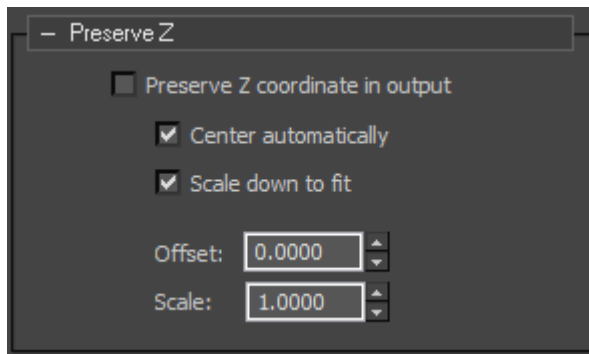
Overview

By default proTize will compute a 2D projection of the 3D scene in 3ds max - the Z coordinate of the laser images is usually 0. Sometimes it might be desirable to preserve the Z (depth) value of the images, so that the result is a 3D image that can be further processed by the DSP.

Preserve Z coordinate in output

Default: disabled.
Enable to preserve Z (depth) information of the rendered images.

Center automatically

Default: enabled.
Enable to force the 3D coordinates to be centered at 0.

Scale down to fit

Default: enabled.
Enable to scale the Z coordinates to that they fit the range of [-1.0, 1.0] as defined by the Lasergraph DSP.

Offset

Default: 0.0
Offset that is added to the Z coordinate in the resulting file. Useful to manually tweak the generated Z value for a series of images (with **Center automatically** and **Scale down to fit disabled).**

Scale

Default: 1.0
Factor that the Z coordinate is multiplied with before written to the resulting file. Useful to manually tweak the generated Z value for a series of images (with **Center automatically** and **Scale down to fit disabled).**

Rollup: Anchor Detection
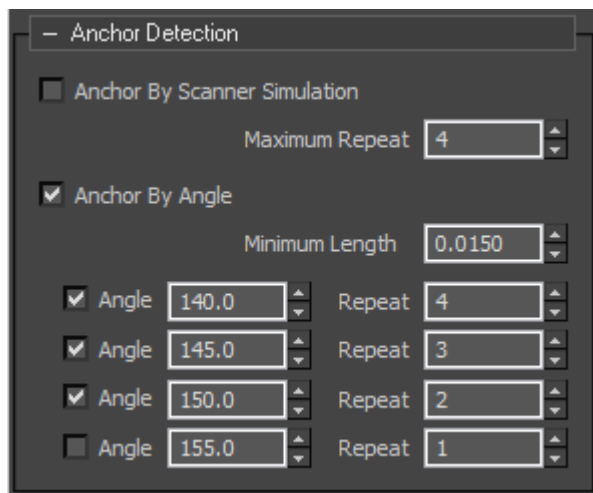
Overview

Anchor detection is one of the laser specific optimizations required to make the images look right. **proTize** has two main algorithms to detect anchors. Detection of anchors based on scanner simulation is an artificial intelligence method of estimating the behavior of scanners in software. **proTize** can detect required repeat points based on this knowledge.
Another method is the anchor detection based on the angle of two line segments. Obviously two segments joined at a sharp angle need a repeat at the junction to be displayed correctly. **proTize max** can control the repeat based on angle. This is the method used for Interactive rendering by default.
There is actually a third method that is internally used to detect anchors based on topology and smoothing groups. See description of **proTize Parameters** modifier for details (Crease Repeats).

Anchor detection with scanner simulation in combination with the anchor detection by angle is the best choice for most applications. If you want a softer look you should disable anchor by angle first. Try to reduce the maximum repeat of the anchor detect by scanner simulation too.

As with most parameters we recommend not to mess around here. If there are objects, or certain points of an object that need special repeat treatment you are probably better off with the per object/point/face parameters that can be applied with the **proTize Parameters** modifier.

Anchor By Scanner Simulation

Default Interactive: disabled. Default Renderer: enabled.
This enables (if checked) the algorithms that finds anchors based on deep knowledge of the behavior of scanners. This is recommended for best quality. It is not enabled by default for interactive rendering because it is somewhat to slow for fast real-time response.

Maximum Repeat

Default: 4.
This is the maximum repeat that the scanner simulation is allowed to attach to a point. Increasing this number is not recommended for today's scanners. You might consider to reduce the repeat to make the final image look smoother.

Anchor By Angle

Default enabled.
This is the global enable of anchor by angle detection. Below you will find up to four different entries for different repeat/angle combinations. If you want to mess around: best is to disable all but one and then change the angle. That way it is easier to decide which of the points are connected at a certain angle.
The default results in a repeat of 4 if the angle is <= 140, a repeat of 3 is applied if the angle is in range [140, 145], repeat 2 for angles in [145, 150]. For angles > 150 there will be no repeats applied.

Minimum Length

Default: 0.0150.
This is the minimum length a line must exceed to be considered by the anchor detection. A value of 0.0 will enable anchor detection for all line segments, larger values decrease the number of lines considered.

Angle

Default: enabled, 140.0, 145.0, 150.0, 155.0.

Repeat

Default: 4, 3, 2, 1

For each of the 4 different entries there is an enable check box, a value for the angle and a value for the number of repeats to be applied. If the enable is checked, all segments connected with an angle <= the specified value will have the repeat increased to at least the specified repeat value. E.g. if the value of the angle is 90 and the value of the repeat is 5, then all points where the line segments meet at an angle of <= 90 will have a repeat of at least 5.

Rollup: Advanced Optimization
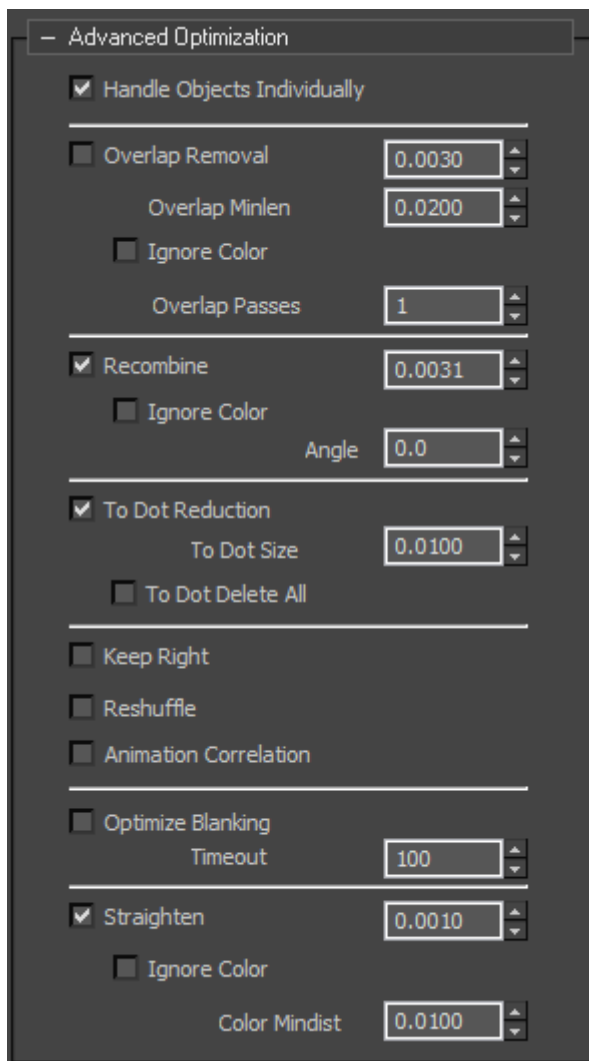
Handle Objects Individually

Default: enabled.

This applies to several stages of the rendering process. Basically it is a hint for the renderer to treat objects individually when routing, filtering etc. This should usually remain globally enabled. With the **proTize Parameters** modifier you can allow cross object handling of some of the optimizations (like overlap removal) if required.

Overlap Removal

Default Interactive: disabled. Default Renderer: enabled.

This controls the algorithm that tries to get rid of redundant lines that run parallel. This improves the output quality, but is disabled by default for interactive rendering to allow fast interactive response. Unwanted (often short) line segments close to other contours are removed by this algorithm.

Overlap Removal value

Default: 0.0030.

This is the maximum distance of lines to be considered for removal. The default value is chosen so that the final output matches to original models as close as possible. You might want to increase this value a bit if you want more redundant lines to be removed. However values of 0.0050 or more often cause too many lines to be removed.

Note: If you increase this value, you might have to increase the value of **Recombine** too!

Overlap Removal Minlen

Default: 0.0200.

Ovelap removal only considers lines that overlap in a certain length. This helps to avoid breaking up lines just because of a short overlap. The default value results in breaking up for overlap even for pretty short sections. You might increase this value a bit if you think too many lines are broken up by overlap removal.

Note that changing the **Overlap Removal value** will reset **Minlen** to default!

Overlap Removal Ignore Color

Default: disabled.

This enables removal of overlapping lines even if the color of the lines is different. Sometimes this can reduce flicker. Note that overlap removal does not work across objects unless explicitly enabled. Sometimes it makes sense to ignore colors in overlap removal when using vertex colors.

Overlap Removal Passes

Default Interactive: 1. Default Renderer: 3.

This basically controls how hard **proTize** tries to find candidates for removal. A value of 1 is less time consuming but might miss some lines that should be removed. A value of 3 is sufficient in most cases.

Recombine

Default: enabled.

This should always be enabled. This is the basic routing algorithm that connects the lines found by silhouette detection etc. to contours.

Recombine value

Default: 0.0031.

This is a measure for the maximum distance of two points that are considered to be connected. Higher values can help to connect unwanted gaps but can also cause false connection. This should be slightly larger than the overlap removal value to allow reconnecting lines broken up by overlap removal. We recommend not to mess around...

Recombine Ignore Color

Default: disabled.

By default lines of different color are not connected. Sometimes flicker can be reduced by allowing the optimizer to connect lines of different colors. Note that this will only work across objects if **Handle Objects Individually** is disabled. Sometimes it makes sense to ignore colors in recombine when using vertex colors.

Recombine Angle

Default: 0.0.

An angle of 0.0 allows all points to be connected, no matter what angles the line segments have. 180.0 will usually not allow any lines to be joined. We recommend not to limit the routing based on angle for normal applications.

To Dot Reduction

Default: enabled.

This algorithm reduces very small objects to a single dot. Very small circles etc. look like a dot anyway.

To Dot Size

Default: 0.01.

This is the maximum size of an object that is considered to be replaced by a single point. Larger values cause more objects to be replaced by a single dot.

To Dot Delete All

Default: disabled.

Unless you have particle generators in your scene you might consider to enable this. All small objects will then be considered noise and being removed completely. However, there is a better method to achieve this with the **proTize Parameters** modifier. So you better leave this untouched.

Keep Right

Default Interactive: disabled. Default Rendering: enabled.

Enabling this helps to keep the path consistent from frame to frame. Use in conjunction with Animation Correlation.

Reshuffle

Default Interactive: disabled. Default Rendering: enabled.

Enabling this helps to keep the path consistent from frame to frame. Use in conjunction with Animation Correlation.

Animation Correlation

Default Interactive: disabled. Default Renderer: enabled.
This option enables a very powerful algorithm that controls the beam path consistency frame to frame. Without **Animation Correlation** the order in that the lines are drawn is handled individually for each image. This can result in unwanted weird flicker as the drawing order changes from frame to frame. With interactive rendering fast response is more important, so this is disabled by default for interactive rendering.

Optimize Blanking

Default Interactive: disabled. Default Rendering: enabled.
Enabling this reduces the length of blanked lines to reduce the flicker rate of the final image. Watch out, in rare cases this can take a long time. Not recommended for interactive rendering.

Optimize Blanking Timeout

Default Interactive: 100. Default Rendering: 6000.
This is the maximum time **proTize** tries to optimize the blanked lines of an image. 100 is equivalent to a second. So we make sure for interactive rendering we don't have to wait too long. However, we recommend to not enable the blank optimizer at all for interactive rendering.
For normal rendering enabling this can increase the framerate. But enabling this without also enabling the Animation Correlation is usually not recommended.

