

# TWL-System

## NITRO Intermediate File Plug-In for SOFTIMAGE|XSI

2009/05/28

**The content of this document is highly confidential  
and should be handled accordingly.**

**Confidential**

These coded instructions, statements, and computer programs contain proprietary information of Nintendo and/or its licensed developers and are protected by national and international copyright laws. They may not be disclosed to third parties or copied or duplicated in any form, in whole or in part, without the prior written consent of Nintendo.

## Table of Contents

1	List of Supported Features .....	11
2	Intermediate File Types.....	14
3	Cautions When Creating TWL and NITRO Data .....	15
3.1	SOFTIMAGE XSI Versions .....	15
3.2	Nodes.....	15
3.2.1	Nodes .....	15
3.2.2	Node Names .....	16
3.2.3	Null .....	16
3.2.4	Chains .....	16
3.2.5	Polygon Mesh.....	17
3.2.6	Duplication.....	20
3.2.7	NURBS Model .....	20
3.2.8	Subdivision Surfaces.....	20
3.2.9	Character Animation (ICA) .....	20
3.2.10	Node Visibility .....	21
3.2.11	Visibility Animation (IVA).....	21
3.2.12	Additional Node Information .....	21
3.3	Materials.....	21
3.3.1	Material Types and Exported Data .....	21
3.3.2	Material Color Animation (IMA) .....	24
3.3.3	Supplement Regarding Materials .....	24
3.4	Textures.....	25
3.4.1	Texture Names .....	25
3.4.2	Texture Files and Formats.....	25
3.4.3	Texture Attributes.....	26
3.4.4	Texture Limitations .....	28
3.4.5	UV Limitations .....	28
3.4.6	Texture Pattern Animation (ITP) .....	29
3.4.7	Texture SRT Animation (ITA).....	32
3.5	Render Tree .....	32
3.6	Billboard Display .....	34
3.7	Overall Animation .....	34
3.7.1	Values Output to the IMD File .....	34
3.7.2	Supplement Regarding Animation.....	35
3.8	Envelopes .....	35
3.8.1	Envelope Settings .....	35
3.8.2	Polygon Shapes Output to the IMD File.....	36
3.8.3	Regarding Envelope Notation in Nintendo TWL-System .....	36

3.9	Loading Scenes/Models Created with SI3D .....	37
3.10	Custom Parameter Set .....	37
4	Intermediate File Output Plug-In .....	39
4.1	Using the Plug-In .....	39
4.2	Intermediate File Output Dialog Setting Method .....	40
4.2.1	Output Options .....	40
4.2.2	General Options .....	41
4.2.3	Output File Selection .....	43
4.2.4	Imd Options .....	43
4.2.5	Animation Options .....	44
4.2.6	Tolerance Options .....	46
4.3	Error Display During Intermediate File Output .....	47
4.4	Warning Display During Intermediate File Output .....	47
4.5	Error Display When Transferring to the 3D Material Editor .....	49
4.6	Saving Intermediate File Output Dialog Box Settings .....	49
4.6.1	Automatic Save Destination Settings .....	50
4.6.2	Importing/Exporting N3ES Files .....	50
4.7	Intermediate File Script Command Output .....	51
4.7.1	Script Command Output .....	51
4.7.2	Writing a Script Command .....	51
4.7.3	Supplemental Items for Script Commands .....	52
4.8	Batch Exporting Intermediate Files .....	52
4.8.1	Batch Export .....	52
4.8.2	Executing Batch Export .....	52
4.8.3	Supplemental Items for Batch Export .....	53
5	Data Creation Plug-Ins .....	54
5.1	Data Creation Plug-Ins .....	54
5.2	Setting Material Attributes (NITRO Set Material Attribute) .....	54
5.3	Verifying Polygon Display Face (NITRO Show Display Face) .....	59
5.4	Verifying Lighting (NITRO Show Lighting) .....	59
5.5	Setting Polygon Rendering Priority (NITRO Set Render Priority) .....	60
5.6	Verifying Polygon Rendering Priority (NITRO Show Render Priority) .....	61
5.7	Setting Billboard Display (NITRO Set Billboard) .....	61
5.8	Verifying Billboard Display (NITRO Show Billboard) .....	62
5.9	Setting the Prohibit Node Deletion Flag (NITRO Set No Cut Node) .....	62
5.10	Verifying the Prohibit Node Deletion Flag (NITRO Show No Cut Node) .....	63
5.11	Setting Texture Pattern Animation (NITRO Set Texture Pattern Animation) .....	63
5.12	Batch Setting Hierarchical Scaling (NITRO Set Hierarchical Scaling) .....	64

5.13	Selecting Polygons with a Specified Number of Vertices (NITRO Select Polygon)	64
5.14	Replacing Element Name Strings (NITRO Replace Character)	65
5.15	Renaming Element Names Exceeding 16 Characters (NITRO Rename Over 16 Characters)	67
6	Information for Programmers	70
6.1	Calculating XSI Node Matrices	70
6.2	Node Reduction Algorithms	70
6.2.1	Algorithm When Specifying Cull Useless Node	70
6.2.2	Algorithm When Specifying Merge Useless Node	71
6.2.3	Algorithm When Specifying Unite	71
6.2.4	Algorithm When Specifying Unite and Combine Polygon	71
6.2.5	Node Reduction Example	71
6.3	SOFTIMAGE XSI Texture Matrix	72
6.4	Custom Parameters	74

## Code

Code 6-1	Texture Matrix	73
----------	----------------	----

## Tables

Table 1-1	List of Supported Features	11
Table 2-1	Intermediate File Types	14
Table 4-1	Node Reduction Methods	42
Table 4-2	Frame Step Mode and Output Frames	45
Table 4-3	Intermediate File Output Errors	47
Table 4-4	Intermediate File Output Warnings	47
Table 4-5	Transfer to the 3D Material Editor Errors	49
Table 5-1	Data Creation Plug-Ins List	54
Table 5-2	Meaning of the Texture Effect Matrix Components	58
Table 6-1	Custom Parameter List	74

## Figures

Figure 3-1	Local Transform Property Editor	16
Figure 3-2	XSI Bone Structure Types	17
Figure 3-3	Example of Rendering Priority	19
Figure 3-4	Visibility Property Editor	21
Figure 3-5	Settings for Diffuse, Ambient, and Specular Color	22
Figure 3-6	Settings for Emission Color	23

Figure 3-7 Material Transparency .....	24
Figure 3-8 Texture Projection Property Editor .....	27
Figure 3-9 Texture Projection Settings .....	28
Figure 3-10 NNS TexPatternPSet Property Editor .....	29
Figure 3-11 NNS_ChangeTexPatternPath .....	31
Figure 3-12 Render Tree Example 1 .....	32
Figure 3-13 Render Tree Example 2 .....	33
Figure 3-14 Render Tree Example 3 .....	33
Figure 3-15 Render Tree Example 4 .....	34
Figure 3-16 Render Tree Example 5 .....	34
Figure 3-17 Play Control .....	35
Figure 3-18 Fully Weighted Envelope Model Example .....	36
Figure 3-19 Weighted Envelope Model Example .....	37
Figure 4-1 NITRO Export Dialog Box .....	39
Figure 4-2 Output Option Dialog Box .....	40
Figure 4-3 General Options .....	41
Figure 4-4 Output File Selection .....	43
Figure 4-5 Imd Options .....	43
Figure 4-6 Animation Options .....	45
Figure 4-7 Tolerance Options .....	46
Figure 4-8 NITRO Autosave Export Settings Dialog Box .....	50
Figure 4-9 Importing and Exporting N3ES Files .....	51
Figure 4-10 N3ES File Save Dialog Box .....	51
Figure 5-1 NITRO Set Material Attribute Dialog Box .....	55
Figure 5-2 NITRO Show Display Face Dialog Box .....	59
Figure 5-3 NITRO Show Lighting Dialog Box .....	59
Figure 5-4 NITRO Set Render Priority Dialog Box .....	60
Figure 5-5 NITRO Show Render Priority Dialog Box .....	61
Figure 5-6 NITRO Set Billboard Dialog Box .....	62
Figure 5-7 NITRO Show Billboard Dialog Box .....	62
Figure 5-8 NITRO Set No Cut Node Dialog Box .....	63
Figure 5-9 NITRO Set Hierarchical Scaling Dialog Box .....	64
Figure 5-10 NITRO Select Polygon Dialog Box .....	65
Figure 5-11 NITRO Replace Character Dialog Box .....	66
Figure 5-12 NITRO Rename Over 16 Characters Dialog Box .....	68
Figure 6-1 Node Reduction Examples .....	72

## Revision History

Version	Revision Date	Description
1.6.0	2009/05/28	<ul style="list-style-type: none"> <li>Updated section 3.1 SOFTIMAGE XSI Versions</li> </ul> Additions/revisions: <ul style="list-style-type: none"> <li>Added support for 7.5. Use the add-on file for XSI 7.</li> </ul>
	2009/03/04	<ul style="list-style-type: none"> <li>Updated section 3.1 SOFTIMAGE XSI Versions</li> </ul>
	2008/10/08	<ul style="list-style-type: none"> <li>Added support for plug-in version 1.6.0 2008-10-08.</li> <li>Made revisions in line with the NITRO-System name change (updating to TWL-System)</li> </ul> Additions/revisions: <ul style="list-style-type: none"> <li>Added support for XSI7.</li> <li>Ended support for XSI5.11. Should be in reverse chronological order.</li> </ul>
	2008/06/18	Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Corrected omissions from the manual in section 3.4.6.4, NNS_TexPatternPSet, section 4.1 Using the Plug-In, section 4.7.3 Supplemental Items for Script Commands, and section 5.1 Data Creation Plug-Ins.</li> <li>Corrected manual deficiencies.</li> </ul>
	2008/04/08	<ul style="list-style-type: none"> <li>Changed the format of the revision history in the Japanese version.</li> <li>Changed the title and subtitle on the cover page.</li> </ul>
	2008/01/23	Bug fixes: <ul style="list-style-type: none"> <li>Revised the color and alpha components (Diffuse, Ambient, Specular, Alpha) of materials in XSI to be output with a value of 1.0 when configured with a value greater than 1.0.</li> <li>Added support for plug-in version 1.6.0 2008-01-23.</li> </ul>
	2007/11/26	Additions/revisions: <ul style="list-style-type: none"> <li>Added a script for batch editing of texture paths saved in NNS_TexPatternPSet (section 2.4.6.4 Batch Editing of Texture Paths Set with NNS_TexPatternPSet).</li> <li>Added a Plug-In Menu to the XSI Main Menu (sections 3.1 and 4.1).</li> </ul> Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Added content concerning supplemental script command output (section 3.7.3 Supplemental Items for Script Commands).</li> </ul> Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that sometimes prevented character animation data saved in ica format from exporting correctly.</li> <li>Fixed bug that caused the export options settings saved in a scene to not be correctly reflected to the export options window when it opened.</li> <li>Fixed bug that sometimes caused texture order to be exported incorrectly when creating a SCR file using NITRO Set Texture Pattern Animation.</li> <li>Added support for plug-in version 1.6.0 2007-11-26.</li> <li>Added Supplemental Items for Script Commands.</li> </ul>
	2007/10/10	Additions/revisions: <ul style="list-style-type: none"> <li>Added support for SOFTIMAGE XSI versions 6.02 and 6.5. The add-on files have not been changed.</li> </ul>

Version	Revision Date	Description
	2007/09/10	Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that sometimes caused files to be saved with the wrong file version in intermediate file export settings.</li> </ul> Ended support for XSI versions 5.0 and 5.1. <ul style="list-style-type: none"> <li>Added support for plug-in version 1.6.0 2007-09-10.</li> </ul>
	2007/06/18	Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that caused &lt;display&gt; priority to always output 0 with the material set by the vertex color.</li> <li>Added support for plug-in version 1.6.0 2007-06-18.</li> </ul>
	2007/05/18	Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug so that &lt;box_text&gt; stored in IMD is exported appropriately.</li> <li>Added support for plug-in version 1.6.0 2007-05-18.</li> </ul>
	2007/04/23	Additions/revisions: <ul style="list-style-type: none"> <li>Support added for XSI version 6.0.1. The add-on file has not changed from the previous version.</li> </ul>
	2007/01/29	Additions/revisions: <ul style="list-style-type: none"> <li>Added support for outputting user normals.</li> </ul> Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that prevented volume_min and volume_max of the IMD file &lt;polygon&gt; and &lt;node&gt; from being output properly for envelope models.</li> </ul> Additions/revisions: <ul style="list-style-type: none"> <li>Ended support for XSI versions 4.0 and 4.2.</li> <li>Added support for plug-in version 1.6.0 2007-01-29.</li> </ul>
	2006/10/03	Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that prevented material color from being correctly obtained when using XSI versions 5.1 or later.</li> </ul> Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Support added for XSI version 5.11.</li> <li>Added support for plug-in version 1.6.0 2006-10-03.</li> </ul>
	2006/05/29	Additions/revisions: <ul style="list-style-type: none"> <li>Support added for XSI versions 5.0 and 5.1. The add-on file has not changed from the previous version.</li> <li>Added support for plug-in version 1.6.0 2006-05-29.</li> </ul>
	2006/04/17	Bug fixes: <ul style="list-style-type: none"> <li>Fixed the phenomenon of FrameIn of the PlayControl being overwritten when the plug-in was executed.</li> </ul> Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Added a caution when KeyFrame was set before FrameIn of PlayControl.</li> <li>Added support for plug-in version 1.6.0 2006-04-17.</li> </ul>
	2005/11/28	Bug fixes: <ul style="list-style-type: none"> <li>Revised &lt;box_test&gt; in the IMD file so that it outputs correctly.</li> <li>Added support for plug-in version 1.6.0 2005-11-28.</li> </ul>



Version	Revision Date	Description
	2005/10/24	Bug fixes: <ul style="list-style-type: none"> <li>Fixed bug that caused the model position to shift during output of an envelope model that uses several constraints.</li> <li>Added support for plug-in version 1.6.0 2005-10-24.</li> </ul>
	2005/06/20	Bug fixes: <ul style="list-style-type: none"> <li>Fixed problem where some colors became darker when 4x4 texel compression texture was created from a texture file with a filename ending in "_cmp4" without additional information (the palette data volume may have increased compared to previous versions).</li> <li>Added support for plug-in version 1.6.0 2005-06-20.</li> </ul>
	2005/02/02	Additions/revisions: <ul style="list-style-type: none"> <li>Supported added for intermediate file format version 1.6.0.</li> <li>Added the "NITRO_ExportCmd" to execute NITRO Export scripts.</li> <li>Updated the following data creation plug-in.               <ul style="list-style-type: none"> <li>NITRO Set Material Attribute</li> </ul> </li> <li>Added Texture Effect Matrix and deleted TexGenST.</li> <li>Added support for plug-in version 1.6.0 2005-02-02.</li> </ul>
1.5.0	2005/01/14	Additions/revisions: <ul style="list-style-type: none"> <li>Added a batch export feature for intermediate files.</li> </ul> Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Support added for XSI version 4.2.</li> <li>Added support for plug-in version 1.6.0 2005-01-14.</li> </ul>
	2004/12/13	Additions/revisions: <ul style="list-style-type: none"> <li>Support added for intermediate file format version 1.5.0.</li> <li>Added a warning.</li> <li>Added/updated the following data creation plug-ins.               <ul style="list-style-type: none"> <li>(Added) NITRO Set Render Priority</li> <li>(Added) NITRO Show Render Priority</li> <li>(Updated) NITRO Set Material Attribute</li> </ul> </li> <li>Added a configurable attribute.</li> <li>Fixed an intermediate file export plug-in bug.</li> <li>Fixed bug that caused the precision of the lower decimal portion of the vertex coordinate to drop when exporting a model with large vertex coordinates to an intermediate file (i.e., when the IMD file <code>pos_scale</code> attribute is large).</li> </ul> Additions/revisions only to the manual: <ul style="list-style-type: none"> <li>Added section 2.2.5.4 Polygon Rendering Priority.</li> <li>Revised the description of Unite and Combine Polygon in section 3.2.2 General Options.</li> <li>Revised the description of Interpolation in section 3.2.5 Animation Options.</li> <li>Added support for plug-in version 1.5.0 2004-12-13.</li> </ul>