Straighten

Default: enabled.
This enables removal of redundant points on straight lines. Should usually be enabled.

Straighten value

Default: 0.001.
This controls how many points are removed. We recommend to leave the value unchanged. Larger values will cause more points to be removed.

Straighten Ignore Color

Default: disabled.
When considering points the color is usually investigated before removing points. Points with different color are usually not considered redundant unless this option is enabled. With vertex colors sometimes many points of different color are created. To remove those points regardless of the color enable this option. (Might be useful if vertex colors are used).

Straighten Color Mindist

Default: 0.01.
This controls how points are removed if they have different colors (like with vertex colors). This value controls the density of points created for lines of quickly changing color. Points closer than the specified value will even be removed if otherwise they would be kept due to a different color. This helps to avoid many very close points of different color, which usually would not make a big difference in laser anyway.

Rollup: Overlap Closed Contours
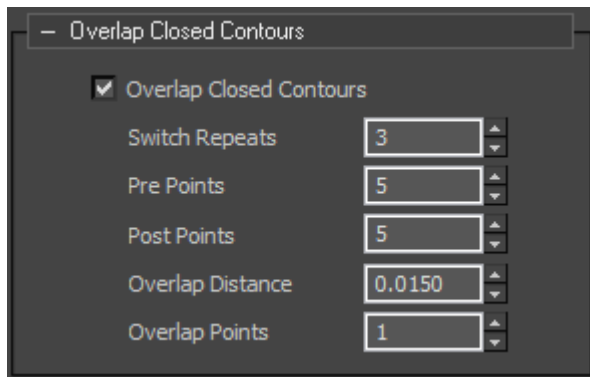
Overview

Closed contours like circles usually look better in laser light with some overlap. The parameters here control how the overlap is applied.

Overlap Closed Contours

Default: enabled.
This should usually be enabled. Controls the generation of overlap for circles and other contours. Overlap looks best with some soft-blanking applied when displayed with the Lasergraph DSP.

Switch Repeats

Default: 3.
The default of 3 means points with repeat 3 or more are corners and not considered for overlap. Only points of repeat 2 or less are considered for overlap.

Pre Points

Default: 5.
This specifies how many points to be drawn blanked at the beginning for overlapped contours, before blanking is turned on. If circles break up, try to increase this value.

Post Points

Default: 5.
This specifies how many points to be drawn blanked at the end of overlapped contours, after blanking was turned on. If circles break up, try to increase this value.

Overlap Distance

Default: 0.015.
This defines the length of the visible overlap (unblanked).

Overlap Points

Default: 1.
This limits the visible (unblanked) part of the overlap in the number of points. If you want more overlap you probably also need to increase the Overlap Distance.

Rollup: Smart Interpolation
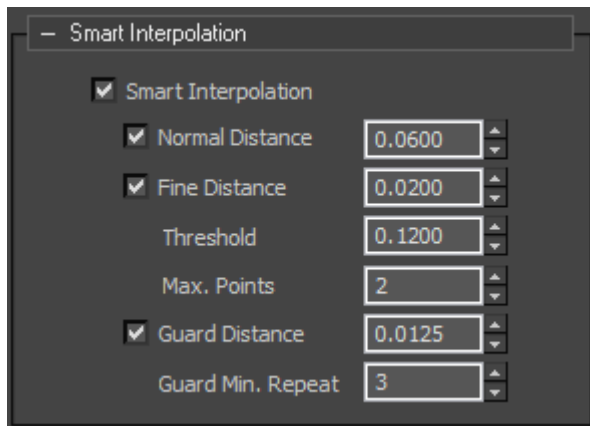
Overview

Smart Interpolation adds points to the final laser image to improve the output quality. It is similar to the real-time interpolation applied by the Lasergraph DSP, but has been improved for better display quality.

Smart Interpolation

Default: enabled.
The global enable/disable of all interpolation sub-algorithms.
We recommend to keep this enabled.

Normal Distance

Default: enabled, 0.0600.
Enables interpolation with the specified distance. The default value was chosen for best quality. We recommend not to change this value.
The value works similar to "`maxdist`" in the Lasergraph DSP scanning parameters. If consecutive points are closer than defined here, additional points are inserted.

Fine Distance

Default: enabled, 0.0200.
Fine Distance Threshold. Default: 0.1200.
Fine Distance Max Points. Default: 2.
For curved lines (vs. straight lines) this forces more points to be inserted in order to allow scanners to follow curved lines exactly. The distance is equivalent to "`maxdist`" in the Lasergraph DSP scanning parameters. The threshold is used to classify lines as being curved or straight. Higher values cause more lines to be treated as curved. **Max Points** limits the number of points inserted. This limits the density.
The default parameters have been selected for best image quality. You might disable the fine distance if it is more important to reduce the flicker while accepting some degradation in quality.
Tip: with the **proTize Parameters** modifier you can control fine interpolation at (sub-)object level.

Guard Distance

Default: enabled, 0.0125.

Guard Min Repeat: Default: 3.

Guards are placed right before and after corners. All points with a repeat >= Guard Min Repeat are considered to be corners. This helps to improve the image quality. However it sometimes adds quite some flicker without improving the image significantly. So you might want to disable this if the image is getting complex and you want to reduce flicker.

Rollup: Softblank

Overview

proTize support automatic generation of softblanking for Lasergraph DSP output. This is not suported for LDS/ILDA output.

Softblank

Default: disabled.
Global enable of automatic softblank generation.

Mindist

Default: 0.0030
Not all line endings will be converted into softblank endings. By default only line endings that do not have other lines in the neighborhood will be considered for softblanking. The value here defines the distance that is considered the neighborhood. Change the value to 0.0 to force all line endings to be softblanked.

Minlen

Default: 0.0031
softblanking works best if lines are not too short. Minlen defines the minimum length a line should have for softblanking.

Minangle

Default: 0.0

By default the neighborhood (see **Minlen**) is only defined by distance. With **Minangle** > 0.0 the angle at that lines meet is also taken into account. The higher Minangle, the less lines are considered neighbors. (Limit 180)

Handle objects separately

Default: enabled.

Enable to consider only lines of same object neighbors. Disable to consider neighbors no matter what object the line was generated from.

Check boundary

Default: enabled.

Enable to consider boundary of frame for softblanking. Disable to ignore boundary.

VBon Dist

Default: 0.0000

Distance of point before softblank on.

VBon Repeat

Default: 0

Repeat of the point before softblank on.

NBon Dist

Default: 0.0200

Distance of the point after softblank on.

NBon Repeat

Default: 4

Repeat of the point after softblank on.

VBoff Dist

Default: 0.0300

Distance of point before softblank off.

VBoff Repeat

Default: 4

Repeat of the point before softblank off.

NBoff Dist

Default: 0.0000

Distance of the point after softblank off.

NBoff Repeat

Default: 0

Repeat of the point after softblank off.

Rollup: Display Parameters
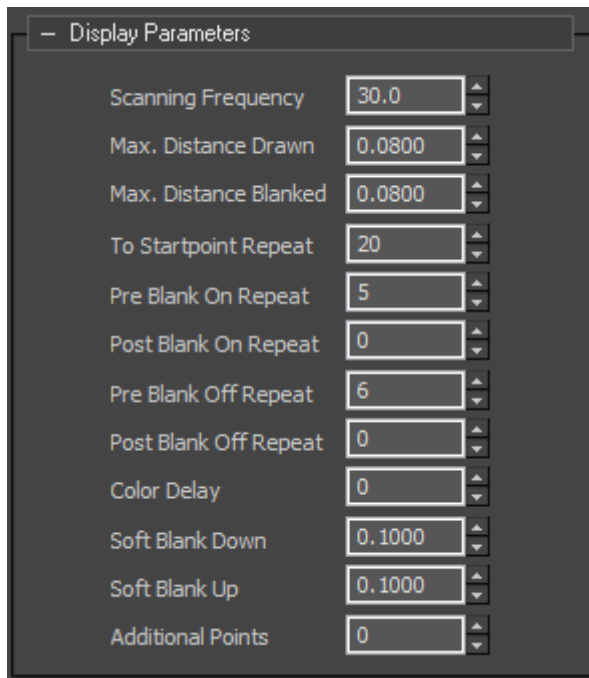
Overview

These parameters have the same meaning as the scanning parameters of the Lasergraph DSP. However the values here are *not* used by the Lasergraph DSP to *display* the images. The parameters define what **proTize** *assumes* for estimation of the frame rate displayed in the viewport. If the values here do not match the values actually used by the Lasergraph DSP, the displayed frame rate will not match the real frame rate.
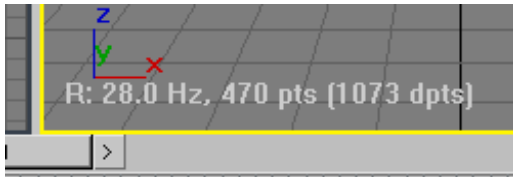
The parameters are important when using dynamic rendering. See "**The proTize Renderer**", **Render dynamic**.

Important: For LD2000 operation and for ILDA output some of these values *are* used in generation of the laser images in order to create "point oriented" frames and thereby change the actual appearance in laser!

And the values *are* used by the Super Preview to create the simulated laser output.

Scanning Frequency

Default: 30.0.

The scanning frequency is used in the estimation of the frame rate in Hz. But the actual frequency used to display the image in laser depends on the display settings of the Lasergraph DSP or LD2000 system. Changing the frequency does *not* change the real output frequency.

Max. Distance Drawn

Max. Distance Blanked

Default: 0.0800.

The Lasergraph DSP automatically add points if two points would otherwise exceed the distance defined by this parameter. (See "`Advanced Parameters ⇨ Display Parameters`" in the Lasergraph DSP). Since points are added by this interpolation, this affects the total number of points displayed and thereby changes the frame rate. **proTize** uses this value to correctly estimate the frame rate. But the generated images are not affected by this parameter. This interpolation is done by the Lasergraph DSP whenever an image is displayed. The value defined here does not change the way the image is displayed by the Lasergraph DSP, but what **proTize** *assumes* the DSP will apply.

The value should still match the value used to display the image in order to allow correct estimation of the frame rate.

Important: With ILDA and/or Pangolin™ output (*.LDS) this interpolation *is* actually applied! It might changes the density for ILDA and Pangolin™ output. Note that this is usually superceded by **Smart Interpolation**. But if Smart Interpolation is disabled the interpolation here will still be applied.

To Startpoint Repeat

Default: 20.

This is the number of points added at the beginning of each frame. This value should match the setting of the Lasergraph DSP. The value is used to estimate the frame rate. Changing the value does not affect the way images are displayed by the DSP.

Important: With ILDA and/or Pangolin™ output (*.LDS) the points *are* added to the frames. So in that case the values really change the way the image is displayed in laser. This is required to create point oriented frames.

Pre Blank On Repeat

Post Blank On Repeat

Pre Blank Off Repeat

Post Blank Off Repeat

Color Delay

Default Pre Blank On: 2.
Default Post Blank On: 3.
Default Pre Blank Off: 4.
Default Post Blank Off: 2.
Default Color Delay: 3.

These values define the number of points added before/after blanking is turned on/off in order to compensate for the inertia of the scanners. As with the other Display Parameters these values do not affect the way images are generated for the Lasergraph DSP, but only determine how many points are added in order to estimate the frame rate. The default values are optimized for LaserAnimation's Accurate projector at 30Khz, with a color/blank delay of 3.

Important: With ILDA and/or Pangolin™ output (*.LDS) the points *are* added to the frames. So in that case the values really change the way the image is displayed in laser. This is required to create point oriented frames.

Soft Blank down

Default: 0.100

This has the same meaning as the corresponding Lasergraph DSP parameter. The value is used only for softblanked line endings that are to be displayed in the Super Preview.

Soft Blank up

Default: 0.100

This has the same meaning as the corresponding Lasergraph DSP parameter. The value is used only for softblanked line endings that are to be displayed in the Super Preview.

Additional Points

Default: 0.

This number allows to specify additional points to be included in the display time estimation. But no points will be added to the frame. This is useful to reserve time with dynamic rendering for other images or to compensate for inter-track delay in LD2000.

With the latest version of the Lasergraph DSP software it is also desirable to have some additional points here. These allow to compensate variations of the display process. This requires the advanced display option "Timed" with the Lasergraph DSP DisplayAnimation command.

The proTize Renderer

Overview

The **proTize max** renderer is a standard 3ds max™ renderer. It can be assigned to the production and/or draft renderer:
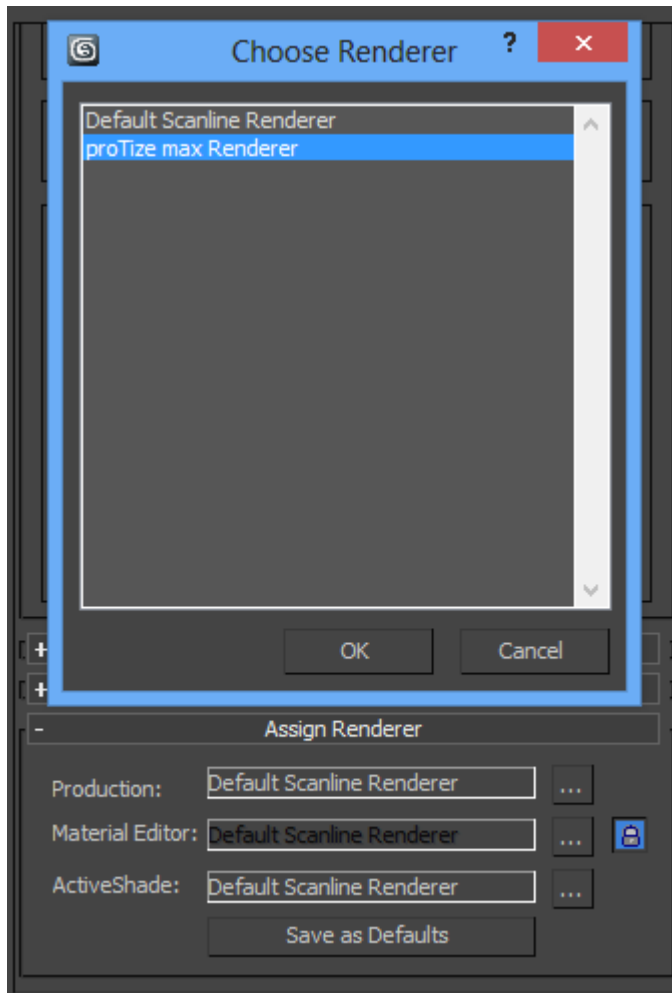
Rollup: proTize max Renderer

Once the renderer is assigned you will get the **proTize max** renderer rollup:
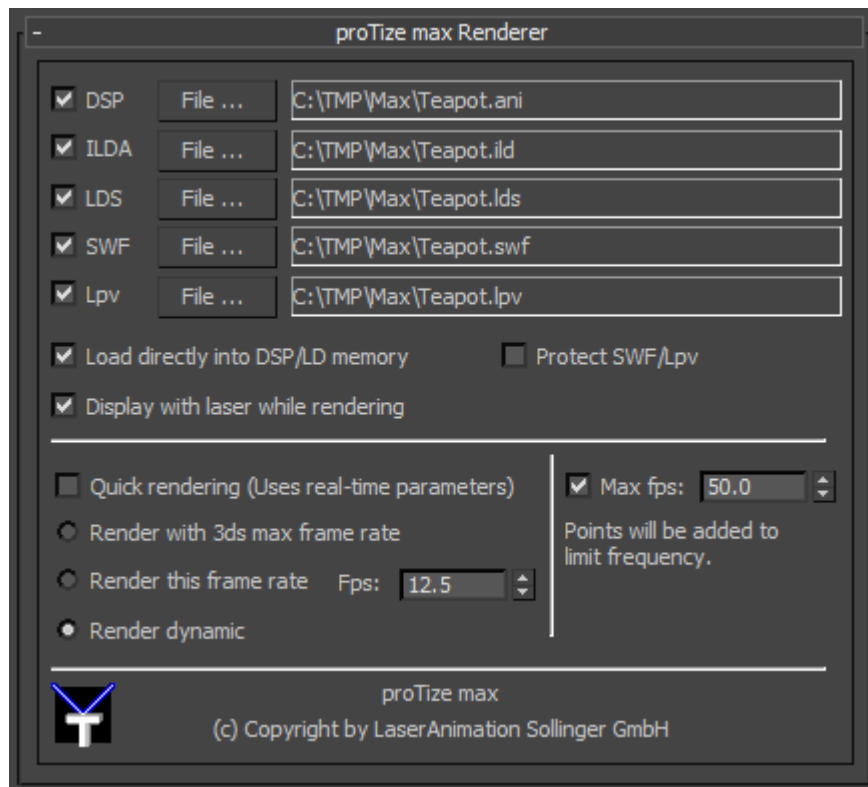
DSP

Default: unchecked, filename by default empty.
This enables writing the rendered images in Lasergraph DSP file format. Click "**File...**" to navigate to the destination directory and specify a destination filename.
The name that is specified here is the name of the *.ani file. This is a file that can directly be loaded into the Lasergraph DSP by the AnimEd. The name of the catalog and the images are derived from this name.

Example:
   Ani: `C:\Tmp\Max\Teapot.ani`
   Catalog: `C:\Tmp\Max\Teapot.CATL`
   Images: `C:\Tmp\Max\Teapot.CATL\Teapot0001.PIC,`
           `C:\Tmp\Max\Teapot.CATL\Teapot0002.PIC...`

ILDA

Default: unchecked, filename by default empty.
This enables writing the rendered images in ILDA file format. Click "**File...**" to navigate to the destination directory and specify a destination filename.
If you have a LD2000 system we recommend to use the LDS format (see below) for best color compatibility.
The output format ILDA is only available at the dongle version of proTize max.

LDS

Default: unchecked, filename by default empty.
This enables writing the rendered images in Pangolin™ native format. This requires a QM2000 board and a properly installed LD2000.dll. Click "`File...`" to navigate to the destination directory and specify a destination filename.
The output format LDS is only available at the dongle version of proTize max.

SWF

Default: unchecked.
Enable this to write an SWF (Flash™ Version 5) preview of the laser output. This is useful to send a file to your client. It can be viewed with the Macromedia Flash™ Player.
Note: The SWF is written with the FPS setting of 3ds max™, if dynamic rendering is used.

Lpv

Default: unchecked.
Enable this to write an Lpv preview of the laser output. This is useful to send a file to your client. It can be viewed with **Lpv Player**. More info on the Lpv format and the player can be found here:

https://www.laseranimation.com/en/customer-area/public-area/laser-show-preview

If the Super Preview is enabled, the Lpv file will automatically be played in the Super Preview window when the rendering has finished.

The output format Lpv is only available at the dongle version of proTize max.

Load directly into DSP/LD memory

Default: unchecked.
Enable this to load the rendered frames and the final animation directly into Lasergraph DSP or QM2000 memory.
This requires that the Lasergraph DSP is in edit mode.
With the QM2000 board make sure to close all other programs to avoid conflicts. The images are loaded into the largest block of free image slots found when the rendering is started.

Attention!
Make sure that the Lasergraph DSP is not used by someone else before enabling this option. Otherwise you might silently add/overwrite images currently in Lasergraph DSP memory! The frames will be written to disk if someone is working with the Lasergraph DSP, modifies a show that is actually unrelated to your rendering, and save that show back to disk.

This option is always reset when a 3ds max™ file is loaded. So you must explicitly enable this after loading a 3ds max™ file.

Display with Laser while rendering

Default: unchecked.
This allows direct display of the frames by the Lasergraph DSP/LD as they are rendered.
This requires that the Lasergraph DSP is in any edit mode.
With the QM2000 board make sure to close all other programs that might access the QM2000 board to avoid conflicts.

Attention!
Make sure that the Lasergraph DSP is not used by someone else before enabling this option.

This option is always reset when a 3ds max™ file is loaded. So you must explicitly enable this after loading a 3ds max™ file.

Protect SWF/Lpv

Default: unchecked.
Enable this to prevent the created SWF file from being imported into Macromedia Flash™ for editing. For Lpv files this prevents any editing/modification of the Lpv and conversion to AVI format (by **Lpv Creator**).

Quick rendering (Uses real-time parameters)

Default: unchecked.
Usually you would not enable this option. If enabled, the Real-time Parameters would be used for rendering instead of the Rendering Parameters. However, this can be useful to get a quick preview of the scene.

Render with MAX settings

Render this frame rate

Render dynamic

These mutual exclusive options tell the renderer how to render the frames with regards to timing.
The first option (Render with MAX settings) will render the frames with the (fixed) frame rate that you selected in the standard 3ds max™ Time Configuration dialog. Usually 25 fps (PAL) or 30 fps (NTSC).

The seconds option (Render this frame rate) allows to render for a frame rate that is different from the 3ds max™ setting. This usually makes sense because most of the time laser is simply to slow to achieve 25 or 30 fps. Especially if you still want the fixed frame rate you might choose half of the video frame rate (12.5 or 15). You would display an animation created that way with a **TimeLoop** from the Lasergraph DSP. The TimeLoop duration should match the total time of the animation as per the 3ds max™ frames. E.g. for an animation of 100 frames (assuming a 3ds max™ setting of 25 fps) the TimeLoop should have a duration of 4 seconds.

The third option (Render dynamic) is the best choice to get very smooth animations, while achieving the optimal frame rate. **proTize** max will not render for a fixed frame rate display when this option is used. Instead, it will compute the images so that they can be displayed back to back without pausing. So the parts of a scene that are very complex are displayed at a lower frame rate. Less complex parts are displayed with a higher frame rate and less flicker. Still the movements will not accelerate/decelerate because of the change in frame rate.

We recommend to use this rendering option whenever possible. This results in optimal output in most cases.

The easiest way to display this with the Lasergraph DSP is to use a Loop instead of a **TimeLoop** with **DisplayAnimation** (relative mode, **LoopCnt**). Another alternative is to use **SetVariables** and increment the image number by one. See **proTize.FILM** from **DSP-Stuff**.

Important!
This only works if the Display Estimation parameters exactly match the scanning parameters used by the Lasergraph DSP/LD2000 for display! Make sure to double check this in the Global Rendering Parameters.

New: With Lasergraph DSP software 2004/06/09 or later there are new options that allow to use **TimeLoop** for animations that have been rendered dynamically: **Dynamic** and **Timed**. Usually **Timed** results in the best display quality. See the Lasergraph DSP release notes for details.

Max fps

Default: enabled, 30.
Allows to limit the output frequency. This is achieved by adding blanked points to the image if otherwise the specified frame rate would be exceeded. This is especially useful if dynamic rendering is used. Otherwise for parts of the scene that contains only a few points, thousands of frames per second would be generated.

You might want to reduce the maximum frame rate if you want to minimize the change in flicker. Let's say you have a sequence that is by complexity limited to about 20 fps in most parts. If there are some parts that are less complex dynamic rendering would display those parts with up to 50 fps. This obviously changes the flicker which is sometimes worse than limiting to about 25 fps. So in such a case you might want rather set the limit to 25, not 50.

About Real-time vs. Render Parameters

When rendering it is important to make sure the Rendering Parameters are properly set. Usually - while creating the scene - the Real-time Parameters will be active. When rendering, by default another parameter set - the Rendering Parameters will be activated temporarily. This is convenient because you don't have to switch the parameters manually and still benefit from the faster response time of the real-time settings and the improved quality for final rendering.