Version	Revision Date	Description
1.4.2	2004/10/25	<p>Additions/revisions:</p> <ul style="list-style-type: none"> <li>Updated the following data creation plug-ins. <ul style="list-style-type: none"> <li>NITRO Set Material Attribute Added a configurable attribute. Changed the name for Lighting to Light0.</li> <li>NITRO Show Lighting Changed so that the four lights can be individually verified.</li> </ul> </li> </ul> <p>Additions/revisions only to the manual:</p> <ul style="list-style-type: none"> <li>Revised the description in section 2.2.5.3, Vertex Colors.</li> <li>Revised the description of the Interpolation option of the intermediate file export plug-in.</li> <li>Added support for plug-in version 1.4.2 2004-10-25.</li> </ul>
	2004/10/06	<p>Added a data creation plug-in.</p> <ul style="list-style-type: none"> <li>NITRO Rename Over 16 Characters</li> <li>Added support for plug-in version 1.4.2 2004-10-06.</li> </ul>
	2004/09/27	<p>Additions/revisions:</p> <ul style="list-style-type: none"> <li>Updated the intermediate file export plug-in.</li> <li>Supported exporting ima, itp, and ita files.</li> <li>Changed from error processing to a warning when exporting models with the nolcon texture applied.</li> <li>Fixed bug that prevented sibling nodes from being output in alphabetically order.</li> <li>Fixed bug that prevented intermediate files from being output normally when textures were set in cluster units.</li> <li>Added the following data creation plug-ins. <ul style="list-style-type: none"> <li>NITRO Set Texture Pattern Animation</li> <li>NITRO Set Hierarchical Scaling</li> <li>NITRO Select Polygon</li> <li>NITRO Replace Character</li> </ul> </li> </ul> <p>Additions/revisions only to the manual:</p> <ul style="list-style-type: none"> <li>Added description to section 2.2.1, Nodes.</li> <li>Added description to section 2.4.5, UV Restrictions.</li> <li>Added description to section 2.8.3, Envelope Notation with Nintendo NITRO-System.</li> <li>Revised the description in section 2.9, Loading Scenes/Models Created with SI3D.</li> <li>Added description to section 2.10, Custom Parameter Sets.</li> <li>Added support for plug-in version 1.4.2 2004-09-27.</li> </ul>
0.5.0	2004/07/26	Initial version (only imd, ica, and iva exports supported).

# 1 List of Supported Features

Table 1-1 shows the status of this plug-in's support for major XSI features. In the Support Status column, **O** indicates that the item is supported and **X** indicates that it is unsupported.

**Table 1-1 List of Supported Features**

Feature		Support Status	Notes
Modeling			
Hierarchy-related	Hierarchical structure output	<b>O</b>	
	Hierarchical (Softimage) Scaling	<b>O</b>	Supported only when standardized to be on or off within a scene
Duplication/Instancing	Duplicate	<b>O</b>	Instantiate and output
	Clone	<b>O</b>	Instantiate and output
	Instance	<b>X</b>	Output as NULL
Visibility	Node visibility	<b>O</b>	
Polygon modeling	Vertex coordinates	<b>O</b>	
	Normals	<b>O</b>	Output of user normals is also supported
	Vertex colors	<b>O</b>	
	UV values	<b>O</b>	
NURBS modeling	NURBS surface	<b>X</b>	
	NURBS curve	<b>X</b>	
Subdivision surface modeling	Poly.Mesh > Subdivision	<b>O</b>	Output as polygons
	Geometry Approximation	<b>X</b>	
Materials	Supported shaders		The following shaders are supported: Lambert, Simple Lambert, Phong, Simple Phong, Blinn, Simple Blinn
	Diffuse	<b>O</b>	
	Transparency	<b>O</b>	Polygon alpha
	Ambient	<b>O</b>	
	Specular	<b>O</b>	
	Incandescence	<b>O</b>	Emission color

Feature		Support Status	Notes
Textures	UV mapping	O	
	Environment mapping	X	Configured in the 3D Material Editor
	Multi-textures	X	
	Wrapping	O	
	Mirror	X	Configured in the 3D Material Editor
	UVW Transformation – Scale	O	Only U and V are supported. W is unsupported.
	UVW Transformation – Rotate	O	Only W is supported. U and V are unsupported.
	UVW Transformation – Translate	O	Only U and V are supported. W is unsupported.
Animation			
General	Key frame animation	O	Bake and export
	Mute animation	O	Bake and export
	Expression	O	Bake and export
	Animation mixer	O	Bake and export
Character	FK animation	O	
	IK animation	O	Bake to FK and export
	Constraint	O	Bake to a node's SRT and export
	Path animation	O	Bake to a node's SRT and export
Visibility	Visibility animation	O	
Materials	Diffuse animation	O	Material color animation
	Transparency animation	O	
	Ambient animation	O	
	Specular animation	O	
	Reflection animation	O	
Textures	Animation that uses an SCR file	O	Texture pattern animation
	Animation configured with UVW Transformation – ScaleUV	O	Texture SRT animation
	Animation configured with UVW Transformation – RotateW	O	

Feature		Support Status	Notes
	Animation configured with UVW Transformation – TransUV	O	
Envelope	Envelope animation	O	
Shape animation		X	
Camera		X	
Light		X	
Fog		X	
Particles		X	
Hair, Fur		X	
Cloth simulation		X	
Batch processing from the command line		O	
Expression using ICE (XSI7)		X	

## 2 Intermediate File Types

The NITRO intermediate file plug-in for SOFTIMAGE|XSI exports version 1.6.0 NITRO intermediate files from SOFTIMAGE|XSI.

This manual uses the following abbreviations: XSI for SOFTIMAGE|XSI, SI3D for SOFTIMAGE|3D, and 3D Material Editor for Nintendo TWL-System 3D Material Editor.

Using this plug-in, the following intermediate files can be exported from SOFTIMAGE|XSI.

**Table 2-1 Intermediate File Types**

Extension	Data Type	Description
IMD	Model Data	Model information, including polygons, hierarchical structures, materials, and textures
ICA	Character Animation Data	Animation information for manipulating node matrices
IVA	Visibility Animation Data	Animation information for manipulating the display of matrices
IMA	Material Color Animation Data	Animation information for manipulating the material color
ITP	Texture Pattern Animation Data	Animation information for replacing multiple textures
ITA	Texture SRT Animation Data	Animation information for manipulating texture matrices

Currently, XSI does not support exporting the Shape Animation intermediate file.

## 3 Cautions When Creating TWL and NITRO Data

### 3.1 SOFTIMAGE|XSI Versions ---

This plug-in is designed to be used with SOFTIMAGE|XSI versions 6.02, 6.5, 7, and Softimage 7.5 for the 32-bit editions of Microsoft Windows. The plug-in for XSI 7 can also be used with XSI 7.01 and Softimage 7.5. Only these versions are supported; use of this plug-in with other versions is not guaranteed.

Descriptions in this manual correspond to the English language display mode.

### 3.2 Nodes

#### 3.2.1 Nodes ---

In this manual, the units that compose the 3D model hierarchical structure are called *nodes*. These correspond to Null or Joint/Polygon Mesh in XSI.

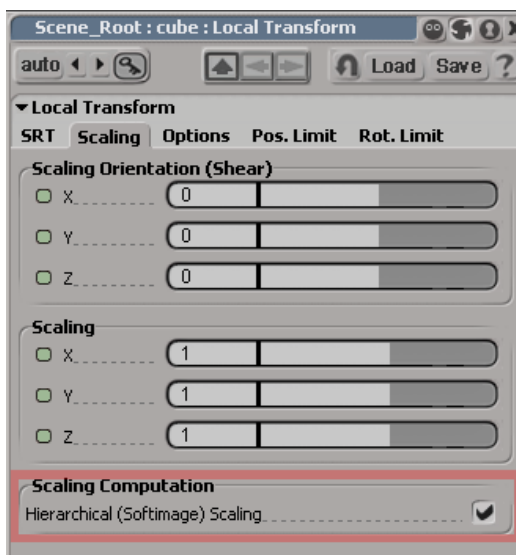
For intermediate files, there must be one root node for each file. When several root nodes exist in XSI, the plug-in adds a node named **world\_root** that groups all the nodes and then exports the intermediate file.

##### 3.2.1.1 Hierarchical (Softimage) Scaling

In XSI, On and Off settings can be switched for each node (in the Local Transform property). It is handled as a setting for the entire model, the same as for Classic Scaling in SI3D.

If all the nodes output to the intermediate file have Hierarchical Scaling selected, then this setting is *On*. (The IMD file's `<model_info>` element attribute `scaling_rule="si3d"`). If all the nodes output to the intermediate file have Hierarchical Scaling cleared, then this setting is *Off*. (The IMD file's `<model_info>` element attribute `scaling_rule="standard"`). When On and Off settings are mixed, an error is generated.

Do not change the Hierarchical Scaling settings when exporting IMD or ICA files.

**Figure 3-1 Local Transform Property Editor**

**Note:** When the On/Off setting for Hierarchical Scaling is changed for a model for which the Scale value is other than 1.0, a non-zero offset value can be set in the Scaling Orientation (Shear) Local Transform property. However, if a non-zero value is set in Scaling Orientation (Shear), the intermediate file may not export correctly. To export correctly, reset the value to zero.

### 3.2.2 Node Names

When using the Nintendo TWL-System library, use of 16 or fewer characters is strongly recommended for node names. Although there is no restriction on the number of characters that can be used for node names, multiple nodes can be given the same name, even if the scene is the same in XSI, if those nodes are associated with different models. When several nodes with the same name exist, the shallowest node in the hierarchy is output with the name unmodified. The other nodes will have an underscore and number, for example, \_1, \_2, appended to the node name. Therefore, the total number of characters used for a node name, including underscores and numbers, should be restricted to 16 or fewer.

### 3.2.3 Null

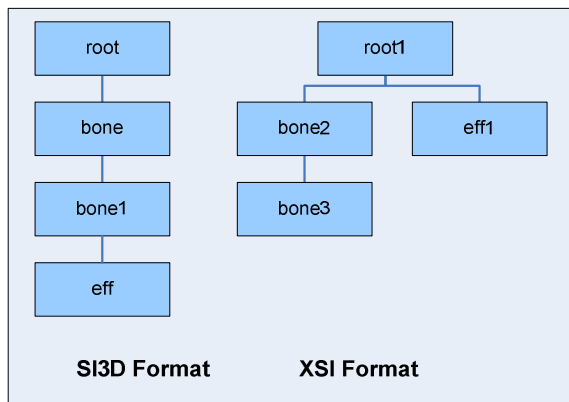
Output as a single node.

### 3.2.4 Chains

The chain elements that compose the skeleton (root, bone, effector) are output as separate nodes.

As illustrated below, XSI can create two types of chains: SI3D or XSI format (can be switched with Model > Create > Skeleton > SI|3D Skeleton Drawing). This plug-in supports either format.



**Figure 3-2 XSI Bone Structure Types**

### 3.2.5 Polygon Mesh

Output as a single node.

#### 3.2.5.1 Polygon Shapes

The following polygon shapes may not display correctly on a Nintendo DS system and may require modification.

- Polygons that do not have all vertices on the same plane.
- Concave polygons that have interior angles greater than 180 degrees.
- Polygons that have holes.

In XSI, a triangle is output as a triangle. Quadrangles are output as quadrangles. Using this plug-in, polygons with five or more angles are divided and output as triangles.

#### 3.2.5.2 Polygon Display Faces

The setting for which face to display (display front face, display back face, or display both faces) is set using the Setting Material Attributes (NITRO Set Material Attribute) plug-in. The default setting is to output to the intermediate file displaying only the front face for all polygons.

The [NITRO Show Display Face](#) plug-in is used to verify the display faces.

#### 3.2.5.3 Normal Vectors

In XSI, there is both a normal that is essential to the object and a user normal.

The user normal can be set with the XSI\_UserNormalEditing plug-in (XSI SDK\examples\workgroup\Addons\XSI\_UserNormalEditing).

Normally, the object-essential normal is output, but the user normal is output for objects that have a user normal (that have Cluster - User\_Normal\_Cluster).

**Note:** When the XSI\_UserNormalEditing plug-in is executed, the vertex color cluster is also automatically set in the cluster. If it is not desirable to set vertex color, delete the vertex color cluster from the scene explorer.

#### 3.2.5.4 Vertex Color

Vertex color data is output when a model with set vertex colors is output to an intermediate file.

To display vertex color without light calculations, use the [NITRO Set Material Attribute](#) plug-in to clear all lights that are affected.

If just one light affected by the NITRO Set Material Attribute plug-in is selected, the vertex color and light calculation can be displayed together. Support for the Nintendo TWL-System library, however, is undetermined.

#### 3.2.5.5 Polygon Rendering Priority

When a single mesh mode in 3DCG tools (corresponding to the `imd` file's `<node>` element) is associated with multiple materials, the polygons that compose the mesh model are divided into several polygon groups (corresponding to the `IMD` file's `<polygon>` element). In this case, the order in which the polygon groups are rendered can be controlled by setting the **Rendering Priority** (corresponding to the priority attribute of the `IMD` file's `<display>` element) for each material in the 3DCG tool. The rendering priority is used when translucent polygons are layered and displayed, or when decal polygons are displayed.

**Note:** The rendering order refers to the order in which render commands are sent to the TWL and NITRO geometry engines. These hardware specifications call for the rendering process for translucent polygons to always be performed after rendering opaque polygons, so even if the rendering priority is set so that a translucent polygon is to be rendered before an opaque polygon, the opaque polygon will always be rendered first on the TWL and NITRO.

To manage the render order of a polygon group, set a rendering priority of one or greater (lower values are rendered first).

For polygon groups that do not require a rendering order, set the rendering priority to **Don't care**. The timing to render polygon groups with a rendering priority of **Don't care** depends on the render routine. In addition, when multiple polygon groups have the same rendering priority, which polygon group is rendered first depends on the render routine.

##### Example:

**Don't care:** No rendering order specified (that is, the timing of the rendering is undefined).

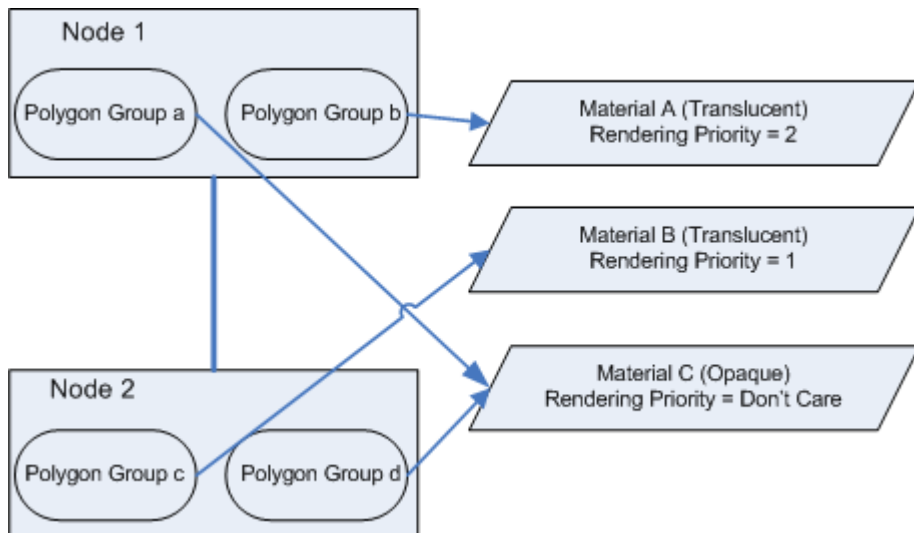
**Note:** The intermediate file handles **Don't care** as a rendering priority of 0.