However, you might switch between the parameters intentionally and/or accidentally. So make sure to check what is currently enabled. (Displayed in the viewport, in the Parameter dialog as well)
If you change the Real-time Parameters, make sure to keep the Render Parameters consistent, or the output of the final rendering will differ from what you have seen while creating the scene.
We recommend to switch to the Render Parameters from time to time to verify that everything looks right. (Use the default shortcut **Alt+Ctrl+R** or click "`proTize ⇨ Render Parameters Active`".)
Also keep in mind that some things that do not look optimal with the Interactive (real-time) Parameters will be improved by using the Render Parameters.

In the viewport the first letter of the info displayed by the interactive **proTize** renderer is 'I' if the Interactive (real-time) Parameter set is currently active. Otherwise a 'R' is shown:
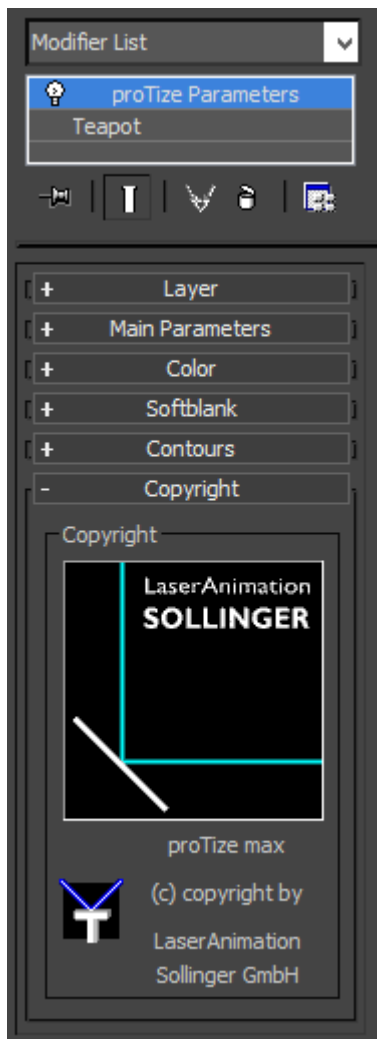
Interactive (real-time) Parameters

Display On DSP enabled
I: 33.0 Hz, 495 pts (910 dpts)

Render Parameters

Display On DSP enabled
R: 32.7 Hz, 495 pts (918 dpts)

The proTize Parameters modifier

Overview

The **proTize Parameters** modifier is what you need if you want to control the way in that an object is rendered. It is important to understand that the modifier works on the current selection in the modifier stack. So you might want to use the Mesh Select modifier to select the vertices, edges or faces that you want to modify.
If no sub-object selection is active in the modifier stack the whole object is influenced by the **proTize parameters** modifier.

Some of the **proTize** properties are internally attached to the faces. Others are kept at edge level. Finally there are vertex properties too. So each of the properties that can be modified with the **proTize Parameters** modifier is naturally a face, edge or vertex parameter. If the sub-object is selected at vertex level, then edge parameters are changed by the modifier if both vertices of the edge are selected. Face parameters are applied to faces that have all vertices selected. The behavior is similar for edge and face selection level.

Rollup: Layer
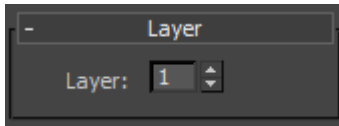
Overview

By default each of the edges, faces and vertices has one value for all the laser rendering properties. E.g. there is one color for an edge. Sometimes it might be required to define different colors for the same edge or face, depending on some conditions. Let's say you want to render the hidden parts of an object in a different color. This would require two colors to be defined. One color for the visible and another color for invisible parts. How do you achieve this with **proTize max**? The solution is to use layers. **proTize max** provides up to 8 layers for each face, edge, vertex. For the example above you would create two layers. The first layer displays visible parts of your scene. The second layer displays invisible (hidden) parts. This requires two applications of the **proTize Parameters** modifier. One application always changes one layer.

Layer

Default: 1.
This simply defines which layer of the **proTize** properties is modified by this application of the **proTize max** modifier.
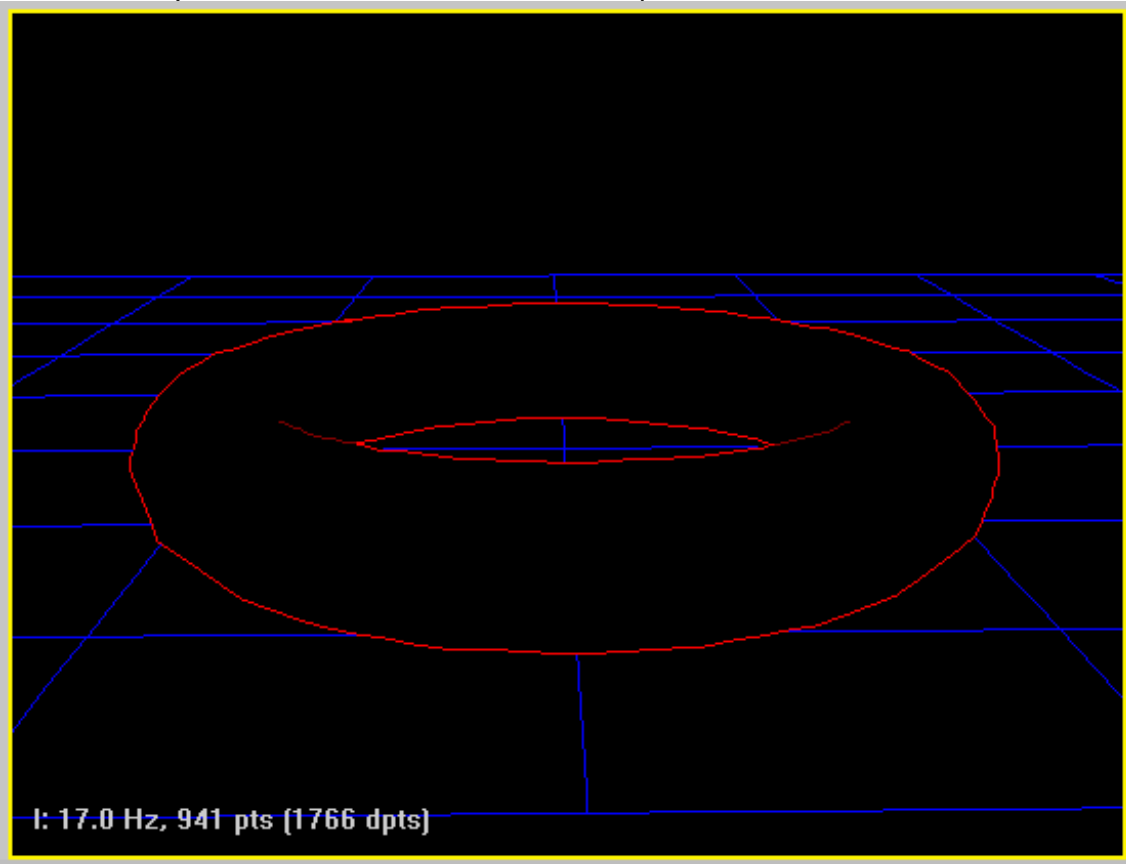
Rollup: Main Parameters
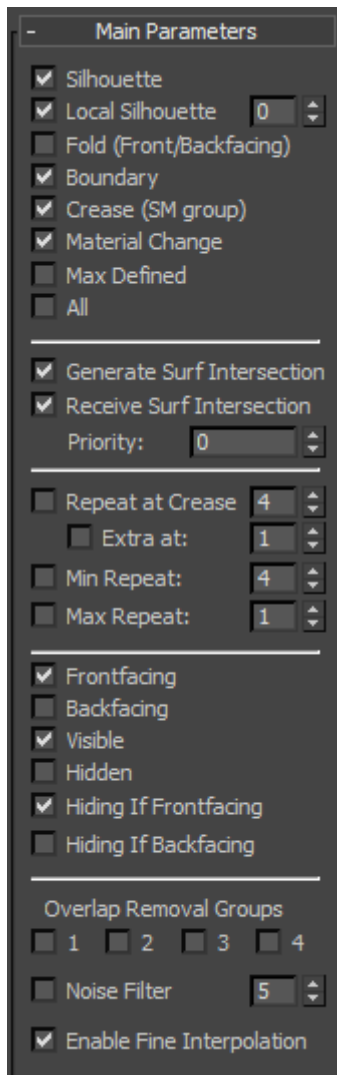
Overview

The Main Parameters rollup defines the most important properties for the **proTize** renderer. The first section defines what edges are actually considered for the laser display.

Silhouette

Default: enabled.

The easiest way to understand the Silhouette is a sample:

The brighter red lines are the Silhouette edges of the object.

Local Silhouette

Default: enabled, value 0.

The local silhouette of the torus is highlighted in the following image:

I: 17.0 Hz, 941 pts (1766 dpts)
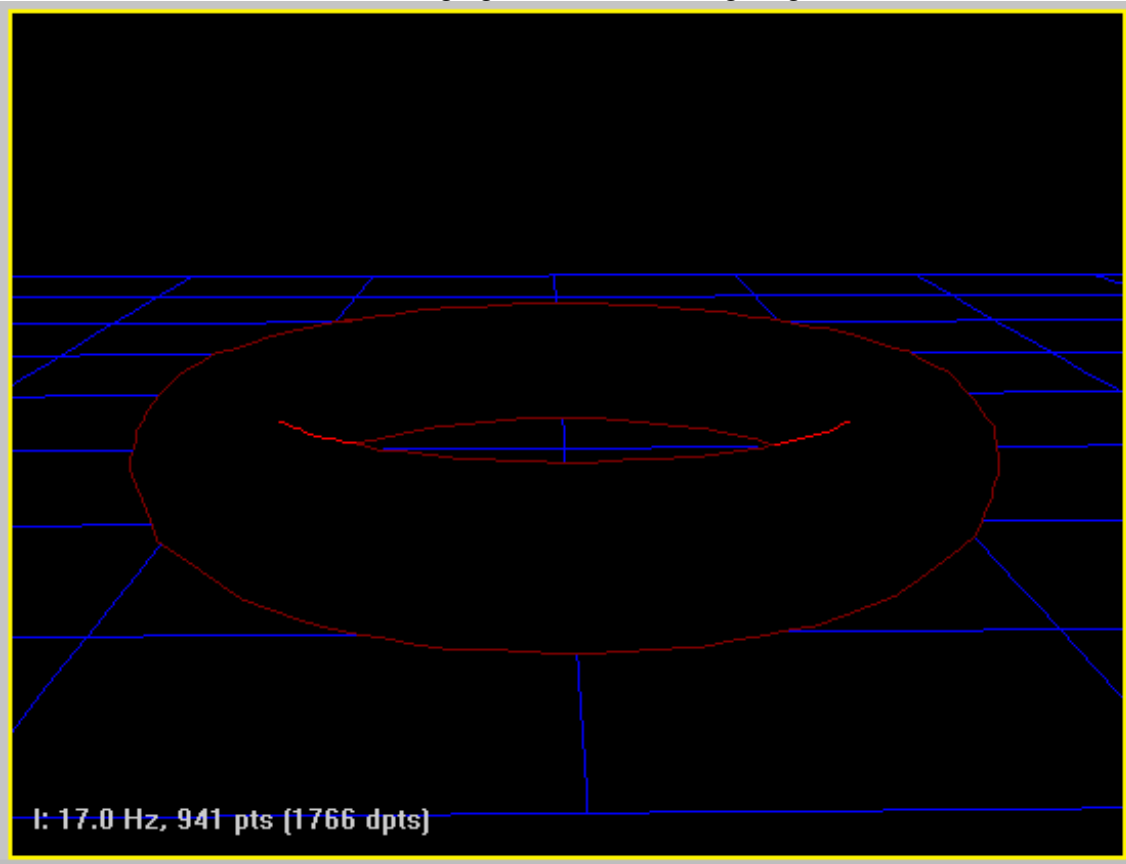
As you can see the local silhouette and the (global) silhouette together make the torus look like expected.