**1 or greater:** Renders in order from the smallest value.

**Note:** The rendering order is controlled in each node, but control for the entire model depends on the render routine.

For example, in Figure 3-3 the render order differs depending on whether it is controlled in each node or for the entire model.

**Figure 3-3 Example of Rendering Priority**



### Rendering Routines

When the render order is controlled in each node (corresponding to the `<node>` element in the IMD file), the general Push/Pop method for matrix calculation is used as a render routine. From the parent node, the render commands for the entire model are sent in the following order.

"(polygon group **a**) → **b** → (**a**) → (**d**) → **c** → (**d**)" (either **a** or **d**)

When the render order is controlled by the entire model (IMD file), all the render commands are sent after the required matrix calculations. Because there is no need to have the render order depend on the parent-child relationship, all of the polygon groups in the model can be rendered following the rendering priority. For a node structure like that above, the render commands are sent in the following order.

"(polygon group **a,d**) → **c** → (**a,d**) → **b** → (**a,d**)" (either **a** or **d**)

Presently, the rendering priority for polygon groups a and d is **Don't care**, so the timing that either is rendered depends on the render routine.

**Note:** The Nintendo TWL-System G3D library uses the latter rendering routine: render order is controlled for the entire model.

The [NITRO Set Render Priority plug-in](#) sets the rendering priority. Materials for which the rendering priority are not set by the NITRO Set Render Priority plug-in are handled as if the rendering priority is set to **Don't care**. To verify the rendering priority, use the NITRO Show Render Priority plug-in.

#### 3.2.5.6 Material Compression Feature and Polygon Groups

When two different materials in the same node have the same content and rendering priorities, and

the material compression feature of the intermediate file export plug-in is used, the materials are combined into a single material, and the polygon groups are combined into one group.

When two different materials in the same node have the same content but different rendering priorities, the materials are combined into one, but the polygon groups are not because the priorities are different.

When the material content and rendering priorities are the same across different nodes, the polygon groups are combined only when **Unite and Combine Polygon** is specified for node deletion.

### 3.2.6 Duplication

---

XSI uses three types of duplication: Duplicate, Clone, and Instance. Of these, Instance cannot be output. Instance is handled as Null.

For Duplicate and Clone, the output is the same as when there are multiple polygon meshes with the same shape.

### 3.2.7 NURBS Model

---

Neither NURBS curves nor NURBS surfaces can be output. They must first be converted to polygons. NURBS-related nodes are handled as Null.

### 3.2.8 Subdivision Surfaces

---

Creating Subdivision surfaces by using Model > Create > Poly.Mesh > Subdivision outputs to an intermediate file as would occur for a normal polygon mesh. However, when envelopes are also used you must configure envelope settings for the nodes that are created with the Subdivision command.

The Subdivision surface created by changing PolygonMesh > Subdivisions in the Geometry Approximation property of the polygon mesh is not supported.

### 3.2.9 Character Animation (ICA)

---

#### 3.2.9.1 ICA Overview

The intermediate character animation (ICA) file data controls the Scale, Rotate, and Translate settings for each node.

The character animation data can be exported as an ICA intermediate file.

#### 3.2.9.2 Setting ICA

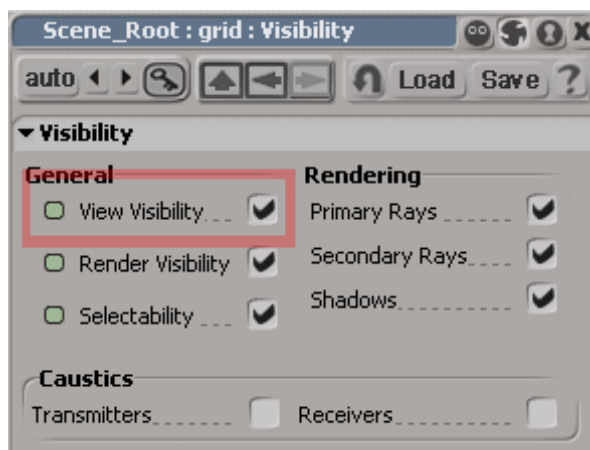
The animation settings are applied to the Local Transform's Scaling, Rotation, and Position for each node.

When animation is set in Global Transform, or when external influences, such as constraints, expressions, inverse kinematics, or animation mixers, are used, the intermediate file export plug-in internally calculates the Local Transform values to conform to how it is viewed in XSI, and then exports the intermediate file. For details, see section 3.7.2 Supplement Regarding Animation.

### 3.2.10 Node Visibility

Nodes for which the Visibility property editor's **View Visibility** check box have been cleared are output to the intermediate file with visibility off (hide).

**Figure 3-4 Visibility Property Editor**



### 3.2.11 Visibility Animation (IVA)

#### 3.2.11.1 IVA Overview

The intermediate visibility animation (IVA) file data controls the Visibility display of a node (show/hide).

The visibility animation data can be exported as an IVA intermediate file.

#### 3.2.11.2 Setting IVA

The IVA file data sets the Visibility property editor **View Visibility** check box for each node.

#### 3.2.11.3 IVA Supplement

Because visibility animation is set for nodes, when exporting an intermediate file be careful not to delete nodes that have visibility animation set when using **Compress Node** to **Cull Useless Node** or **Merge Useless Node**. (Specified nodes are not deleted when using [Setting the Prohibit Node Deletion Flag \(NITRO Set No Cut Node\)](#)). If **Compress Node** is set to **Unite** or **Unite and Combine Polygon**, visibility animation will not export correctly because the nodes will become one node.

### 3.2.12 Additional Node Information

Information that cannot be set with standard XSI features can be appended to nodes as custom parameters and defined in the intermediate file. For details, see Chapter 5 Data Creation Plug-Ins.

Lights, cameras, and curves cannot be output as nodes.

## 3.3 Materials

### 3.3.1 Material Types and Exported Data

This section describes the XSI material properties that are defined in the intermediate file.

### 3.3.1.1 Material Names

The name set for a material in XSI is output to the intermediate file as is.

There is no restriction on the number of characters that can be used for material names. However, it is strongly recommended to use 16 or fewer characters, including underscores and numbers, for material names when using the Nintendo TWL-System library.

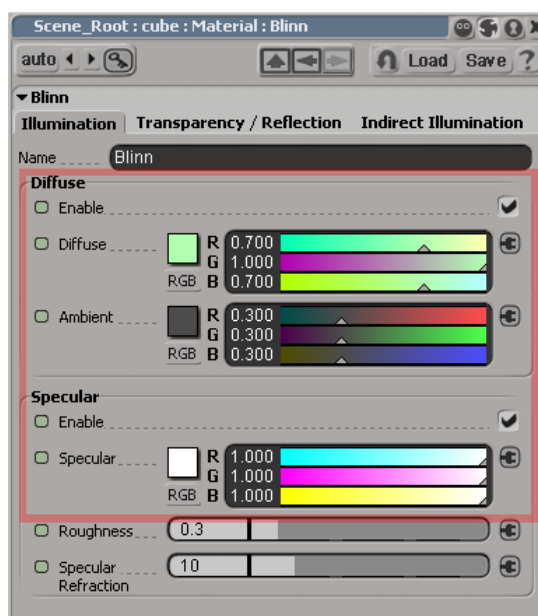
### 3.3.1.2 Material Types

The color elements that can be output depend on the material type. When using specular color, use Phong (or Simple Phong) or Blinn (or Simple Blinn). When not using specular color, use Lambert (or Simple Lambert).

**Note:** Even when materials other than the above are used, values are output to the intermediate file based on the existence of each of the elements of ambient and specular color.

Each of the material's color elements are defined in the following elements of the intermediate file.

**Figure 3-5 Settings for Diffuse, Ambient, and Specular Color**



- **Diffuse Color**

Outputs the Diffuse value. If the Enable check box is cleared, black is output.

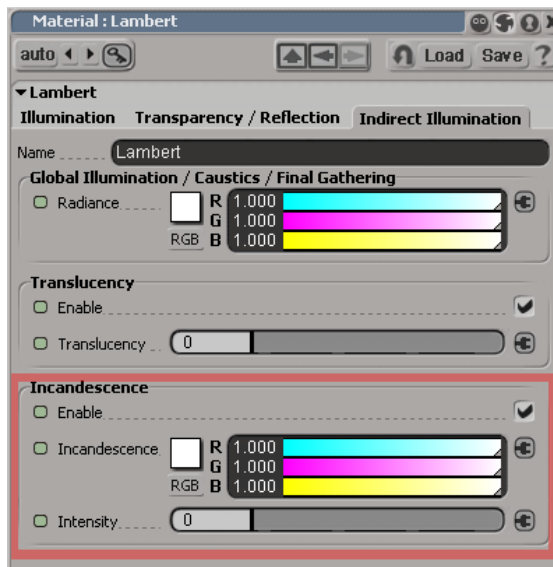
- **Ambient Color**

When the material has an Ambient element, the Ambient value is output. If there is no Ambient element, or if the Enable check box is cleared, black is output.

- **Specular Color**

When the material has a Specular element, the Specular value is output. Roughness and Specular Refraction are not defined. If there is no Specular element, or if the Enable check is cleared, black is output.

Figure 3-6 Settings for Emission Color



- **Emission Color**

When the material has an Incandescence element, the product of the Incandescence value and Intensity value is output as the emission color. If there is no Incandescence element, or if the **Enable** check box is cleared, black is output.

- **Polygon Alphas**

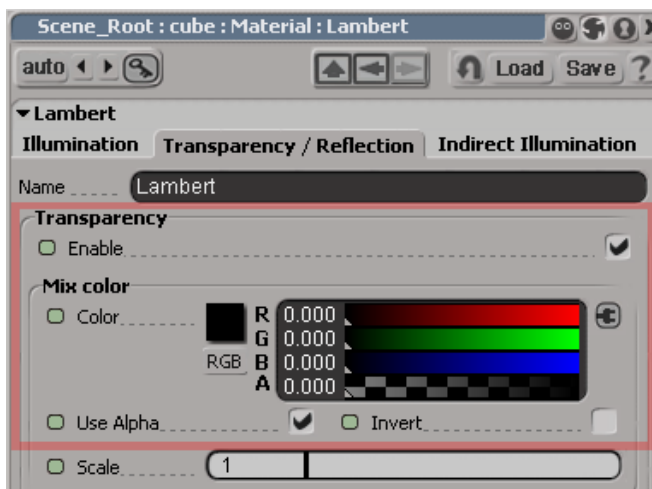
The Transparency element is output as a polygon alpha.

If the **Enable** check box is cleared, opaque is output. When both **Enable** and **Use Alpha** are selected, the Alpha value is output. When **Use Alpha** is cleared, the Red value for **Color** is output. At this time, Invert is also defined in the value.

With TWL and NITRO, when the alpha value is 0, the specifications call for a wireframe display, but with Nintendo TWL-System, when the alpha value is 0, the render command for the polygon with the allocated material is not sent, and it is hidden. To set the wireframe display, use the [NITRO Set Material Attribute](#) plug-in.

If the material does not have a Transparency element, it outputs as opaque.

Figure 3-7 Material Transparency



### 3.3.2 Material Color Animation (IMA)

#### 3.3.2.1 IMA Overview

The intermediate visibility animation (IMA) file data control manipulates material diffuse, ambient, specular, and emission colors, and polygon alphas.

The material color animation data can be exported as an IMA intermediate file.

#### 3.3.2.2 Setting IMA

- **Diffuse, ambient, specular, and emission colors**

Animation is set for Diffuse, Ambient, Specular, and Incandescence (or Intensity) of the XSI material properties.

When animation is turned On/Off (checked/cleared) for **Enable**, the Off (cleared) state outputs black.

- **Polygon alphas**

Sets animation for Transparency.

When **Enable** is cleared, it is handled as opaque. If **Enable** is selected and **Use Alpha** is also selected, then the animation set for the Alpha value is reflected in the intermediate file. If **Use Alpha** is cleared, the animation set for the Red value of **Color** is reflected in the intermediate file (Green and Blue values are ignored).

### 3.3.3 Supplement Regarding Materials

- TWL and NITRO custom parameters can be appended to materials. For details, see section 5.2 Setting Material Attributes (NITRO Set Material Attribute).
- When overlapped materials (state when a certain polygon is registered in multiple clusters and multiple materials are set) exist, a warning appears when the intermediate file is exported. The material that was first obtained by the plug-in is applied in the intermediate file.



## 3.4 Textures

### 3.4.1 Texture Names

---

The texture image file name without the extension is output as the texture name. When texture image files with the same name but different paths are used, the intermediate file export plug-in outputs them as separate textures. Be aware that in these cases multiple textures with the same name will exist in the intermediate file.

There is no restriction on the number of characters for texture names. However, it is strongly recommended to use 16 or fewer characters when using the Nintendo TWL-System library.

### 3.4.2 Texture Files and Formats

---

When a TGA or PIC file with additional information for Nintendo TWL-System (additional information, below) is used, the texture format, palette name, texel data, palette data, and so forth saved in the additional information is reflected in the intermediate file.

TGA or PIC files with additional information are currently created using the Nintendo TWL-System Photoshop plug-in. For information on using the Nintendo TWL-System Photoshop plug-in, see the *Nintendo TWL-System Photoshop Plug-Ins* manual.

Textures supported by XSI can also be used in files other than TGA files (PIC files) with additional information. However, in these cases palette data cannot be shared among multiple textures.

#### 3.4.2.1 Texture Formats

When there is additional information, the intermediate file export plug-in outputs texture with the specified additional information.

When there is no additional information, the texture is automatically converted to an appropriate texture format that can be used with TWL and NITRO in the intermediate file export plug-in.

The texture format is determined automatically with the following conventions. Non-translucent textures have texels with a texture file alpha value (8 bit) of 128 or greater changed to opaque.

1. Filenames that end in "\_cmp2," excluding the extension
  - 4x 4 texel compression texture (linear interpolation with a maximum of 2 palettes for each 4x4 texel)
2. Filenames that end in "\_cmp4," excluding the extension
  - 4x4 texel compression texture (maximum of 4 palettes for each 4x4 texel)
3. Excluding the above, having translucent texels and using 8 or fewer colors
  - A5I3 Translucent Texture
4. Excluding the above, having translucent texels and using 32 or fewer colors
  - A3I5 Translucent Texture

5. Excluding the above, the format is determined as follows by number of colors used.

- 4 or fewer colors used → 4-Color Palette Texture
- 16 or fewer colors used → 16-Color Palette Texture
- 256 or fewer colors used → 256-Color Palette Texture
- 257 or more colors used → Direct Color Texture

When using a format other than direct color texture, the palette data is also output.

#### **3.4.2.2 Palette Names**

When there is additional information, the name specified in the additional information is used.

When there is no additional information, the palette name is the file name without the extension, with `_p1` appended.

The intermediate file export plug-in treats palettes with the same name as the same palette. To share palette data among multiple textures, specify the same palette name.

However, if palettes with different palette data content are given the same palette name, be aware that an error occurs when exporting the intermediate file.

There are no restrictions on the number of characters that can be used in a palette name. However, it is strongly recommended to use 16 or fewer characters when using the Nintendo TWL-System library.