The value that can be changed with the Local Silhouette needs some explanation: This value controls the Local Silhouette detection. Most other renderers that do silhouette detection simply detect *all* fold edges. A fold edge is defined as the adjacent edge of a front and a backfacing triangle. This simple method often detects edges to be displayed that you would not want to be drawn.

Silhouette and Local Silhouette in red, other fold edges white:

I: 20.3 Hz, 695 pts (1476 dpts)
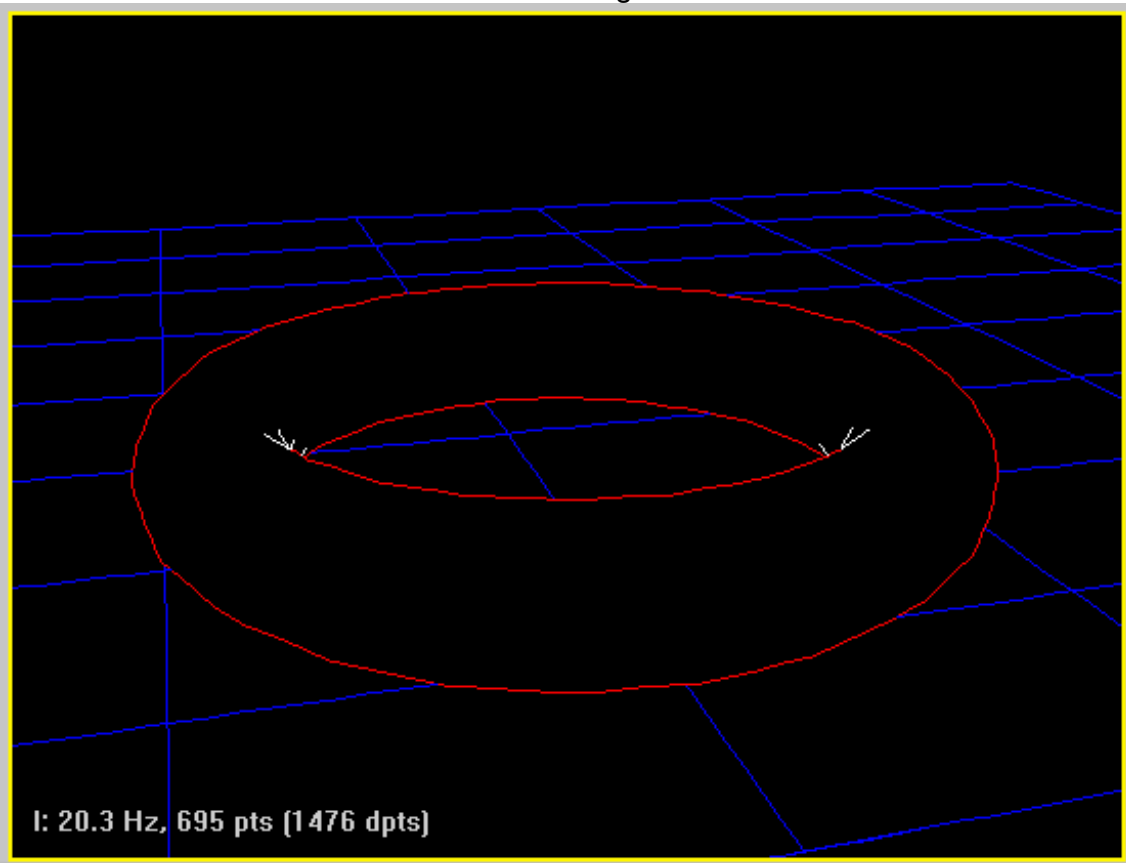
Obviously you would not want the fold edges (white). The unique smart silhouette detection of **proTize max** allows to remove those folds.

A value of 0 enables the default behavior of the Local Silhouette detector. This creates best results in most cases. Sometimes you might want to modify the silhouette detection. In that case check values from 1 to 9. The higher the value, the less likely an edge is considered a Local Silhouette. A value of 3 is a good start for some meshes that generate too many Local Silhouette edges with the default value of 0.

Also consider to enable the Noise Filter (explained below). Especially if you get dots that you want to get rid of.

Note, the value even has an effect if Local Silhouette is disabled: Fold (see below) will enable all edges that share a front and backfacing triangle and do *not* meet the local silhouette criteria. Since changing the value changes the classification of Local Silhouette edges (vs. Fold edges), Fold edges are implicitly modified by this value.

Fold

Default: disabled.

This allows to enable the fold edges (edges that are shared by front and backfacing triangles) that are neither Silhouettes nor Local Silhouettes. Usually images look better without Fold. If unwanted gaps occur, try to enable Fold. Also consider changing the Local Silhouette value to control classification of Local Silhouette vs. Fold edges.

Boundary

Default: enabled.

An edge is a boundary if it is not shared by two or more faces.

Here is a sample of the torus with some of the triangles deleted.
The boundary of the "hole" is shown in white:
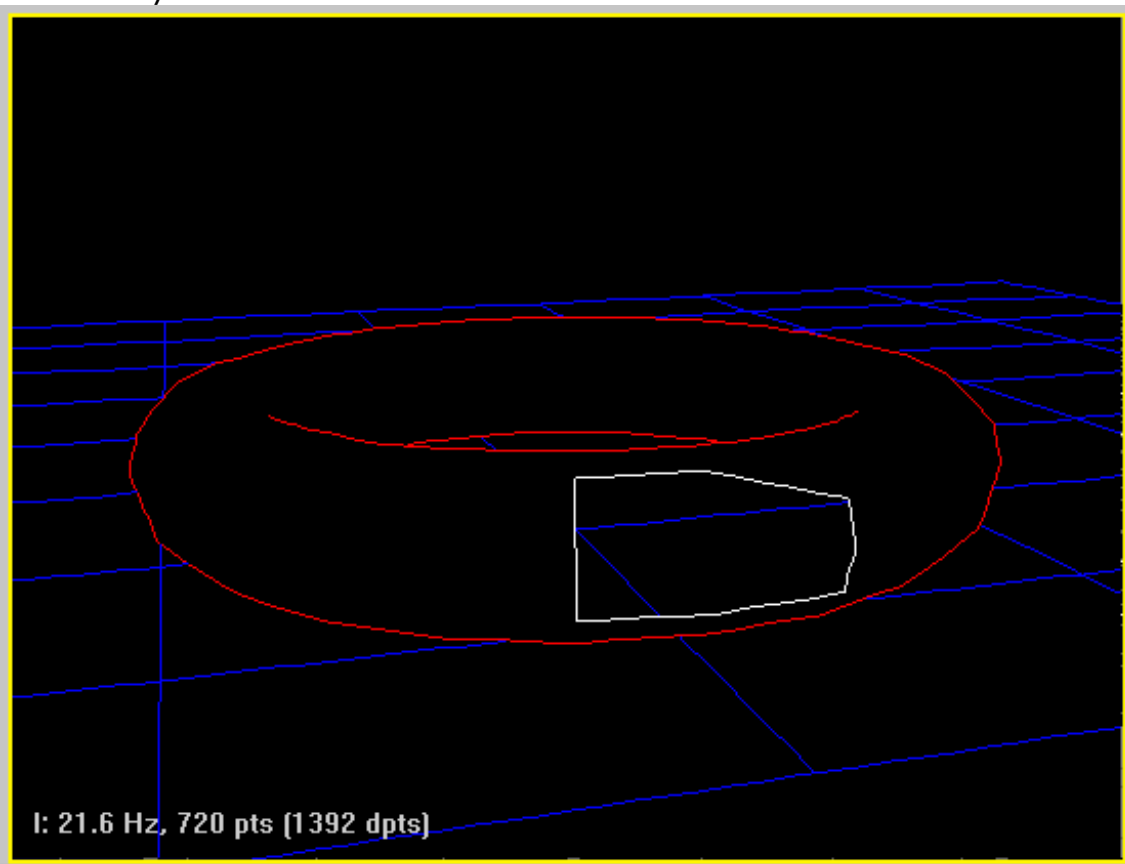
Crease

Default: enabled.

All edges that do not share at least one smoothing group are crease edges.

A cylinder without Crease edges: Crease edges in bright red:

Material Change

Default: enabled.

Simply tells **proTize max** to render all edges where the material id changes. The edge is drawn in the color of the material with the higher number.

A cylinder with 3 different materials:
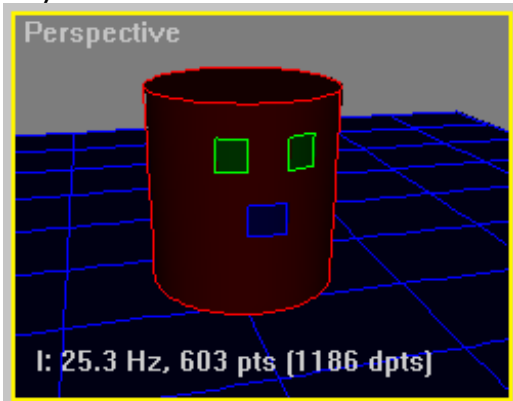
Max Defined

Default: disabled.
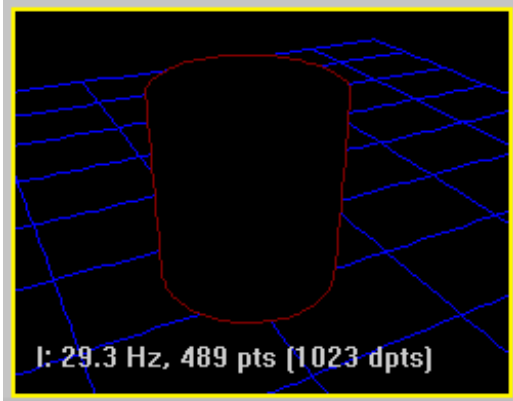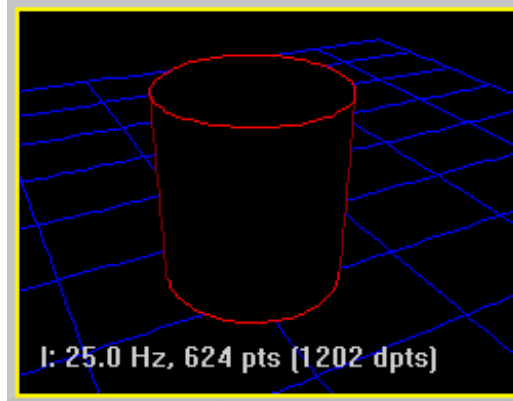
This enables all edges for **proTize max** that are tagged "visible" by 3ds max™. This is in particular useful to be used with sub-object level selection.

This is a cylinder, 2 cap and 3 height segments:

I: 17.9 Hz, 792 pts (1678 dpts)
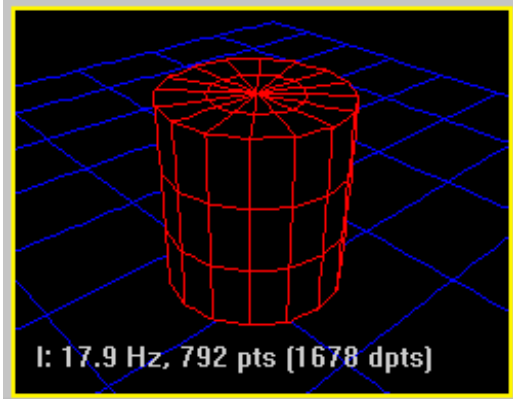
Max Defined applied to sub-object selection:

I: 23.0 Hz, 573 pts (1306 dpts)

All
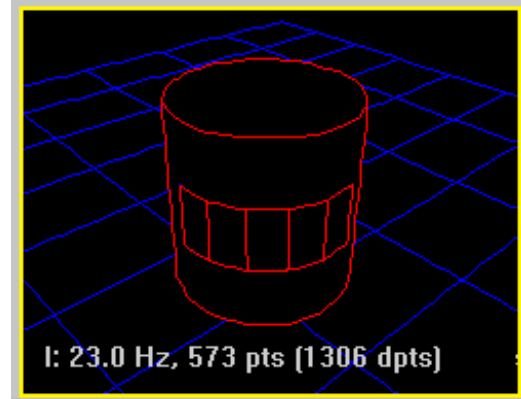
Default: disabled.