#### **3.4.3 Texture Attributes**

---

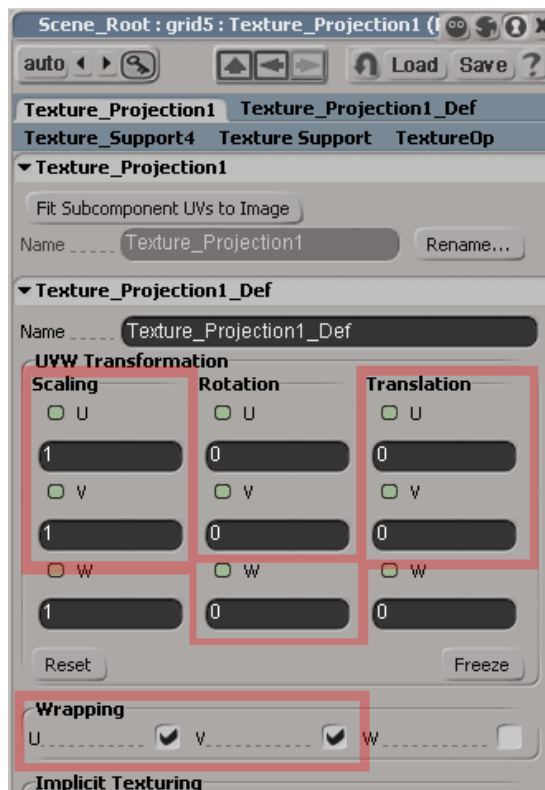
The following texture-related properties can be reflected in the intermediate file.

Properties that are not specifically noted below are not reflected in the intermediate file.

##### **Texture Repeat and Texture Matrix**

The **Texture Projection** property editor contains the texture repeat display and texture matrix settings.

Figure 3-8 Texture Projection Property Editor



### Texture Repeat Display Set with Wrapping

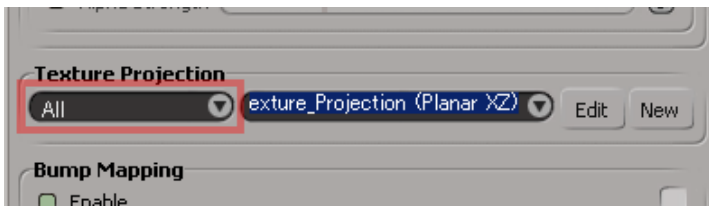
In XSI, the material properties also have repeat display settings for hardware rendering (Wrap U, V), but the intermediate file export plug-in references the Wrapping texture projection property (for software rendering).

The application method can be changed by using **UVW Transformation** parameters to manipulate the texture matrix without changing the texture coordinates set in the vertex. Of these, ScalingU, ScalingV, RotationW, TranslationU, and TranslationV are output in the intermediate file. When animation is set in these values, they can be exported as texture SRT animation (*ita*) data.

The other UVW Transformation parameters (ScalingW, RotationU, RotationV, and TranslationW) are not reflected in the intermediate file. If these are set to something other than the default value, the display with XSI and the display with TWL or NITRO may not match.

In addition, Scaling, Rotation, and Position of Texture\_Support are not referenced. If these are set to something other than the default value, the display with XSI and the display with TWL or NITRO may not match.

When sharing materials and applying the same texture among multiple objects in XSI, for the target objects, under **Texture Projection**, select **All**, and then click **Edit**. An error occurs if the texture matrix or repeat settings are different in each object. To change the texture matrix or repeat settings in each object, set a separate material in each object.

**Figure 3-9 Texture Projection Settings**

#### 3.4.3.1 Texture Flip

Currently, texture flip is not supported in XSI. To set, use the 3D Material Editor.

**Note:** By changing Alternate in the Image property editor in XSI, the texture can be alternately displayed in reverse. But because this differs from the TWL and NITRO specifications, the intermediate file export plug-in does not reference this parameter.

### 3.4.4 Texture Limitations

The maximum for the width and height of texture images is 1024 texels. When the width or height is not a size that can be used with TWL or NITRO (8, 16, 32, 64, 128, 256, 512, or 1024), the texel color at the right edge or bottom edge of the image is added to in the intermediate file export plug-in until a size that can be used by TWL or NITRO is obtained to be output (a warning is displayed).

When texels are added in the plug-in, be aware that TWL and NITRO may not display correctly if repeat or flip is applied.

### 3.4.5 UV Limitations

When an application other than UV mapping is used in XSI, texture coordinates corresponding to the UV value are automatically calculated in the plug-in.

To display the texture correctly on TWL and NITRO, the UV value must meet the following conditions.

$$-2048 \leq (U \text{ value} \times \text{texture width}) < 2048$$

$$-2048 \leq (V \text{ value} \times \text{texture height}) < 2048$$

When texture Scaling, texture Rotation, or texture Translation are used together, the UV value that is the result of the application must meet the above conditions.

**Note:** Texture scaling is handled differently in XSI from TWL and NITRO. In XSI, when the vertex UV value is the same, if the texture Scaling value is doubled, the picture will also be doubled; in TWL and NITRO, doubling the UV value causes the picture to repeat twice. This plug-in has merged this difference, and the reciprocal of the texture Scaling value in XSI is output to IMD and ITA files to lessen the calculation cost on TWL and NITRO. Be aware that the limit for the UV value on TWL and NITRO may be exceeded because the number of times the texture repeats increases as the texture Scaling value set in XSI approaches 0.

### 3.4.6 Texture Pattern Animation (ITP)

#### 3.4.6.1 ITP Overview

This animation replaces textures.

The texture pattern animation data can be exported as an ITP intermediate file.

#### 3.4.6.2 Setting ITP

The texture pattern animation setting uses the SCR file that is commonly supported by XSI.

##### SCR Files

The SCR file is a text file that has a `.scr` extension.

The *nth* (an integer of 1 or greater) line of the SCR file describes the absolute path of the texture image file to be displayed on the *nth* frame in XSI. If the texture image file normally specified in the XSI Image property is specified in the SCR file instead, the texture can be replaced and displayed in accordance with the frame number.

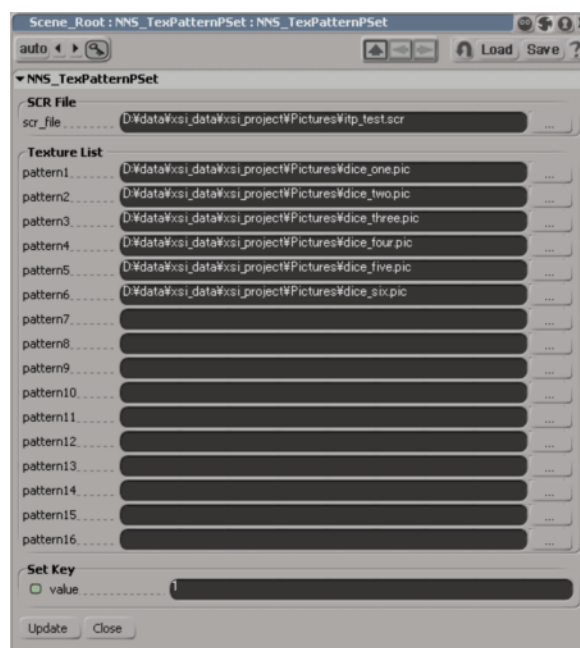
**Note:** Zero or negative frames cannot be set.

Although, the SCR file may be created independently by the user, the following procedure is recommended.

##### 1. Settings During Modeling

When **NITRO Set Texture Pattern Animation** is selected from the **NITRO-System** toolbar, the following property editor appears (at this time, the `NNS_TexPatternPSet` custom parameter is added below the scene).

**Figure 3-10 NNS TexPatternPSet Property Editor**



In the **NNS\_TexPatternPSet** property editor, the textures that are used for the texture pattern animation are registered to the **Texture List** and are listed in order from the top. Register textures of the same width and height.

**Note:** In the **NNS\_TexPatternPSet** property editor, textures registered in the **Texture List** are always exported to an IMD file.

## 2. Settings During Animation Creation

- a. Open the **NNS\_TexPatternPSet** property editor added to the bottom of the scene. In the `scr_file` box, specify the SCR file path and file name (any folder and file name), and then click **Update**. The SCR file is created.
- b. Specify the SCR file created in step a in place of the texture image file.
- c. Open the **NNS\_TexPatternPSet** property editor. In the **Value** box, set the texture number to be displayed in a given frame to perform animation. At this time, at the same time the animation key is created, the texture displayed in the work view is replaced. Internally, when a key is added in the **NNS\_TexPatternPSet** property editor, the content of the SCR file specified in `scr_file` is simultaneously updated by being overwritten.

**Note:** Depending on the user's environment settings, the work view display may not be replaced even if an animation key is added. In this case, in the **NNS\_TexPatternPSet** property editor, after the animation key is added, click **Update** to update the SCR file.

When using the Animation Editor to edit an animation curve, the SCR file is automatically updated only when the **NNS\_TexPatternPSet** property editor is open; if the property editor is not open, then the SCR file is not updated. To ensure the SCR file is updated, after editing the animation curve, click **Update** in the **NNS\_TexPatternPSet** property editor.

**Note:** To use multiple texture pattern animations in a particular scene, create them using the **NNS\_TexPatternPSet** property editor, and then create a separate SCR file for each. Be sure not to overwrite existing SCR files.

### 3.4.6.3 ITP Supplement

- **Texture output to an IMD file**

**When using SCR files created independently by the user (that is, when **NNS\_TexPatternPSet** is not used),** all of the textures described in the SCR file are output to an IMD file.

When a separate SCR file is set for each scene with a different number (type) of textures, even if the model is the same, be aware that the number (type) of textures output to the IMD file per scene changes.

**When using **NNS\_TexPatternPSet** and creating the SCR file as described above,** in addition to the textures described in the SCR file, the textures registered in the **NNS\_TexPatternPSet Texture List** are also output to the IMD file.

Even if a different SCR file is created for each scene with the same model, if the texture registered in the **NNS\_TexPatternPSet Texture List** is the same, then the number of textures output to the IMD file does not change.

- **Caution when moving projects**

When moving each project to a different PC or changing the folder structure, the paths to the texture image files registered in the **Texture List** or the SCR files changes and the intermediate file may not output correctly. In these cases, after resetting the new paths for the **scr\_file** and **Texture List**, the new SCR file must be recreated by clicking **Update**.

#### 3.4.6.4 Batch Change of the Texture Path Configured in NNS\_TexPatternPSet

XSI specifications require that an absolute path be used for the texture names stored in an SCR file. Relative paths are not supported.

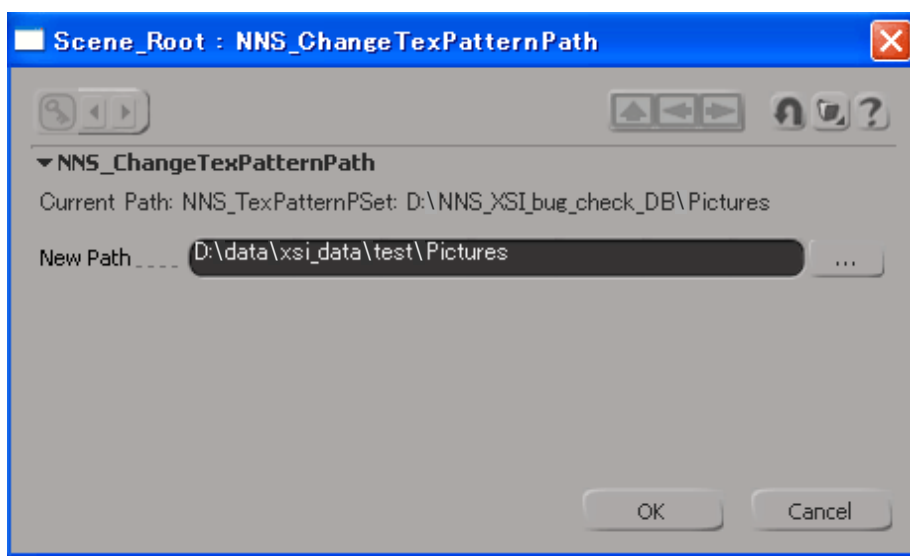
For example, when the database path is changed on the same computer or the database is moved to another computer, animations will not be properly displayed, and intermediate files will not be output normally if the textures do not exist at the old path contained in the SCR file.

The textures registered in **NNS\_TexPatternPSet** and the SCR file path can be changed at the same time using this script.

However, note that you cannot change the path of the textures stored in the SCR file. After you have used this script to update the paths registered in **NNS\_TexPatternPSet**, press **Update** in the **NNS\_TexPatternPSet** window to update the SCR file contents.

If several different paths are specified in **NNS\_TexPatternPSet**, you can also specify a new path for each. If you want to keep from modifying some paths when doing so, leave the corresponding **New Path** fields blank when you run the script.

**Figure 3-11 NNS\_ChangeTexPatternPath**



Perform the following procedure to run the script.

1. Open the scene saved by **NNS\_TexPatternPSet** in **Scene\_Root**.
2. Select the **NNS\_TexPatternPSet** to change.
3. Run the **NNS\_ChangeTexPatternPath** script command.
  - a. Currently, the path of files registered in **TextureList** is displayed as **CurrentPath**. Specify a new path and press **OK** to update the files registered in **NNS\_TexPatternPSet** to the new path.
  - b. Open **NNS\_TexPatternPSet** and press **Update** to update the texture path stored in the SCR file to the new path.

### 3.4.7 Texture SRT Animation (ITA)

#### 3.4.7.1 ITA Overview

This animation changes the way texture is applied by manipulating the texture matrix. The texture SRT animation data can be output as an ITA intermediate file.

#### 3.4.7.2 Setting ita

Set texture SRT animation with the following procedure.

1. Apply a texture in XSI, and then open the **Texture Projection** property editor.
2. Move to the frame to be configured and set the animation keys for **ScalingU**, **ScalingV**, **RotationW**, **TranslationU**, and **TranslationV**.

## 3.5 Render Tree

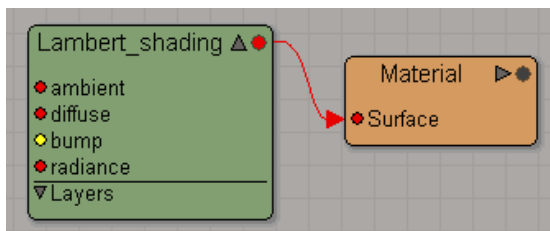
The intermediate file output plug-in uses the following rules to output material and texture data.

- **Shader value is output for diffuse, ambient, and specular**

When color animation is set in diffuse, ambient, and specular, a file can be output as a material color animation (ima). When the shader does not have ambient or specular elements, each is output as black.

In the example below, the shader color for diffuse and ambient is output, and because there is no specular element, it is output as black. When color animation is set in diffuse and ambient, it can be output in an IMA file.

Figure 3-12 Render Tree Example 1



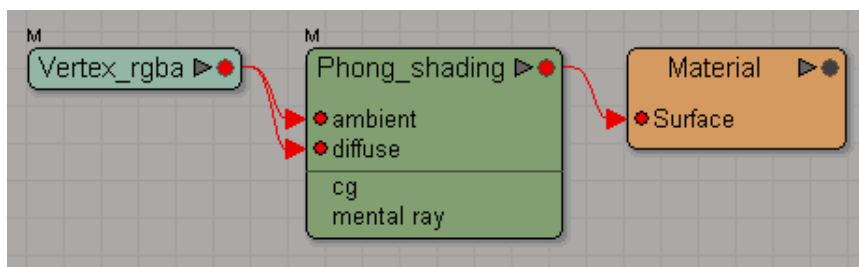


When vertex color is set in the model, vertex color is output to the intermediate file even when the Vertex\_rgba node is connected or not connected.

When the Vertex\_rgba node is connected to diffuse or ambient, that color element is output as a fixed color (diffuse as white, and specular and ambient as black). In addition, when some node is connected to diffuse or ambient, even when color animation is set in that element, it is not output in the IMA file.

In the example below, the vertex color is output. Diffuse is output as white, and ambient and specular are output as black. Even when color animation is set in diffuse, it is not output to the IMA file.

**Figure 3-13 Render Tree Example 2**

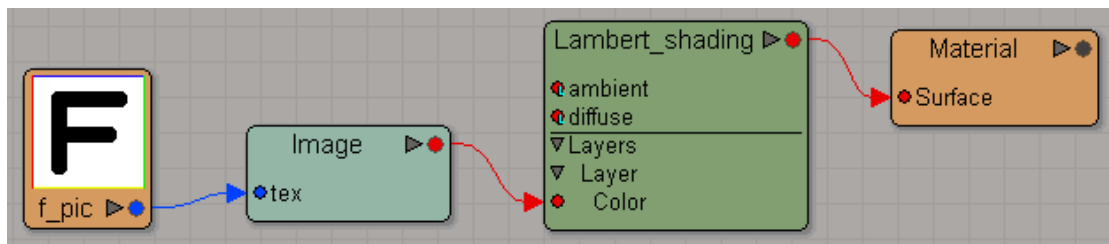


- **Set texture in the texture layer**

By setting texture in the texture layer, color can be freely set in diffuse, ambient, and specular. When multiple textures are set in the texture layer, the intermediate file export plug-in outputs the texture first detected to the intermediate file.

In the example below, with the texture applied, diffuse and ambient have the shader color output. Since there is no specular element, black is output. When color animation is set in diffuse and ambient, it can be output in an IMA file.

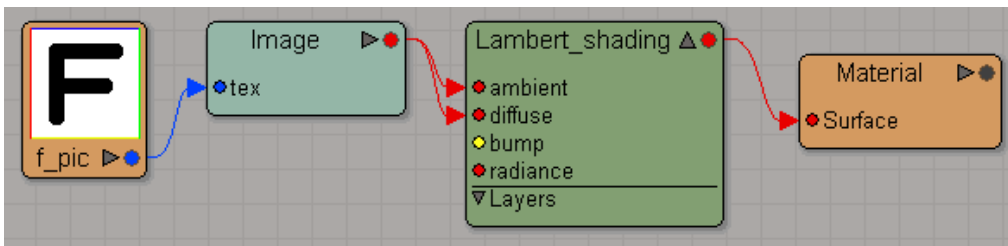
**Figure 3-14 Render Tree Example 3**



Even when the Image node is directly connected to the shader's diffuse, the texture is output.

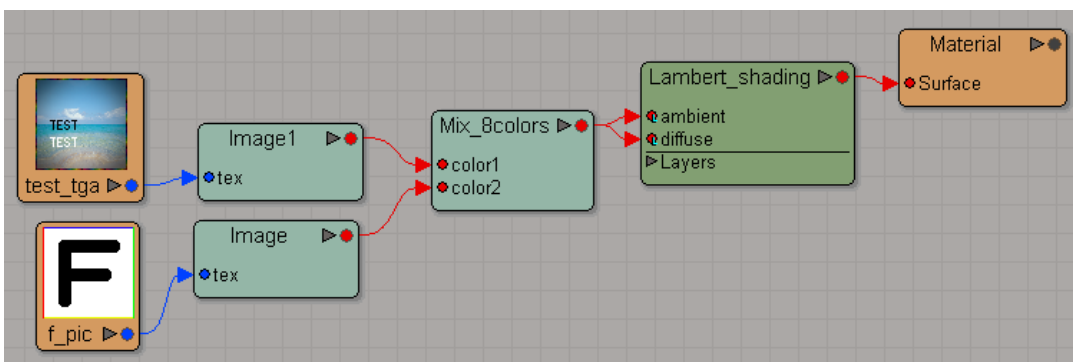
However, in this case, the color element connected to the Image node outputs the fixed color noted above and is not output to the IMA file, even when color animation is set. To use texture and material color (animation) together, set texture in the texture layer.

In the example below, with the texture applied, diffuse is output as white, and ambient and specular are output as black.

**Figure 3-15 Render Tree Example 4**

In situations other than those noted above, for example, when a node of Mix\_2colors or Mix\_8colors is connected to diffuse and multiple textures are set, the texture first detected in the intermediate file export plug-in is output.

In the example below, test\_tga connected to color1 of Mix\_8colors is output as an applied texture.

**Figure 3-16 Render Tree Example 5**

## 3.6 Billboard Display

Billboard display refers to a display method in which the node always faces toward the camera regardless of how the node and camera are positioned (on the DS, this is performed by manipulating the matrix displaying the polygon).

Billboard display settings are performed by the Setting Billboard Display (NITRO Set Billboard) [plug-in](#). Billboard display cannot be confirmed in XSI.

## 3.7 Overall Animation

### 3.7.1 Values Output to the IMD File

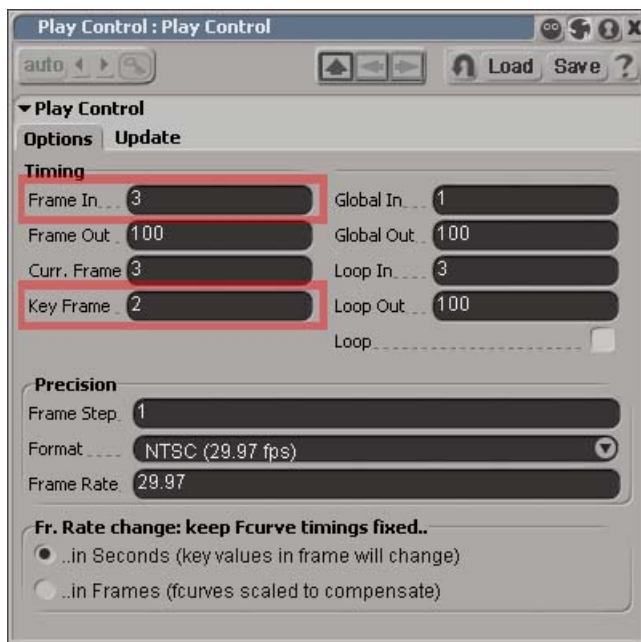
When a model is animated, the value in the start frame specified with the output option is output to the IMD file. However, for the nodes Scale, Rotate, and Translate that affect the envelope, the value when the envelope was set (i.e., Reset Actor) is output.

The current frame status in XSI is not output.

### 3.7.2 Supplement Regarding Animation

- When **KeyFrame** is set before **FrameIn** with the **Play Control** settings, note that the **FrameIn** value is expanded to the **KeyFrame** value when the plug-in terminates.

Figure 3-17 Play Control



- The intermediate file format does not support the XSI constraint, expression, inverse kinematics, forward kinematics, inverse kinematics blend, script operator, or animation mixer features. However, when these features are used in XSI, the plug-in automatically calculates the local Scale, Rotate, and Translate values for the affected nodes to match the appearance in XSI, and then outputs the intermediate file.
- When the Cycle feature has been set for each animation curve, the animation data reflecting the Cycle feature is output.

## 3.8 Envelopes

### 3.8.1 Envelope Settings

The intermediate file export plug-in also supports output of envelope models.

The weight (weight value) of the envelope set in each vertex is output to the intermediate file as 1 - 99% (rounded off the nearest integer). An error occurs when values of 0 or less or 100 or more are set, or when the total is not 100% (excluding errors of less than 1%).

### 3.8.2 Polygon Shapes Output to the IMD File

---

When an envelope is set, the polygon of the shape when the envelope is set is output to the IMD file.

However, when the intermediate file export plug-in option **Compress Node** is set to **Unite** or **Unite and Combine Polygon**, the polygon of the shape in the start frame is output. This feature can be used to have the same shape that is in XSI with each IMD file (and since there is only one node, character animation and visibility animation cannot be used).

### 3.8.3 Regarding Envelope Notation in Nintendo TWL-System

---

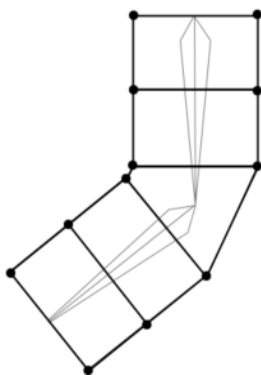
The procedure of associating multiple nodes (also called skeletons or bones) to a polygon mesh and changing a shape by matching the shape to the movement of the nodes is called Skinning or Envelopes (it is called something different in each 3DCG tool), but in Nintendo TWL-System, it is called Envelopes.

The two types of Nintendo TWL-System envelopes are **Fully Weighted Envelopes** and **Weighted Envelopes**.

#### Fully Weighted Envelopes

A fully weighted envelope indicates the state where the vertex assigns 100% weight to one of the nodes. When all of the vertices that compose the polygon mesh are fully weighted envelopes, that model is called a fully weighted envelope model.

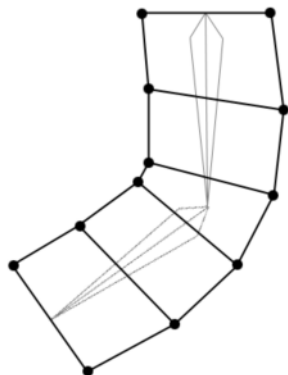
**Figure 3-18 Fully Weighted Envelope Model Example**



#### Weighted Envelopes

A weighted envelope indicates the state where the vertex assigns 100% weight to two or more of the nodes. If even one of the vertices that compose the polygon mesh is a weighted envelope vertex, the model is called a weighted envelope model.

Although a more smooth curve can be expressed with a weighted envelope model by increasing the number of nodes for which a single vertex assigns weights or increasing the types of weight values, the calculation volume increases during rendering when these values are increased.

**Figure 3-19 Weighted Envelope Model Example**

**Note:** For details on the support status for weighted envelope models in the Nintendo TWL-System G3D library, see *G3D Library Release Notes*.

### 3.9 Loading Scenes/Models Created with SI3D

---

#### Available data

When scenes or models created with SI3D are imported to XSI, the model data, character animation, visibility animation, and material color animation correctly loaded into XSI can be output to intermediate files from XSI using this plug-in.

#### Data that cannot be loaded or displayed properly in XSI

Texture SRT animation created with SI3D might not be imported correctly in XSI. In addition, the texture pattern animation information and user data added to nodes and material set by using the NITRO intermediate file plug-in for SOFTIMAGE|3D cannot be imported. The values must be reset using this plug-in.

### 3.10 Custom Parameter Set

---

For this plug-in, primarily when using data creation plug-ins, the following name custom parameter sets may be added to nodes or material scenes.

- NNS\_NodePSet
- NNS\_MaterialPSet
- NNS\_TexPatternPSet
- NNS\_ExpDialogPSet

The intermediate file export plug-in looks at the custom parameter set name and reflects the setting content, so if the custom parameter set name is changed, it may not be reflected correctly in the intermediate file.

Determination is made up to the "-PSet" part of the custom parameter name, so the user can enter any characters for identification after "-PSet."

**Example**

NNS_TexPatternPSet	→ NNS_TexPatternPSet_eye	OK
NNS_TexPatternPSet1	→ NNS_TexPatternPSet_mouth	OK
NNS_TexPatternPSet2	→ NNS_TexPattern_hair	NO

## 4 Intermediate File Output Plug-In

The intermediate file export plug-in can output intermediate files to a specified folder and transfer data to the 3D Material Editor.

### 4.1 Using the Plug-In

1. Start XSI, and then open a scene.
2. Select some nodes from the model to output to an intermediate file.  
(There is no need to select nodes to output the entire scene to intermediate files.)
3. From the menu bar, select **NITRO-System** and run **NITRO Export** to open the following dialog box (you can also run it in the custom toolbar opened from the **Application** menu by selecting **Toolbars** and then **Nintendo NITRO-System**).

**Figure 4-1 NITRO Export Dialog Box**



4. To output intermediate files:  
Click **Output Intermediate Files**, select a destination folder, and then set other options.  
  
To transfer intermediate files to 3D Material Editor:  
Click **Use 3D Material Editor**, and then set other options.  
  
To merge files, select **Merge Imd File**, and then specify the IMD files.

**Note:** For detailed descriptions of each dialog box item, see section 4.2 Intermediate File Output Dialog Setting Method.

5. Click **OK** in the **Intermediate File Output** dialog box.
6. When the intermediate files are output correctly, the history pane of the script editor displays **Export success**.

When a Warning is displayed in the history pane, the intermediate files are output. Review the warning content for details.

If **Error** is displayed in the history pane, the intermediate files were not output. Review the error content for details.

## 4.2 Intermediate File Output Dialog Setting Method

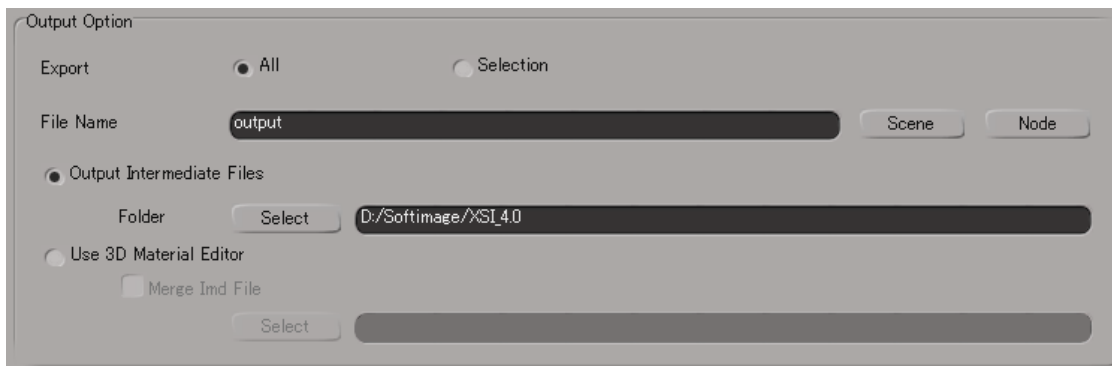
The intermediate file output destination, type, optimization, and more can be set using the intermediate file **Output Option** dialog box.

Be sure to set each feature.

### 4.2.1 Output Options

The **Output Option** dialog box specifies the output method for intermediate files.

**Figure 4-2 Output Option Dialog Box**



- **Export**

This selects the target to output to the intermediate files.

Select **All** to specify that all of the nodes in the XSI scene are targeted for output.

Select **Selection** to specify that the nodes in the hierarchy under the currently selected node(s) are output. When an envelope model is output with **Selection**, weighted nodes must be output to the intermediate file.

- **File Name**

This specifies the name of the intermediate file to output (omitting the extension).



Click **Scene** to set the name of the current scene. Click **Node** to set the name of a selected node (the node highest in the hierarchy). When several nodes are at the same level, the name of the node that comes first alphabetically is set. If no node is selected, the name of the node that comes first alphabetically in the scene is set.

- **Output Intermediate Files**

Select this option to output intermediate files to a specific folder.

The **Folder** box shows where the intermediate files are output. Do not use double-byte characters or single-byte kana characters.

- **Use 3D Material Editor**

Select this option to transfer intermediate file data to the 3D Material Editor.

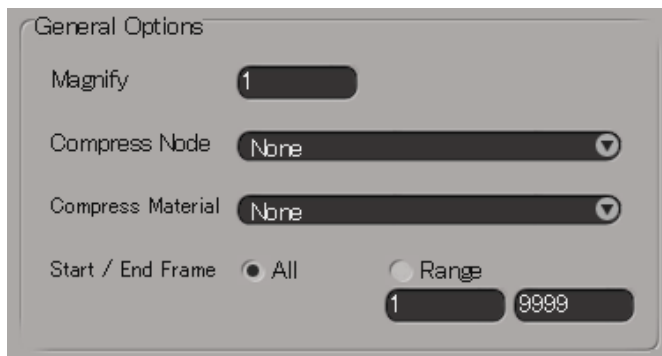
When **Merge Imd File** is selected and the IMD file path name is specified, the 3D Material Editor automatically merges and loads the IMD file data after transferring the data. Do not use double-byte characters or single-byte kana characters in the IMD file path name.

For details about using 3D Material Editor, see *Nintendo TWL-System 3D Material Editor*.