This simply enables all edges.

Applied to sub-object selection:

I: 22.6 Hz, 604 pts (1326 dpts)

Phone +49 (30) 780 963 00 · Fax +49 (30) 780 963 25
info@laseranimation.com · www.laseranimation.com
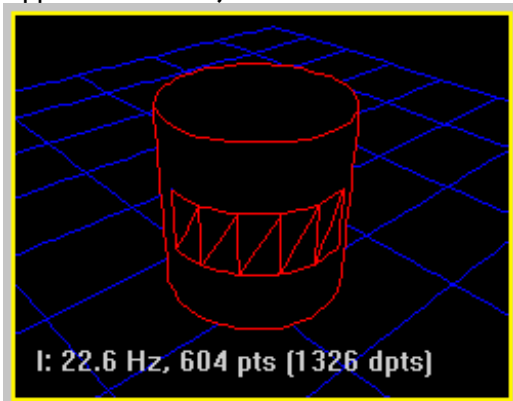
Surface Intersections
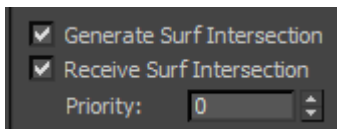
Overview

proTize max provides full support for surface intersections. It generates edges to visualize surface intersections in the laser output. Surface intersections can be restricted. A surface intersection is only rendered if a surface that has "`Generate Surf Intersection`" enabled intersects a surface that has "`Receive Surf Intersection`" enabled. For a surface that has "`Generate Surf Intersection`" enabled, but "`Receive Surf Intersection`" disabled, intersections within the object will be suppressed.

Generate Surf Intersection

Default: enabled.

Receive Surf Intersection

Default: enabled.

Priority

Default: 0.

The priority defines which of two surfaces that intersect defines the color, and the other parameters of the rendered intersections. The face with the higher priority "wins". If both have the same priority **proTize max** will apply an internal default priority.

Red cube higher priority   Green cube higher priority

Repeat Control

Overview

Several aspects of the anchor/repeat detection can be controlled with the **proTize max** modifier. In addition to the global anchor detection based on angle and scanner simulation, t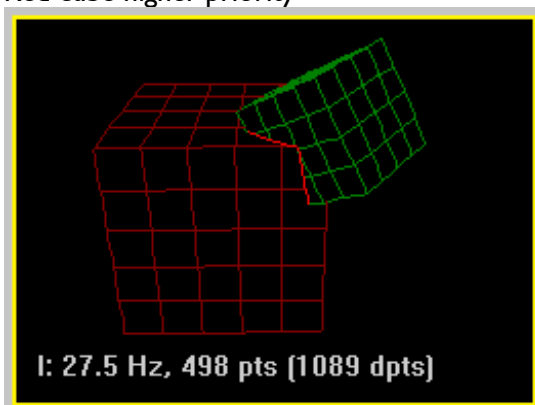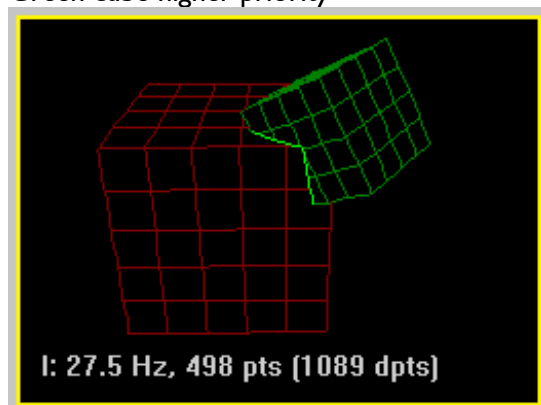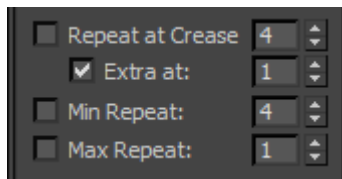here is a third way **proTize max** determines anchors: The smoothing groups. Whenever an edge crosses another edge that is a crease edge an anchor point is placed at the crossing. This is based on 3d/topology information and allows anchors to be detected independent of the 2d appearance of the image. Most of the time this results in more predictable anchor detection.
However, proper operation of "`Repeat at Crease`" depends on correct definition of the smoothing groups and might fail with some meshes. So if you get bright points at unexpected places disable "`Repeat at Crease`".

Repeat at Crease

Default: disabled, value 4.
Enables detection of repeats when smoothing group changes. The value specifies the repeat attached to crease anchor points. Disable if you think there are too many anchors detected.

Extra at

Default: enabled, value 1.
Enables detection of additional repeats. This forces even more crease anchor points. With Extra enabled the crease anchor detection is pretty sensitive. This should be disabled first if too many anchors are detected.
The value controls an internal threshold. Should usually be left at 1.

Min Repeat

Default: disabled, value 4.
This forces all points in the final image to a repeat of at least the specified value. This is not usually recommended. However it can be useful to achieve special effects. It is sometimes useful to enable this temporarily to mark the selected points in the final output.

Max Repeat

Default: disabled, value 1.
This allows to limit the repeat of points. Can help to round up corners and to limit the flicker at the cost of crispness. Also useful for special effects.

Visibility Determination
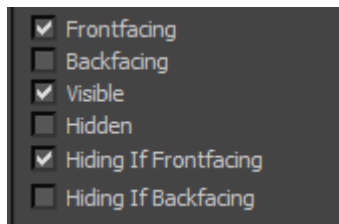
Overview

By default all faces of the objects are rendered similar to the normal 3ds max™ rendering. E.g. hidden (occluded) edges are not rendered, backfacing triangles are ignored.
All these characteristics can be modified separately for the laser output:

Frontfacing

Default: enabled.
Enables rendering (display) of frontfacing triangles.

Backfacing

Default: disabled.
Enables rendering (display) of backfacing triangles. Usually this is not required. But sometimes you might want to enable this to disable backface culling.

Visible

Default: enabled.
Enables rendering (display) of visible (not occluded) edges. Usually you will leave this enabled. However, if you want different layers for occluded and not occluded parts of an object you might disable this for one of the layers.

Hidden

Default: disabled.
Enables rendering (display) of invisible (occluded) edges. This is usually not enabled. Enable this if you want a wire frame look, without hidden line removal.

Hiding If Frontfacing

Default: enabled.
Frontfacing triangles are used for hidden line removal.

Hiding If Backfacing

Default: disabled.
Similar to the 3ds max™ renderer only front facing triangles are used in the hidden line removal algorithm by default. Sometimes this results in display errors, especially with objects that do not have a closed surface. In that case try to enable "`Hiding If Backfacing`".
The teapot is an example for this:

LaserAnimation Sollinger GmbH · Crellestr. 19/20 · D-10827 Berlin   - 71 -
Phone +49 (30) 780 963 00 · Fax +49 (30) 780 963 25
info@laseranimation.com · www.laseranimation.com

Hiding If Backfacing disabled
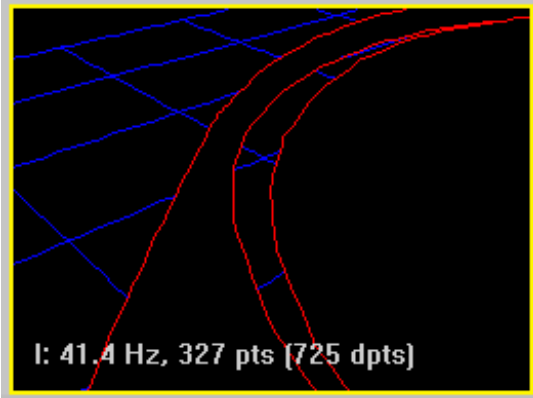
Hiding If Backfacing enabled
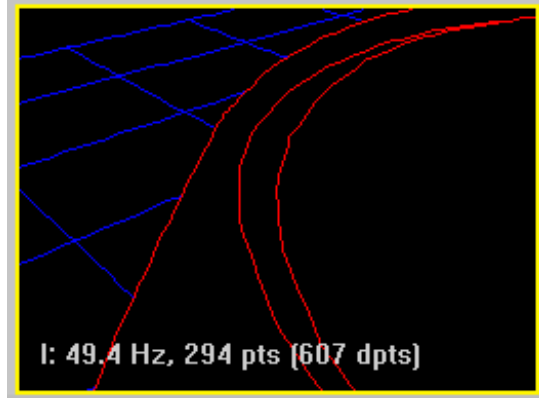
Filtering

Overlap Removal Groups

Default: none checked.

The overlap groups work similar to smoothing groups. Two edges are usually only considered by the overlap removal algorithm if they belong to the same object. Sometimes, especially with intersecting objects, more than one 3ds max™ object form a final object in the output. In such cases it might be desirable to force overlap removal across objects. The overlap removal groups allow to define such logical groups of objects. If two edges share an overlap group, they are checked for overlap removal, even if they belong to different objects.

Noise Filter

Default: disabled, value 5.

By default no information will be removed from the final laser image. Even small dots generated by the silhouette detector will remain in the output. To get rid of small objects enable the noise filter. The noise filter removes all objects up to a certain size. The value controls the threshold. Note that the actual size is relat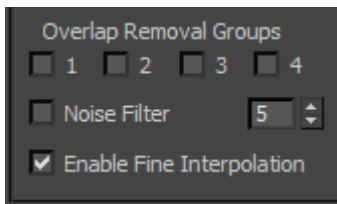ive to the global "`To Dot Size`". A value of 5 is a good starting point. It removes all objects that do not exceed "`To Dot Size`". Smaller values only remove tiny objects. Higher values (up to 10) remove pretty large objects.

Enable Fine Interpolation

Default: enabled.

This controls whether the fine interpolation (see Global Rendering Parameters) shall be used for curved lines or not. With fine interpolation the density of points is increased for curved (vs. straight) lines. This results in more precise output. However, it also increases the total number of points and this results in more flicker. Do reduce the flicker you might want to disable this for some objects.

There is another reason why it could make sense to disable this. The fine interpolation causes more points to be placed at some parts of the objects. This increases the intensity locally. To avoid this, disable Fine Interpolation for objects where this effect is more disturbing than the benefit of more precisely scanning the lines.

Rollup: Color
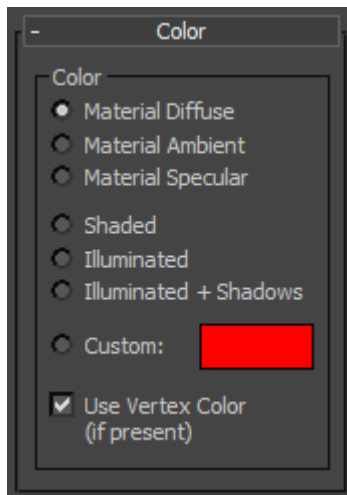
Overview

There are different methods how **proTize max** renders colors. By default the diffuse material color of an object is used. If no material is attached to an object, the wire frame color is used.
The color rollup allows to modify the color source.

Material Diffuse

Default: enabled.
The diffuse color of the material is used to determine the laser color.

Material Ambient

Default: disabled.
The ambient color of the material is used to determine the laser color.

Material Specular

Default: disabled.
The specular color of the material is used to determine the laser color.

Shaded

Default: disabled.
The color will be evaluated for each vertex, including evaluation of the materials with maps.
By default this is not shown with the Interactive Renderer for performance reasons. To force evaluation of shaded or illuminated objects, enable **Interactive Rendering** from the proTize menu.

Illuminated

Default: disabled.

Like **Shaded**, but light sources will be taken into account too.

By default this is not shown with the Interactive Renderer for performance reasons. To force evaluation of shaded or illuminated objects, enable **Interactive Rendering** from the proTize menu.

Illuminated + Shadows

Default: disabled.

Like **Illuminated**, but shadows will be taken into account too.

By default this is not shown with the Interactive Renderer for performance reasons. To force evaluation of shaded or illuminated objects, enable **Interactive Rendering** from the proTize menu.

Custom

Default: disabled, color red.

Allows a custom RGB color is to be specified. Very useful to define different colors for different layers. E.g. display the silhouette in with the material color, while displaying contours in another layer with a custom color.

Use Vertex Color

Default: enabled.

If this option is enabled, the color of vertices is used for the laser lines. There are different ways to apply colors to vertices.

See **Samples\ContoursHR-Illuminated.max.** This sample demonstrates the use of the "`Assign Vertex Color`" utility of 3ds max™ that allows to use maps, lighting and even shadows with **proTize max**. See the 3ds max™ manual for details (search for "`Assign Vertex Colors Utility`").

See "`Samples\RGB-Cube.max`" for an example of how to use the VertexPaint modifier.

Also consider using **Shaded** or **Illuminated**.

Rollup: Softblank
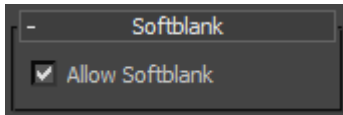
Overview

Softblank is enabled or disabled in the Global Rendering Parameters.
The following settings are ignored if Softblank is disabled there.

Allow Softblank

Default: enabled.
As long as Softblank is enabled in the Global Rendering Parameters "Allow Softblank" determines if an object is soft blanked or not.

Rollup: Contours
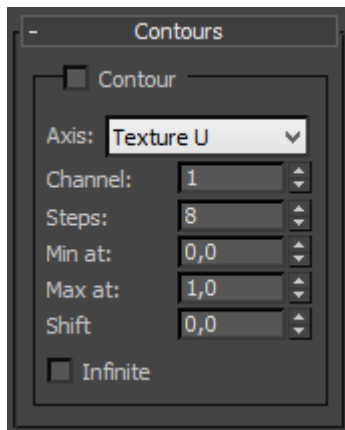
Overview

A sample says more that thousand words:
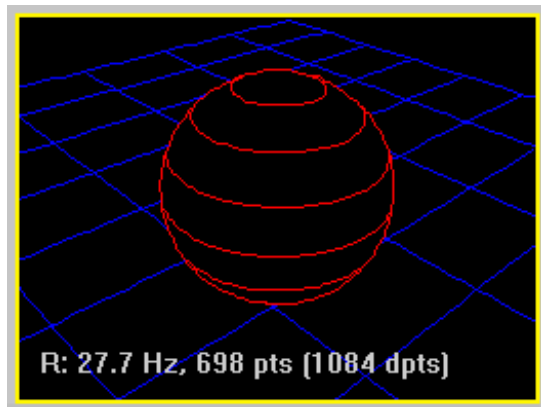
This is a blue plane with two different layers of contours (U and V) and a red sphere with one layer of contours attached.

Another example from **Samples\Wave.max**:
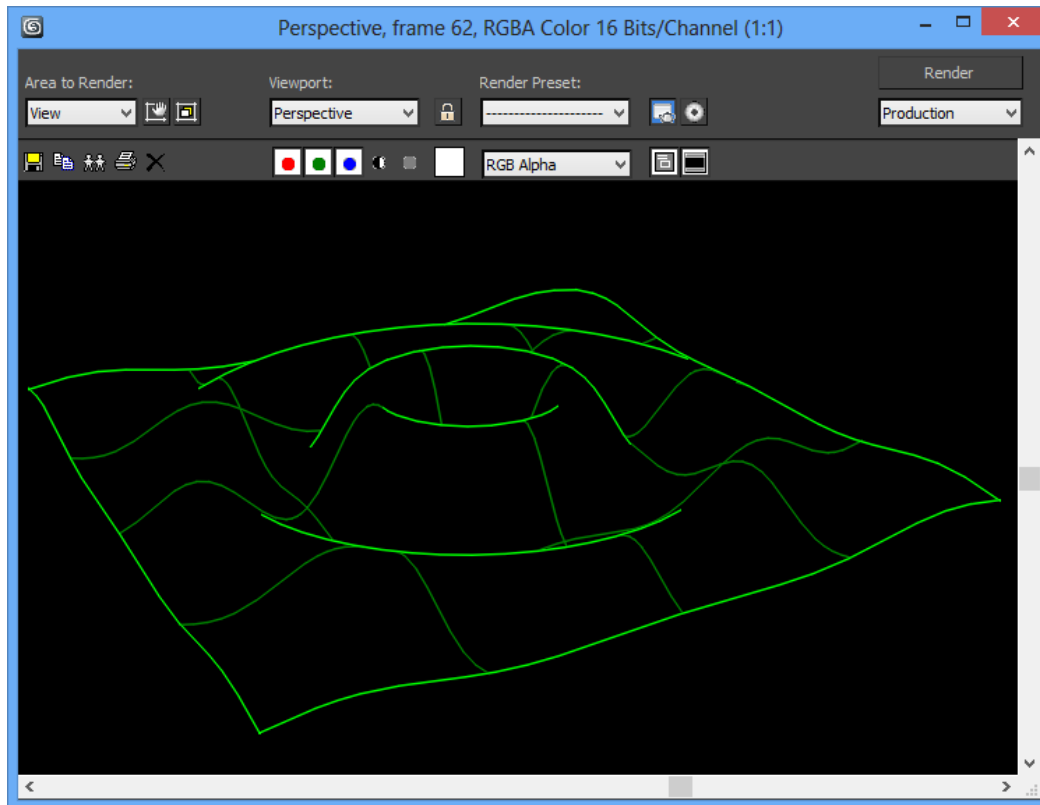
Contour

Default: disabled.
Global enable/disable of the contour.

Axis

Default: Texture U.
This defines the axis the contours are attached to.

This can be:

> Texture U
> Texture V
> Texture W
> Object X
> Object Y
> Object Z
> World X
> World Y
> World Z

When using the texture channel (U, V, W), make sure to check "`Generate Mapping Coords`" in the rollup of the object. Alternatively use the UVW Map modifier etc. to create texture coordinates.

Channel

Default: 1.

This is only used if the axis is one of the texture channels (U, V, W). It defines the texture (map) channel to be used for this contour. 3ds max™ supports up to 100 mapping channels. 1-99 refer to the Map Channel, 0 is the Vertex Color Channel.

Steps

Steps: Default: 8.

Min at

Min at: Default: 0.0.

Max at

Max at: Default: 1.0.

Shift

Shift: Default: 0.0.

Infinite

Infinite: Default: off.

These parameters define position and density of the contour lines:
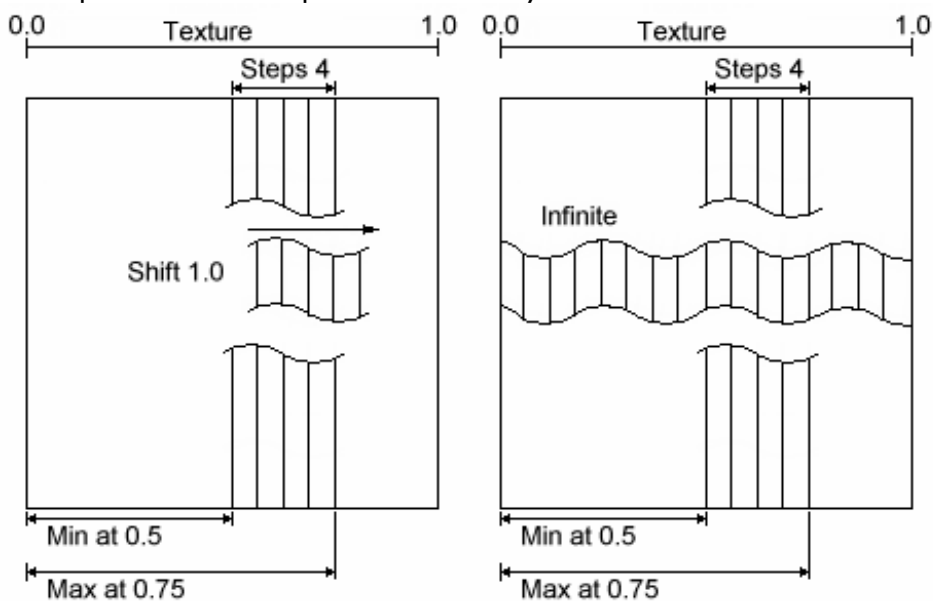
In this example 4 steps are defined in range [0.5, 0.75]. Note that there are 4 steps, but 5 lines. The distance from line to line is defined as: (MaxAt - MinAt) / Steps.

Shift simply allows to move the contours along the axis. A value of 1.0 is equivalent to a shift by one step.

With Infinite the contours are repeated all over the surface.

The Super Preview

Overview

The Super Preview displays a simulation of the interactive rendering result on the monitor. Even the dynamic behavior of scanners and fog are simulated. This allows to get a good impression of the final result without any laser hardware attached.

The Super Preview can be opened from the proTize menu or with **Alt+Ctrl+F**.

Properties

The properties window of the Super Preview allows customization of the laser simulation. To open the Super Preview Properties right-click the Super Preview window and select **Properties** from the context menu. With the default keyboard assignments you can also open it with **Alt+Ctrl+G**.
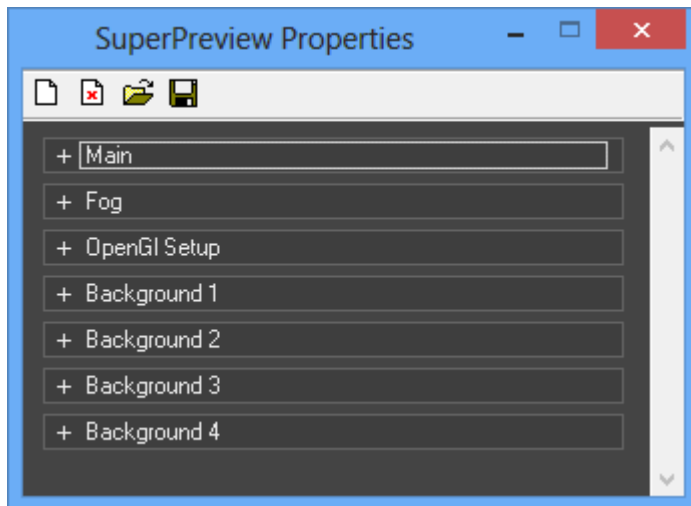
Default, Load and Save

"Reset all Parameters to default (As defined by Lpv File)"
The first icon from the left sets all parameters to the values defined in the Lpv file.

"Reset all Parameters to default (Ignore Lpv Parameters)"
The second icon from the left resets all parameters to the default values. Settings stored in the Lpv file are ignored.

"Load Parameters from File"
Opens the dialog box for opening the current settings. These can be exchanged at will between **LGPreview**, **Lpv Player** and **proTize**.

"Save current Parameters to File"
Opens the dialog box for saving the current settings. This way you can reuse a setting later without the trouble of adjusting all values again.