## 4.2.2 General Options

The **General Options** dialog box applies general settings to intermediate files.

**Figure 4-3 General Options**



- **Magnify**

Specifies the scale factor applied to the Model vertex coordinates or node Translation value. The size of the entire model can be changed.

- **Compress Node**

Specifies the node reduction mode. By reducing the number of nodes, the addition to matrix calculations is reduced and less memory is used. The nodes output to the intermediate file are reduced, but the data in XSI is not changed.

The following node reduction methods are available. Use according to model use.

**Table 4-1 Node Reduction Methods**

Mode	Description
<b>None</b>	Nodes are not reduced. Outputs the hierarchical structure in XSI without modification.
<b>Cull Useless Node</b>	Deletes the nodes that are not required to display the model and then outputs. <b>There is an effect on envelope models.</b>
<b>Merge Useless Node</b>	After performing the Cull Useless Node process, the nodes for which matrices can be combined are combined and then output. <b>The number of nodes can be reduced more than for Cull Useless Nodes.</b> However, the following restrictions apply to the Scale value. <b>"Non-uniform (X, Y, Z values are not the same). Scale values must not be set in nodes that have children."</b> If nodes that do not observe the restrictions or the child nodes of those nodes are deleted, then the model may not display correctly. When the Scale value is animated, all frames must observe the above restrictions.
<b>Unite</b>	All nodes are combined into one, and all the polygons are output with global coordinates (the node name is world_root). <b>This is especially effective for 3D geographical data or single objects without a parent-child structure.</b> Polygons belonging to different nodes (corresponding to <polygon> in the IMD file) are output individually, even if the materials are the same. Do not select this mode when using character animation or visibility animation.
<b>None</b>	Nodes are not reduced. Outputs the hierarchical structure in XSI without modification.
<b>Unite and Combine Polygon</b>	After performing the Unite process, polygons with the same material are also combined. (However, polygons for which the existence of vertex color differs, or that have different rendering priorities, will not be combined even if they have the same materials.) Although <b>display resolution may be higher than for Unite</b> , detailed clipping processing is not possible. Please do not select this mode when using character animation or visibility animation.

**Note:** Even when **Cull Useless Node** or **Merge Useless Node** is selected, the nodes with a deletion prohibited flag set with the [NITRO Set No Cut Node](#) plug-in are not deleted.

For details about the Cull Useless Node and Merge Useless Node algorithm, see [section 6.2](#) Node Reduction Algorithms.

- **Compress Material**

This specifies material compression. When **None** is selected, all material targeted for output is output. When **Compress Same Material** is selected, materials for which the set content match exactly are combined and then output to the intermediate file.

However, the following materials are never compressed.

- Materials that are set for material color animation, texture pattern animation, or texture SRT animation.
- Materials that have **Compress** set to **Don't compress** with the NITRO Set Material Attribute plug-in.

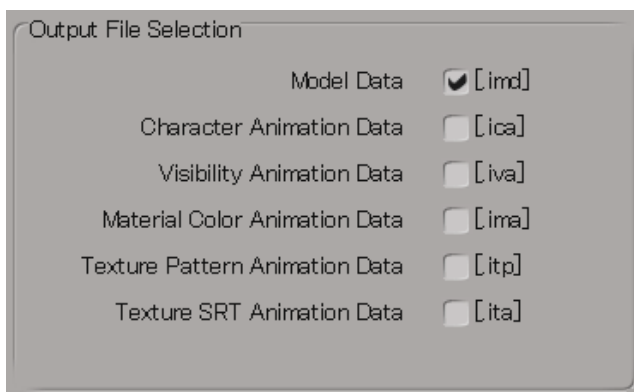
- **Start / End Frame**

This specifies the range (beginning frame and final frame) for animation to be output. When **All** is selected, the animation range in XSI is output. When **Range** is selected, the beginning frame and final frame can be specified with numerical input. However, if the input Start frame is smaller than the XSI beginning frame, the Start frame becomes the XSI beginning frame. In addition, if the input End frame is larger than the XSI final frame, then the End frame becomes the XSI final frame.

### 4.2.3 Output File Selection

The **Output File Selection** dialog box specifies which intermediate file types to output.

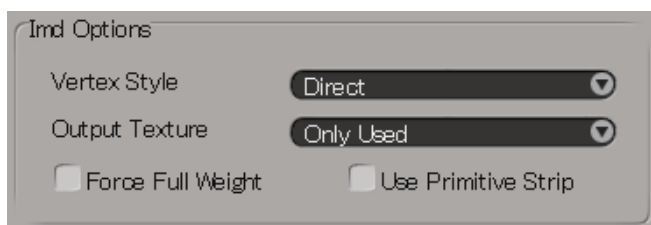
**Figure 4-4 Output File Selection**



### 4.2.4 Imd Options

The **Imd Options** dialog box specifies the IMD options.

**Figure 4-5 Imd Options**



- **Vertex Style**

This specifies the output format for vertex coordinates and vertex color.

Select **Direct** for the vertex coordinates and vertex color values to be directly output to the IMD file's <polygon> element. Normally, this format is used for scenes that have been optimized with the TWL or NITRO geometry command.

Select **Index** for the vertex coordinate values to be output to <vtx\_pos\_data> and the vertex color values to be output to <vtx\_color\_data>. The index numbers in each array are output to <polygon>. The Index format is an extended format that will be able to support shape animation and so forth in the future.

- **Output Texture**

This specifies the conditions for outputting textures to the IMD file.

When **Only Used** is selected, only the textures used in the output model are output.

When **All** is selected, all textures connected to all materials in the scene are output.

- **Force Full Weight**

When selected, even if the weight value of the envelope model vertex is distributed among multiple nodes, the node with the largest weight value is output by forcibly giving it full weight (100% weight). If there are multiple nodes with the same weight value, when the Compress Node option is set to none, the node with the smallest index is output with full weight.

When cleared, each node is output with the weight value unchanged.

The weight value is a percent rounded to the nearest integer and output so the sum is 100%. If the total is not 100%, or if there is an inappropriate value, an error occurs (excluding errors of less than 1%).

- **Use Primitive Strip**

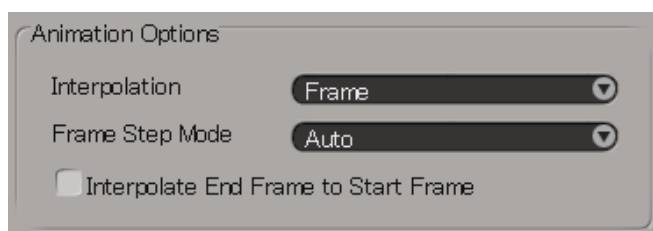
When cleared, linked polygons are not used, and polygons are output as either triangle or quadrangle polygons.

When selected, output uses linked triangle polygons and linked quadrangle polygons as much as possible, and outputs only polygons that cannot be linked as either triangle polygons or quadrangle polygons. When this is selected the appearance does not change, but the number of vertices to process can be reduced.

## 4.2.5 Animation Options

---

The **Animation Options** dialog box applies general settings for animation.

**Figure 4-6 Animation Options**

- **Interpolation**

This specifies a method for animation playback that uses fractional frames during playback.

Select **Frame** when playing to handle fractional frames by rounding to the nearest integer frame; select **Linear** when playing to use fractional frames without rounding and to apply linear interpolation to values from fractional frames.

**Note:** Although with the Nintendo TWL-System G3D library, it is possible to play fractional frames by setting **Interpolation** to **Linear**, the CPU calculation processing will be slightly increased compared to when **Interpolation** is set to **Frame**.

For animation data that does not require **Interpolation** to be set to **Linear**, be careful to set **Interpolation** to **Frame** to reduce the CPU load and then output.

**Note:** Only the ICA file supports Linear in the October 2008 G3D library. For IMA and ITA files, even if Linear is set, playback will be the same as if Frame were set. For the status of Linear support for IMA and ITA files, see *G3D Library Release Notes*.

- **Frame Step Mode**

This specifies the culling condition for animation.

When set to:

- 1 All frames are output without culling.
- 2 Values for every other frame are output (data volume is approximately halved).
- 4 Values for every fourth frame are output (data volume is approximately quartered).

**Auto** Optimized culling conditions are automatically determined for each animation curve from the Tolerance Options settings.

**Table 4-2 Frame Step Mode and Output Frames**

Frame Step	Index of the Output Frames															
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0		2		4		6		8		10		12		14	15
4	0				4				8				12	13	14	15

When (all frames - 1) is not divisible by the number of times culling is performed, the data of the remaining portion is all output.

- **Interpolate End Frame to Start Frame**

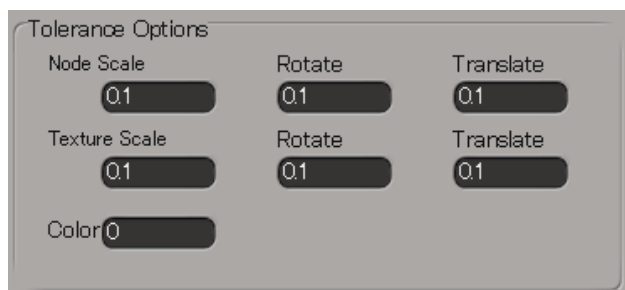
When selected, interpolation processing from the final frame to the beginning frame during interpolation playback occurs.

When cleared, after the final frame, the state stops at the final frame state.

## 4.2.6 Tolerance Options

The **Tolerance Options** dialog box specifies the allowable tolerance when optimizing animation data.

**Figure 4-7 Tolerance Options**



When the maximum value of the difference in the value of the beginning frame and the values of each of the frames is less than the allowable range specified here, then the animation curve is seen as constant, and only the value in the beginning frame is output.

In addition, when **Frame Step Mode** in the **Animation Options** dialog box is set to **Auto**, the culling condition for animation data is automatically determined and is also used as the allowable tolerance. For culling conditions for animation data, the **Maximum error during linear interpolation** is determined to be **less than the allowable range** set here. Smaller Tolerance values increase the animation precision, but the data volume increases.

- **Node**

These settings indicate the allowable tolerances for the Scale, Rotate, and Translate values for character animation. Set a numerical value of 0.0 or higher. The unit for **Rotate** is degrees. For **Translate**, the allowable tolerance is for the **value after applying Magnify**.

- **Texture**

These settings indicate the allowable tolerances for the Scale, Rotate, and Translate values for texture SRT animation. Set a numerical value of 0.0 or higher. The unit for **Rotate** is degrees.

- **Color**

This is the allowable tolerance for the Diffuse, Ambient, Specular, Incandescence (emission), and Transparency (polygon\_alpha) values for material color animation. Set a numerical value that is neither less than 0 nor more than 31.

### 4.3 Error Display During Intermediate File Output

When an error is detected during intermediate file output, the error content is displayed in the script editor and the process is aborted. The following table lists the error types (in alphabetical order).

**Table 4-3 Intermediate File Output Errors**

Error	Description
Can't open file. [file path]	The file does not exist, cannot be opened, or cannot be overwritten.
Hierarchical Scaling settings are not identical.	The Hierarchical Scaling settings do not match. Turn all nodes on or off and then output.
Invalid n3es file. [file path]	The N3ES file could not be read correctly.
Invalid Output Folder.	The folder specified as the output destination for the intermediate files does not exist or cannot be accessed. Merge lmd File Path is empty.
No effective node.	No object exists that can be output.
Output File Name is empty.	No output file name was specified.
Texture palette data is not identical. [palette name]	This error is generated when two or more textures are using palettes with the same name and the palette data content of each is different. When the palette data content is different, specify a different palette name.
Texture projection properties are different per object. [material name]	The texture projection settings for each object are different. To change the texture matrix or repeat settings for each object, set a separate material in each object.
Texture size over. [file name] [width x height]	The texture size exceeds the limit that can be used with TWL and NITRO. Neither can use textures that exceed 1024 texels in height or width.
Wrong weighted vertices exist. [node name]	The total of the envelope weight values does not equal 100%, the envelope weight value is 0% or less or a vertex that exceeds 100% exists.

### 4.4 Warning Display During Intermediate File Output

When a warning is detected during intermediate file output, the warning content is displayed in the script editor. The process is not aborted, and the intermediate file is output. The following table lists the warning types (in alphabetical order).

**Table 4-4 Intermediate File Output Warnings**

Warning	Description
Can't export NURBS curve. [node name]	The NURBS curve cannot be output. It is output as a Null node.
Can't export NURBS surface. [node name]	The NURBS surface cannot be output. It is output as a Null node.

Warning	Description
Can't get UV. [ node name ]	The texture has been applied, but the UV coordinates are not set. Vertices without UV coordinates are output as U=0.0 and V=0.0.
Invalid end frame.	The final frame specified with the intermediate file output dialog was set before the beginning frame in the tool.
Invalid start frame.	The beginning frame specified with the intermediate file output dialog was set after the final frame in the tool.
Length of name over 16 characters. [type: name]	The name (node name, material name, texture image name or texture palette name) output to the intermediate file exceeds 16 characters. When using the Nintendo TWL-System library, it may not operate correctly.
Mtx_prim_size of <polygon> is over 1. [ polygon name ]	The mtx_prim_size attribute of the <polygon> element in the IMD file exceeds 1 (that is, an envelope model that requires more than 31 matrices to render a given polygon group).  <b>Note:</b> For the October 2008 Nintendo NITRO-System G3D library, this type of IMD file cannot be displayed (binary conversion cannot be performed). For details on the support status of the most recent G3D library, see <i>G3D Library Release Notes</i> .
Multi texture is used. Use first texture only. [material name]	Multiple textures are set for a material. When the Output Texture option in the intermediate file output dialog is specified as Only Used, the plug-in outputs only the first detected texture to the intermediate file according to the Render Tree rules.
No material color animation.	Although IMA file output is specified, the output target does not have material color animation set.
No polygon in mesh node. [node name]	There are no polygons in the mesh node. It is output as a Null.
No texture image name. [material name]	The texture specification is incorrect. It is output as the default texture nolcon.
No texture pattern animation.	Although ITP file output is specified, the output target does not have texture pattern animation set.
No texture SRT animation.	Although ITA file output is specified, the output target does not have texture SRT animation set.
No visibility animation.	Although IVA file output is specified, the output target does not have visibility animation set.
Node name changed. [node name]	Because multiple nodes with the same name exist, the node name output to the intermediate file was changed.
Overlap material exist. [node name]	Overlapped materials exist. The material first obtained in the plug-in is reflected.
Same named texture file exist. [file name]	In the output target, multiple texture files exist that have the same file name but different folders or extensions. If the image file path is different, even if the image file name is the same (regardless of whether the content of the image (or palette) data of the image file matches), the intermediate file export plug-in outputs each as a separate texture. Be aware that same-name image or palette data are output in duplicate.



Warning	Description
Size of texture is wrong. [file name] [width x height]	The texture width or height is not a size that can be used with TWL or NITRO (8, 16, 32, 64, 128, 256, 512, or 1024). The intermediate file export plug-in automatically adds the texel color at the right edge or bottom edge of the image until a size that can be used by TWL and NITRO is obtained and then outputs.
Texture size must be power of 2 for repeat / flip. [file name]	The height or width size of the texture applied with repeat or flip is not a power of two.
The number of matrix for displaying this model over 31. [matrix size]	The number of matrices required to render a model exceeds 31.
Total polygon size over. [polygon size]	The total number of polygons exceeds the TWL or NITRO polygon list RAM size. Be aware that all the polygons cannot be displayed simultaneously. The maximum number of polygons is 2048 if all are only triangle polygons, and 1706 if all are only quadrangle polygons. When triangle and quadrangle polygons are mixed, the following conditional equation must be met.  $\text{Number of triangle polygons} \times 20 + \text{number of quadrangle polygons} \times 24 \leq 40960$
Total vertex size over. [ vertex size ]	The number of process vertices exceeds the TWL or NITRO limitation. The maximum for process vertices is 6144.
UV range over. [node name] [s, t]	The texture UV value (corresponding to the TWL or NITRO ST coordinates) exceeds the limitation for TWL and NITRO. . ST coordinate values must neither be less than -2048 nor greater than or equal to 2048.
Zero normal exist. [node name]	A normal vector with length 0 exists. Note that lighting cannot be performed correctly.

## 4.5 Error Display When Transferring to the 3D Material Editor

When an error is detected during transfer to the 3D Material Editor, the error content is displayed in the script editor. The following table lists the error types (in alphabetical order). An error window may be output from the 3D Material Editor.

**Table 4-5 Transfer to the 3D Material Editor Errors**

Warning	Description
3D Material Editor is not found.	The 3D Material Editor was not installed correctly. Check the environmental variable and folder contents.
Failed to start 3D Material Editor.	The 3D Material Editor output an error and terminated. Be sure to check the error output and make corrections.
Merge lmd File Path is empty.	Merge and load has been specified, but the field for the IMD file to be merged and loaded is blank.

## 4.6 Saving Intermediate File Output Dialog Box Settings

The content set using the intermediate file export dialog box is automatically saved when the

intermediate file is exported, and the next time the dialog box is opened, it is loaded and set as the default value automatically. In addition, the set content can be imported or exported as an N3ES (NITRO 3D Export Settings) file.

The following section details this method.

#### 4.6.1 Automatic Save Destination Settings

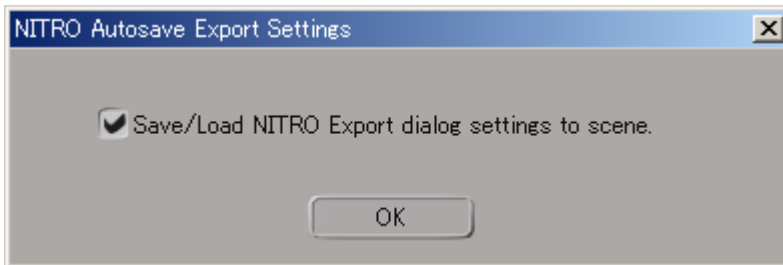
---

The dialog box settings can be saved for the scene being manipulated.

To save the settings in the scene and give priority to loading the settings saved in the scene, use the **NITRO Autosave Export Settings** plug-in.

On the **NITRO-System** menu, click **NITRO Autosave Export Settings**. The following dialog box opens. The default setting for the check box is selected.

**Figure 4-8 NITRO Autosave Export Settings Dialog Box**



- If the check box is selected:

When exporting intermediate files: The dialog box settings are saved to a file and in the scene. (The NNS\_ExpDialogPSet custom parameter set is added to the scene.)

When opening the dialog box: The settings saved in the scene are given priority and loaded.

If there are no settings saved in the scene, the settings saved in the file are loaded. This is convenient when the settings are different for each scene.

- If the check box is cleared:

When exporting intermediate files: The settings are saved to a file.

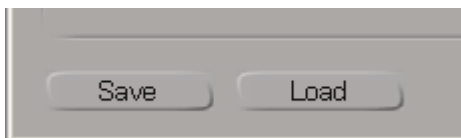
When opening the dialog box: The settings saved in the file are loaded.

This is convenient to export using the save settings even when switching scenes.

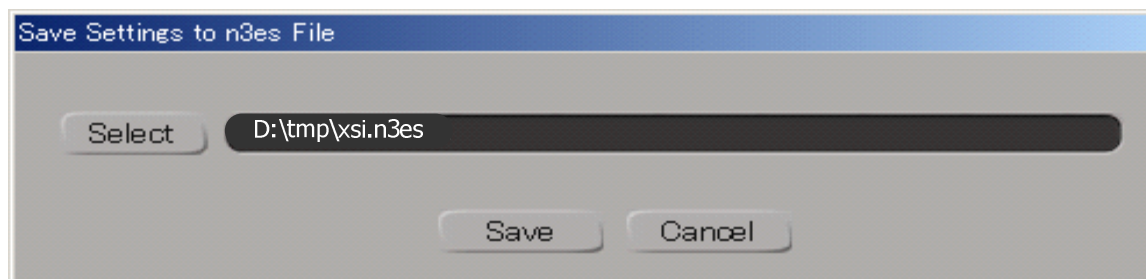
#### 4.6.2 Importing/Exporting N3ES Files

---

To import and export N3ES files, use the **Save** and **Load** buttons located in the bottom left of the intermediate file export dialog box.

**Figure 4-9 Importing and Exporting N3ES Files**

When **Save** is clicked, the following dialog box appears (the **Load** dialog box is used in the same way).

**Figure 4-10 N3ES File Save Dialog Box**

In the **Select** box, specify the name of the N3ES file to be exported (imported for Load).

The file extension is N3ES (NITRO 3D Export Settings).

When **Save** is clicked, the status of the dialog box is exported to the specified N3ES file, and the intermediate file export dialog box reappears.

(For Load, the content of the specified N3ES file is reflected in the intermediate file export dialog box.)

## 4.7 Intermediate File Script Command Output

### 4.7.1 Script Command Output

In XSI, intermediate files can be output by running the script editor or a script command from a script created by the user (command name: `NITRO_ExportCmd`) without opening the NITRO Export plug-in dialog box. This is called *script command output*.

### 4.7.2 Writing a Script Command

The format for the `NITRO_ExportCmd` script command is shown below.

```
NITRO_ExportCmd [output_name], [n3es_file]
```

If no arguments are specified, then this runs with the same option settings as when the **NITRO Export Plug-In** dialog box is open. By specifying arguments, however, the filename can be changed and the option settings in an N3ES file can be reflected.

**output\_name:** Specifies the name of the intermediate file to output.

If not specified, the filename in the N3ES file or the option setting dialog is reflected.

`n3es_file`: Specifies the N3ES file to use for the option settings using a full path.

When `output_name` is specified, only the file name `output_name` is given priority.

The following is an example of execution.

- Output using the option settings from the previous time an intermediate file was output.

```
NITRO_ExportCmd [Enter]
```

- Change the file name to be output and then output.

```
NITRO_ExportCmd "mario_run" [Enter]
```

- Reflect the contents of the N3ES file in the option settings then output.

```
NITRO_ExportCmd , "C:/data/test.n3es" [Enter]
```

- Reflect the contents of the N3ES file in the file name to be output and the option settings, and then output.

```
NITRO_ExportCmd "mario_run" , "C:/data/test.n3es" [Enter]
```

### 4.7.3 Supplemental Items for Script Commands

---

If the plug-in returns an error, the VBScript error number returns `E_FAIL`.

```
'ERROR: - [line 7 in d:\nns_xsi60_plugin\script\NNS_Export_Command.vbs]
```

When the above error occurs, review the options and scene by referring to the script dialog error display.

If the specified N3ES file does not exist or is invalid, `E_FAIL` is returned.

## 4.8 Batch Exporting Intermediate Files

### 4.8.1 Batch Export

---

In addition to opening a scene in XSI and exporting an intermediate file, one or more scenes can be output to intermediate files in a batch using standalone mode.

This is called *batch exporting*.

### 4.8.2 Executing Batch Export

---

1. Prepare an N3BE file.

The N3BE file specifies scenes and export conditions, and the export location for the intermediate files.

Prepare the file according to *NITRO\_n3beFileFormat.pdf*, available separately.

2. Execute batch export by using `NNS_Batch_Export_XSI60.bat` located in the `NNS_XSI60_Plugin` folder and the N3BE file.

**Note:** NNS\_Batch\_Export\_XSI60.bat must be revised according to *Setup\_SoftimageXSI\_Plugin.pdf*.

Input the following from the command prompt to execute.

```
NNS_Batch_Export_XSI60.bat sample.n3be [Enter]
```

The N3BE file can also be dragged and dropped on NNS\_Batch\_Export\_XSI60.bat to execute.

When batch export ends normally, the following message is displayed at the end.

```
Batch Export is finished. Total [ooo] scenes.
```

When there is a problem with the content of the N3BE file, an error message is displayed and the process aborts (terminates) at that time.

The following are the most common error messages.

- Error: "\*\*\*\*" is not specified.                      \*\*\* is not specified.
- Error: "\*\*\*\*" is wrong.                              The \*\*\* specification is invalid.

When an error related to the export of the intermediate file occurs while the batch export is executing, the following error message appears, and the process aborts (terminates) at that time.

```
Error: Failed to export
```

The errors and warnings related to the intermediate file export are output to the log file specified by the N3BE file.

---

### 4.8.3 Supplemental Items for Batch Export

---

- The NNS\_Batch\_Export.vbs file is used in the NNS\_Batch\_Export\_XSI60.bat file. If the XSI standalone does not execute, revise the settings after reading the setup manual.
- To perform batch export, an N3ES file is required.

Select the N3ES file in the N3BE file to specify the option settings to use to export the intermediate file. Even if the export option settings are saved in the scene file, batch export does not reference them and always exports with the settings in the N3ES file.

## 5 Data Creation Plug-Ins

### 5.1 Data Creation Plug-Ins

The data creation plug-ins are a group of plug-ins that supplement the intermediate file export plug-in. They are used primarily to add and check TWL and NITRO custom parameters in nodes on XSI. The information added using these plug-ins is reflected in the intermediate file.

Data creation plug-ins are run using one of the following methods.

- From the **NITRO-System** menu.
- From a custom toolbar. To open the toolbar, from the **Application** menu, select **Toolbars** and then click **Nintendo NITRO-System**.

**Table 5-1 Data Creation Plug-Ins List**

Plug-In Name	Feature Description
NITRO Set Material Attribute	Adds rendering setting information to materials.
NITRO Show Display Face	Verifies polygon face display settings.
NITRO Show Lighting	Verifies lighting settings.
NITRO Set Render Priority	Sets polygon rendering priorities.
NITRO Show Render Priority	Verifies polygon rendering priorities.
NITRO Set Billboard	Sets billboard display.
NITRO Show Billboard	Verifies billboard display.
NITRO Set No Cut Node	Sets the prohibit node deletion flag.
NITRO Show No Cut Node	Verifies the prohibit node deletion flag.
NITRO Set Texture Pattern Animation	Sets texture pattern animation.
NITRO Set Hierarchical Scaling	Sets batch Hierarchical Scaling.
NITRO Select Polygon	Selects polygons with the specified number of vertices.
NITRO Replace Character	Searches for and replaces element name strings.
NITRO Rename Over 16 Characters	Searches for element names that exceed 16 characters and replaces those names.

### 5.2 Setting Material Attributes (NITRO Set Material Attribute)

This plug-in adds TWL and NITRO render setting information to materials as custom parameters.

**Note:** This is not reflected onscreen in XSI.

(A custom parameter set named "NNS\_MaterialPSet\*" is set in the material.)

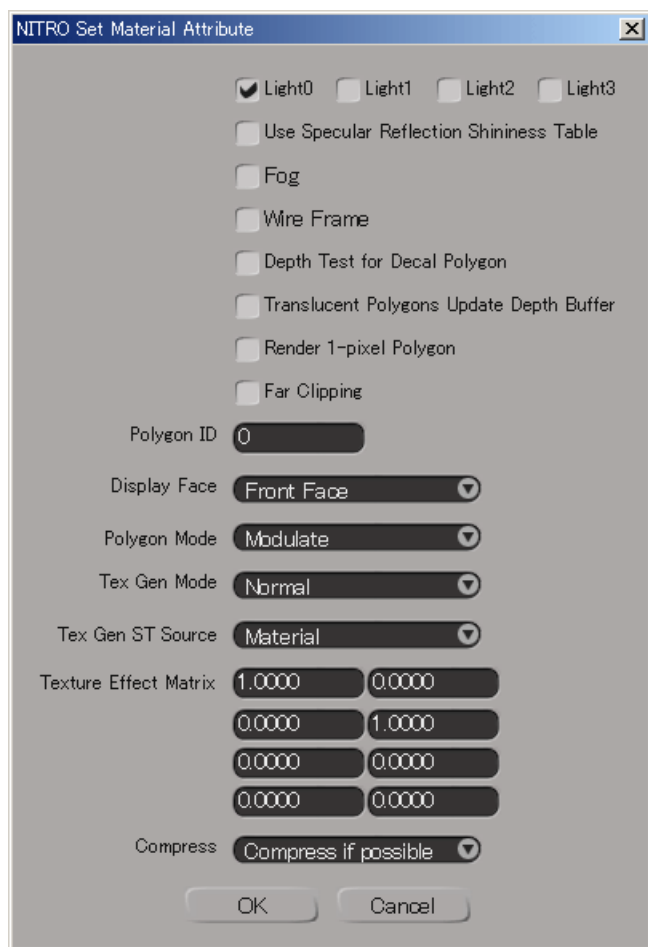
### Using the Plug-In

Select a material, and then, on the **NITRO-System** menu, click **NITRO Set Material Attribute**. The following dialog box appears, displaying the current settings added to the material.

When multiple materials are selected, the material first recognized in the plug-in is displayed. To apply the settings to all the selected materials, click **OK** (all items, not just changed items, are updated).

When a polygon mesh is selected, the material applied to the polygon mesh is targeted.

**Figure 5-1 NITRO Set Material Attribute Dialog Box**



To add the custom parameter to the material, select all settings in the dialog box, and then click **OK**.

- **Light0, Light1, Light2, and Light3**

Specifies the lights that are affected when displayed on TWL or NITRO. This is not reflected onscreen in XSI.

The default check box settings are: Light0 is selected; Light1, Light2, and Light3 are cleared.

If even a single light check box is selected, the normal data of the polygons belonging to this material is output. If all the light check boxes are cleared, the normal data is not output.

- **Use Specular Reflection Shininess Table**

Specifies whether to use the specular reflection luminance table when calculating the specular component. The default check box setting is cleared.

When the Light0, Light1, Light2, and Light3 check boxes are all cleared, this attribute cannot be changed and is output to the intermediate file as off.

- **Fog**

Specifies whether to apply fog. The default check box setting is cleared.

- **Wire Frame**

Specifies whether wire frame display is selected. The default check box setting is cleared.

- **Depth Test for Decal Polygon**

Specifies whether to perform a depth test for decal polygons. When selected, the depth test for decal polygons is performed, and rendering occurs when the depth value of a fragment equals the depth value in the depth buffer. When cleared, the normal depth test for polygons is performed, and rendering occurs when the depth value of a fragment is smaller than the depth value in the depth buffer. The default check box setting is cleared.

Be sure to render decal polygons after polygons targeted for application are rendered.

The render order of polygon groups is controlled by the [NITRO Set Render Priority](#) plug-in.

- **Translucent Polygons Update Depth Buffer**

Specifies whether to update the depth buffer when rendering translucent polygons. The default check box setting is cleared.

- **Render 1-pixel Polygon**

Specifies whether to render polygons that are one pixel (dot). The default check box setting is cleared.

- **Far Clipping**

Specifies whether to use FAR clipping. When selected, polygons that intersect the FAR plane are clipped. When cleared, polygons that intersect the FAR plane are deleted. The default check box setting is cleared.

- **Polygon ID**

Specifies the polygon ID. The value range is 0 - 63. The default is 0.

- **Display Face**

Specifies polygon display faces. Front Face displays only the front face, Back Face displays on the back face, and Both Face displays both faces. The default is Front Face.



- **Polygon Mode**

Specifies the polygon mode. Modulate is modulation mode, Decal is decal mode, Toon / Highlight is toon / highlight shading, and Shadow is shadow polygon. The default is Modulate.

- **Tex Gen Mode**

Specifies the texture coordinate conversion mode. **None** is no texture coordinate conversion, **TexCoord** is TexCoord source, **Normal** is Normal source, and **Vertex** is Vertex source. The default is **None**.

When performing environmental mapping, select **Normal**; when performing projection mapping, select **Vertex**.