Super Preview Properties: Main
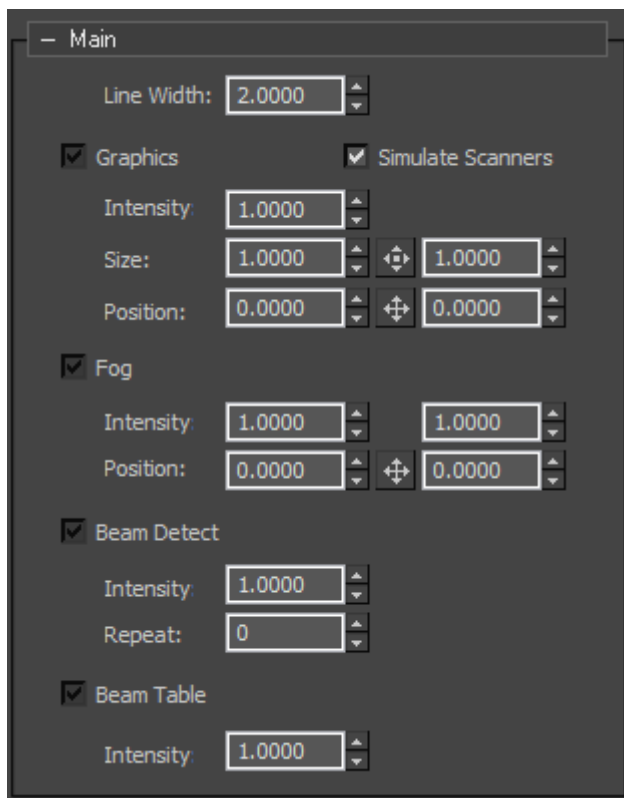
Line Width

This parameter modifies the width (in pixels) of lines displayed by the Super Preview. The default value of 2.0 usually results in the best quality. With full screen display and high resolution, wider lines may result in a better picture.
Unfortunately not all graphics cards support arbitrary adjustment of the line width.

Graphics

By activating this parameter, the laser picture is displayed as a graphic. If "Enable Fog" is turned off this is equivalent to a graphics projection onto a screen.
Combined with "Enable Fog" the effect is more that of a gauze installed between the point of view and the scanner.
"Intensity" is used to adjust the brightness of the graphic. Higher values result in brighter lines.
"Size" influences the size of the picture, where the X- and Y sizes can be adjusted separately or simultaneously by keeping the mouse button depressed on the "&"-symbol and dragging. With "Pos" you determine the position of the picture. Here X- and Y positions can also be set separately or simultaneously with "&".

Fog

If you activate this parameter, the virtual room fills with fog. The fog with clouds floats through your preview picture. "Intensity" sets the brightness of the fog. The values can range from barely visible fog (0.1) to completely filled areas. With "Pos" you determine the position of the scanners. X- and Y positions can be set separately or simultaneously ("&").

Beam Detect

If this parameter is activated, the Super Preview performs an automatic beam detection. This means that points which have one or more repeats will be displayed as bright lines. The "Intensity" of the lines can be set. The parameter "Repeat" determines the number of repeats necessary to display a line as a "beam".

Beam Table

By activating this parameter beams from the beam table will be simulated. Two predefined options are available: a beam table for 8 positions and one for 20 positions.
"Intensity" determines how clearly the beams will be accentuated.
Beam tables can be present in Lpv files.

Super Preview Properties: Fog
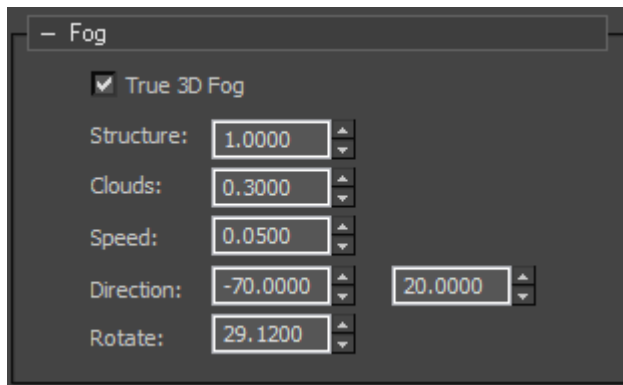
Overview

Here you set the details of the fog. These settings are only done on the PC. Please note the you need a fast graphics card with OpenGL support to achieve optimal graphics display.

True 3D Fog

Activating True 3D Fog makes the display of the fog even more realistic. However, this is not supported by all graphics cards. Under certain circumstances it is also possible that even though it does work the calculation is very slow.

Structure

The structure of the fog can be set on a range from unstructured (Haze, 0.0) to a clear, defined, structured display (1.0).

Clouds

Changes the number of clouds from no clouds (0.0) to many, clearly defined clouds (1.0).

Speed

The speed with which the clouds float through your virtual showroom can be set. Here the value 0 means that the clouds do not move.
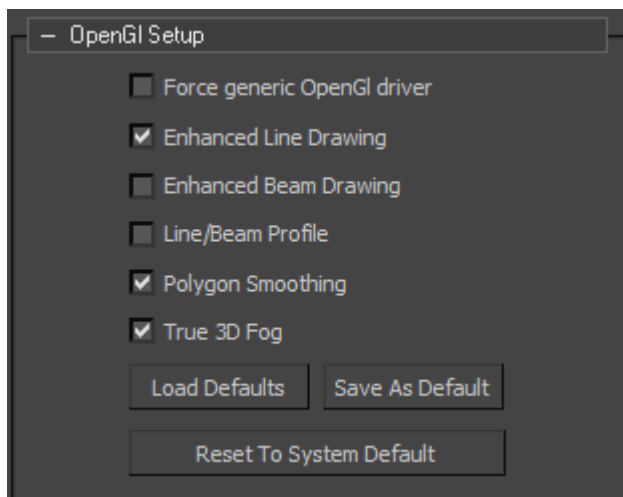
Direction

Define the direction in which the virtual clouds will move.

Rotate

This parameter lets the clouds rotate around the Z-axis.

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Super Preview Properties: OpenGL Setup

Overview

In this section you have the possibility to set OpenGL parameters. The standard configuration usually leads to the best display. In individual cases it may be possible that you can improve or accelerate the output by optimizing these parameters for your graphics card. The Super Preview analyses your configuration and tries to determine the optimal settings. These are referred to as System Default. If you find a better configuration, you can save this so that it is automatically activated the next time the Super Preview is started. This is referred to as Default.

Force generic OpenGl driver

This parameter activates the software OpenGL driver by Microsoft® Windows®. Only use this if display errors occur. In practice this driver is very slow and it may take several seconds for a picture to be calculated.

Enhanced Line Drawing

When this parameter is activated the lines are drawn in a special mode. With some graphics cards this will improve the display.

Enhanced Beam Drawing

When this parameter is activated the lines for beams are drawn in a special mode. With some graphics cards this will improve the display.

Beam Profile

Lines are not cut sharply at the edges, they have a profile. This looks a little more realistic. Only works if "Enhanced Line Drawing" is activated.

Polygon Smoothing

When this option is supported by the graphics card the picture usually looks clearer and so called steps are avoided. This option usually does not make the display slower if it is supported by the graphics card. It is therefore superior to the "Global Scene anti-Aliasing" which you may find in

the setup of your graphics card. Here it also depends on the graphics card if the picture is actually improved.

True 3D Fog

Activating True 3D Fog makes the display of the fog even more realistic. However, this is not supported by all graphics cards. Under certain circumstances it is also possible that even though it does work the calculation is very slow.

Load Defaults

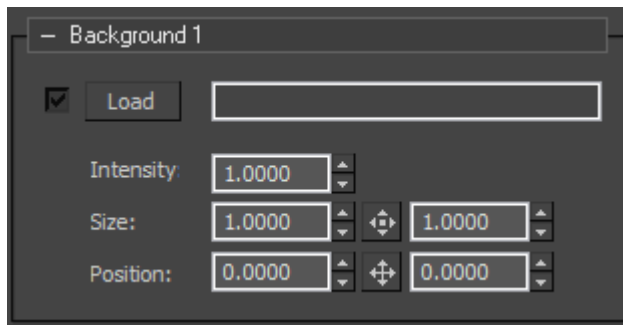Stored default values concerning the OpenGL setup are loaded.

Save As Defaults

The current OpenGL configuration is saved as default configuration.

Reset To System Default

The OpenGL configuration is reset to its values at delivery.

Properties – Background

Overview

You can add up to four background pictures, logos or watermarks into your preview. Accepted file formats are JPEG or PNG (PNG = Portable Network Graphics).

Load

Activate the checkbox to display the specified background picture. Clicking the "Load" button " will open a file select box where you can choose a graphic.

Intensity

Specify the intensity / brightness of the background picture. It often makes sense to reduce the intensity of background pictures or watermarks so that they will not interfere with the laser simulation.

Size

Specify the size with this parameter.

Position

This parameter determines the position of the background picture. Usually background pictures will be oriented toward the center. At +/-10 you can also attach the pictures to one of the edges.

Tips + Tricks

Render warning can be ignored

When Rendering sequences with **proTize max** sometimes a dialog box shows up that warns "`You are rendering a sequence with no assigned file. Frames may be lost.`". You can ignore this if you enabled any of the laser specific output formats, because this is only related to Bitmap/AVI output of the rendering.

Optimizing rendering of Flash™ output

When rendering for Flash™ (SWF) output only, use the Real-time Parameters or disable things like Overlap Removal, Keep Right, Reshuffle, Optimize Blanking, Animation Correlation etc. in Rendering Parameters. This speeds up SWF rendering significantly and most of the optimizations are only required for laser output.

Rendering Text

There are several methods of rendering text and other shapes:
A simple method is to use the **Turn to Mesh** modifier. **Text.max** in **Samples** shows how to do this.
Another method is to use the **Extrude** modifier and the **Smoothing** modifier. This results in text that can optionally have depth. See **Text-3D.max**. With the Extrude either choose a very small **Amount** (e.g. 0.001) for flat text, or larger values for 3d text. The **Smoothing** modifier is required even though Extrude has a smoothing option. We are not sure why this is the case. But without explicitly applying the **Smoothing** modifer there are often crease edges that should not be there.
The third method results in transparent text. In the text's **Rendering** rollup check **Renderable**, set **Thickness** to 0.001 and **Sides** to 3. See **Text-Transparent.max** in Samples. Make sure to disable **Repeat at Crease**. Otherwise repeats show up at the wrong places. This is related to the way 3ds max™ creates the text.
Text-Explosion.max is a sample how to let the text explode.

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This software is based in part on libpng and zlib.

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Release Notes

Version 2024/04/02

- Bugfix: Under certain circumstances Softblanking with Mindist 0.0000 could cause a crash.
- The default of "Repeat at Crease" has been changed from enabled to disabled.
- The DSP version now starts converting significantly faster.
- Missing sample files have been added to the installer.
- The driver of the hardware key (dongle) has been updated.

Version 2014/09/30

- New Rollup "Softblank" in the proTize Parameters modifier.

Version 2014/09/05

- Support for Autodesk 3ds Max 2012 (32-Bit version).
- 3ds Max 4 and 5 are no longer supported.
- New proTize max Parameter "Black Threshold".
- New installer solves compatibility issues with the 64-bit editions of Windows.
- The driver of the hardware key (dongle) has been updated.

Version 2011/01/12

- Support for Autodesk 3ds Max 2010 and 2011 (32-Bit versions).

Version 2010/03/03

- Support for Autodesk 3ds Max 9, 2008 and 2009 (32-Bit versions).
- Bugfix: Orthogonal rendering did not work correctly.
- The driver of the hardware key (dongle) has been updated.

Version 2009/10/06

- The ILDA export (only available at the dongle version) now supports the new true color format.
- The driver of the hardware key (dongle) has been updated.

Version 2005/09/08

- Support for True Color output added for the Lasergraph DSP format.
- A bug in the handling of the boolean modifier has been fixed.
- Improved support for particles systems.
- Added support for manual clipping planes (camera).
- Lpv follows 3ds max's time slider (useful for review after rendering).
- More robust rendering in general.

Version 2004/11/19

- Fixed problems with 3ds max™ 6. (Crashes with proTize assigned as renderer for the Material Editor).

Version 2004/06/09

- **Limit Time** option added to the **General** rollup.
- Support for the Lasergraph DSP's display options **Timed** and **Dynamic**.
- Support for 3ds max™ 6 added.
- The **Super Preview** has been integrated.
- Support for **Lpv** files has been added.
- **Stereoscopic 3D** support has been added. Supports **Anaglyph**, **Trimagic** and separate **Left** and **Right** projectors.
- **Preserve Z** options added.
- **Softblank** generation added.
- New color modes **Shaded**, **Illuminated**, **Illuminated + Shadows** added.
- **Interactive Shading** option added.