Even when Tex Gen Mode is set to **None**, if the texture matrix of the texture connected to the material is not a unit matrix, then it is output as TexCoord (Normal and Vertex are output as unrelated to the texture matrix).

- **Tex Gen ST Source**

Specifies whether to output the texture coordinate of the corresponding polygon when the texture coordinate conversion mode is Normal or Vertex.

**Polygon** outputs the polygon texture coordinates. It is possible to have special mapping expression that transforms normally applied texture according to the normal vector and vertex coordinates.

**Material** does not output the polygon texture coordinates. The application method in XSI is ignored, and the texture coordinates are determined from the normal vector or vertex coordinates. Specify Material when performing general environmental/projection mapping.

The default is Material.

- **Texture Effect Matrix**

When the texture coordinate conversion mode is either Normal or Vertex, this specifies the 4x2 matrix that affects texture coordinate conversion. When performing environmental/projection mapping, this can be used to adjust the texture position, direction, or size.

To convert a value that can be used by TWL and NITRO (a multiple of 1/4096), enter a value, and then press ENTER.

The meaning of each component of the matrix is described below.

**Table 5-2 Meaning of the Texture Effect Matrix Components**

S Coordinate	T Coordinate
Impact of X coordinate on S coordinate	Impact of X coordinate on T coordinate
Impact of Y coordinate on S coordinate	Impact of Y coordinate on T coordinate
Impact of Z coordinate on S coordinate	Impact of Z coordinate on T coordinate
Offset volume of the S coordinate	Offset volume of the T coordinate

**Notes:**

- Although a 4x4 matrix is output to the intermediate file, only a 4x2 component of the 1st and 2nd columns can be set with the plug-in because the 3rd and 4th columns do not impact texture coordinate conversion.
- When Tex Gen ST Source is Polygon, the 4th row components do not have an effect.

**Nintendo TWL-System G3D Library Precautions**

In the G3D library, the XYZ coordinates that are multiplied by the Texture Effect Matrix are as follows.

- Environmental Mapping (Tex Gen Mode = Normal): Coordinates with the normal vector converted to view coordinate system
- Projection Mapping (Tex Gen Mode = Vertex): Coordinates with the vertex coordinates converted to the world coordinate system
- After multiplying with the Texture Effect Matrix, the product with the "matrix combining the mapping center and position" and "the Texture Scale & Rotate (only for environmental mapping) matrix specified with the material" is the final texture coordinates.
- With environmental mapping, the 4th row of the Texture Effect Matrix has no effect.
- For envelope models, environmental/projection mapping cannot be displayed properly.
- **Compress**

This flag is used to prevent compression when the intermediate file export dialog box option

**Compress Material** is set to **Compress**.

When **Compress if possible** is selected, if attributes exactly match those of another material, only one is output (material names are ordered alphabetically from a, and the one coming first is given priority). However, materials with material color animation, texture pattern animation, or texture SRT animation set are never compressed.

When **Don't compress** is selected, even if attributes exactly match those of another material, each material is output individually.

The default is Compress, if possible.

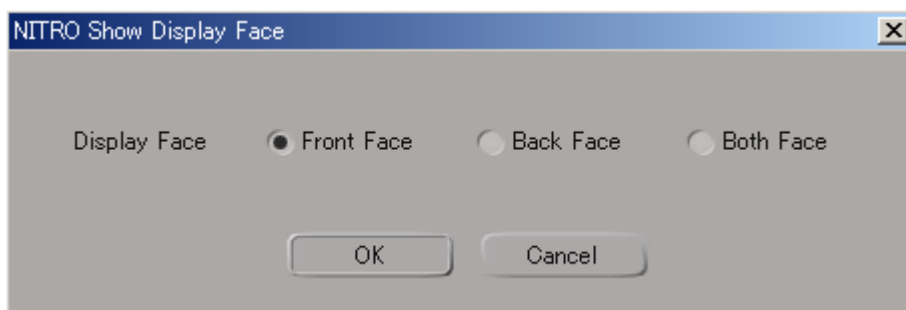
### 5.3 Verifying Polygon Display Face (NITRO Show Display Face)

This plug-in verifies the polygon display face settings set with the NITRO Set Material Attribute plug-in.

#### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Show Display Face**. The following dialog box appears.

**Figure 5-2 NITRO Show Display Face Dialog Box**



According to the selected content, the target material and the polygons that set those materials are selected.

Click **OK** to maintain the selected status; click **Cancel** to release the select status for all polygons.

### 5.4 Verifying Lighting (NITRO Show Lighting)

This plug-in verifies the light that is affected by the NITRO Set Material Attribute plug-in settings.

#### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Show Lighting**. The following dialog box appears.

**Figure 5-3 NITRO Show Lighting Dialog Box**



According to the selected content, the target material and the polygons that set those materials are selected.

Click **OK** to maintain the select status; click **Cancel** to release the select status for all polygons.

<b>Off</b>	No light has an effect
<b>Light0 On</b>	Light0 has an effect
<b>Light1 On</b>	Light1 has an effect
<b>Light2 On</b>	Light2 has an effect
<b>Light3 On</b>	Light3 has an effect
<b>Any Light On</b>	One or more lights have an effect

## 5.5 Setting Polygon Rendering Priority (NITRO Set Render Priority)

Sets polygon rendering priorities.

### Using the Plug-In

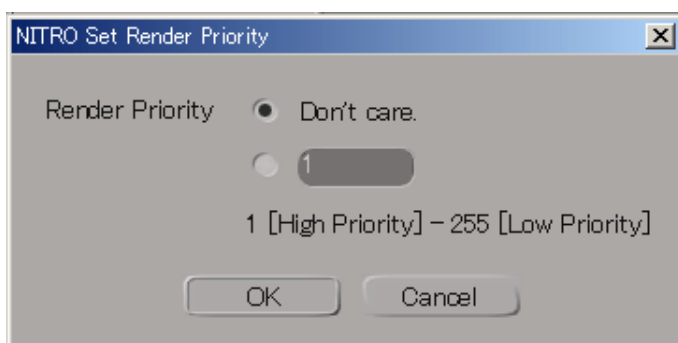
Select a material or mesh model, and then, on the **NITRO-System** menu, click **NITRO Set Render Priority**. The following dialog box appears, showing the current settings added to the material.

When multiple materials are selected, the material first recognized in the plug-in is displayed; to apply the settings to all of the selected materials, click **OK**.

When a polygon mesh is selected, the material applied to the polygon mesh is targeted.

For details about polygon rendering priorities, see section 3.2.5.5 [Polygon Rendering Priority](#).

**Figure 5-4 NITRO Set Render Priority Dialog Box**



For **Render Priority**, select either **Don't care** (no render order specified) or the numerical box, enter an integer not less than one and not greater than 255, and then press ENTER. Polygons belonging to materials with smaller values are rendered first. When there are several materials with the same value, which polygon belonging to a material will be rendered first is undefined (depends on the render routine).

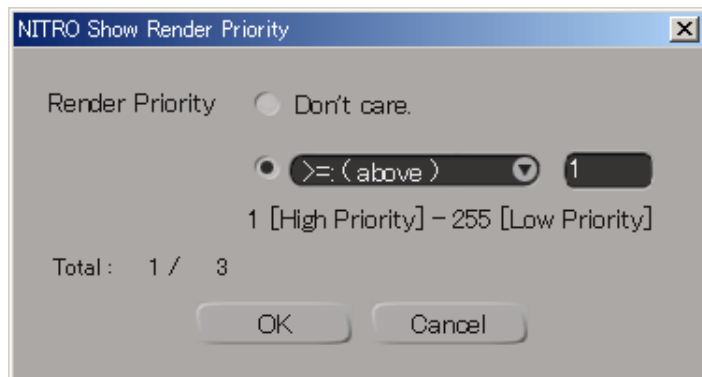
## 5.6 Verifying Polygon Rendering Priority (NITRO Show Render Priority)

Selects polygon rendering priorities set in materials according to conditions.

### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Show Render Priority**. The following dialog box appears.

**Figure 5-5 NITRO Show Render Priority Dialog Box**



- **Render Priority**

When **Don't care** (no render order specified) is selected, or when a conditional specification is selected and the condition and numerical values are specified, the materials and polygons belonging to the materials are selected and displayed. The conditions that can be selected are less than (< : under), less than or equal to (<= : below), equal to (= : exactly), greater than or equal to (>= : above), and greater than (> : over). Integers not less than one and not greater than 255 can be specified.

- **Total**

Displays the number of materials selected of the total number of materials.

To close, click **OK**. The corresponding materials and polygons associated with those materials remain in the selected state. If canceled, the selection is released.

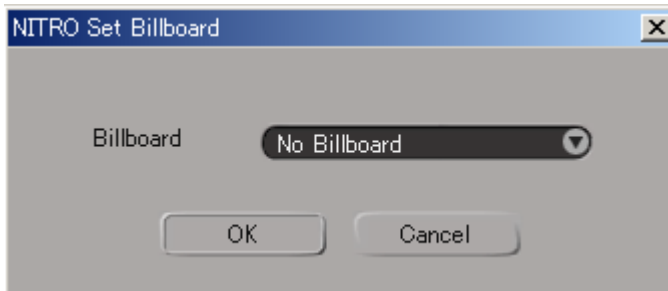
## 5.7 Setting Billboard Display (NITRO Set Billboard)

Billboard display information is added to nodes as a custom parameter. (A custom parameter set named "NNS\_NodePSet" is set in the node.)

### Using the Plug-In

Select the node(s) in which the billboard is to be set.

On the **NITRO-System** menu, click **NITRO Set Billboard**. The following dialog box appears.

**Figure 5-6 NITRO Set Billboard Dialog Box**

From the drop-down list, select **No Billboard**, **Billboard**, or **Y-Billboard**, and then click **OK** to set the option in the node as a custom parameter.

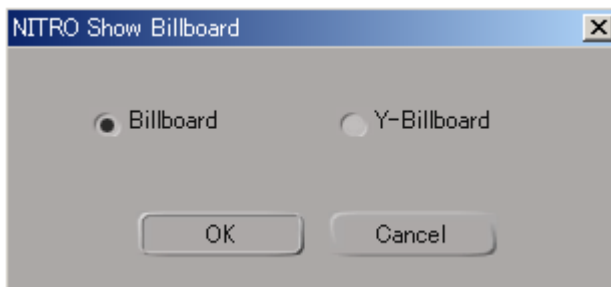
**No Billboard** is normal matrix display, **Billboard** displays by always facing toward the camera, and **Y-Billboard** displays by rotating around the global Y-axis toward the camera. The default setting is No Billboard.

## 5.8 Verifying Billboard Display (NITRO Show Billboard)

This plug-in verifies the billboard information set with the NITRO Set Billboard plug-in.

### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Show Billboard**. The following dialog box appears.

**Figure 5-7 NITRO Show Billboard Dialog Box**

When **Billboard** is selected, only nodes with billboard displayed specified in the XSI scene are selected. Similarly, when **Y-Billboard** is selected, only nodes with Y-Billboard display specified are selected. Click **OK** to maintain the selection status; click **Cancel** to return the selection status to its prior setting.

## 5.9 Setting the Prohibit Node Deletion Flag (NITRO Set No Cut Node)

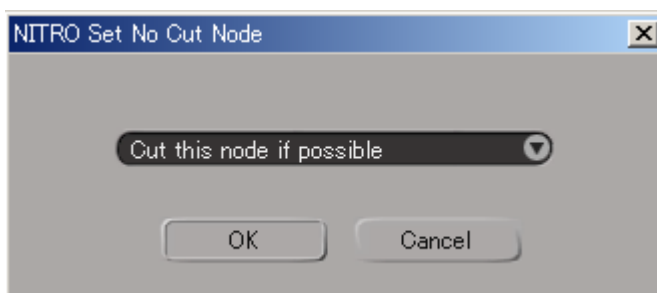
When exporting an intermediate file, this flag can be set in a node as a custom parameter to prevent the node from being deleted even if the node reduction feature has been enabled. (A custom parameter set named "NNS\_NodePSet" is set in the node.)

### Using the Plug-In

When exporting an intermediate file, select the node(s) not to be deleted even when the node reduction feature is used.

On the **NITRO-System** menu, click **NITRO Set No Cut Node**. The following dialog box appears.

**Figure 5-8 NITRO Set No Cut Node Dialog Box**



The current settings of the selected node are displayed in the dialog box. When several are selected, the node first detected by the plug-in is displayed.

Select **Don't cut this node** to prevent a node from being deleted; select **Cut this node if possible** when a node can be deleted during node reduction. The default is set to allow nodes to be deleted.

## 5.10 Verifying the Prohibit Node Deletion Flag (NITRO Show No Cut Node)

---

Searches for and selects only those nodes that have been set to not be deleted (= Don't cut this node) with the **NITRO Set No Cut Node** plug-in.

### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Set No Cut Node**.

If any nodes have the prohibit node deletion flag added, those nodes are selected.

## 5.11 Setting Texture Pattern Animation (NITRO Set Texture Pattern Animation)

---

Sets the texture image file to be used with texture pattern animation and creates the SCR file.

For details on using the plug-in, see section 3.4.6 Texture Pattern Animation (ITP).

## 5.12 Batch Setting Hierarchical Scaling (NITRO Set Hierarchical Scaling)

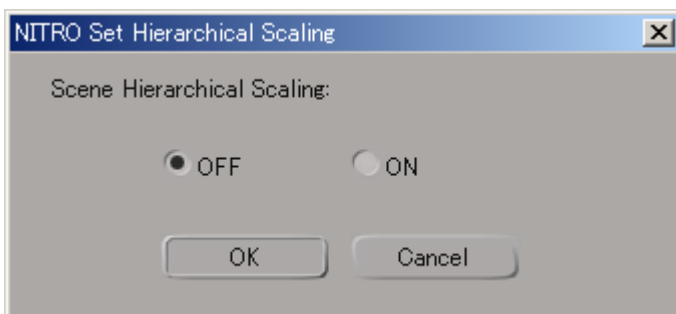
---

Hierarchical Scaling of all nodes in a scene is set at the same time.

### Using the Plug-in

On the **NITRO-System** menu, click **NITRO Set Hierarchical Scaling**. The following dialog box appears.

Figure 5-9 NITRO Set Hierarchical Scaling Dialog Box



Select **OFF** or **ON**, and then click **OK**. Hierarchical Scaling for all nodes in the scene are updated at the same time.

## 5.13 Selecting Polygons with a Specified Number of Vertices (NITRO Select Polygon)

---

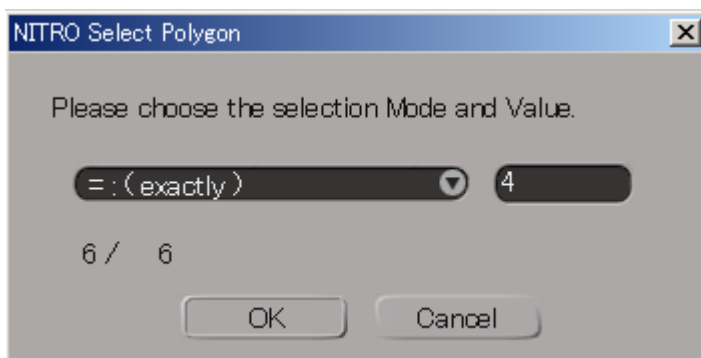
### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Select Polygon**. The following dialog box appears.

The selection status of polygons in XSI changes according to the conditions set in the dialog box.

At this time, when the plug-in is executed with the mesh model selected, the polygons in the selected mesh model are targeted. When the plug-in is executed and no mesh model is selected, the polygons of all mesh models in the scene are targeted. If there are no mesh models in the scene, the plug-in terminates with an error.



**Figure 5-10 NITRO Select Polygon Dialog Box**

Choose the selection Mode and Value, and then click **OK** to save the selection status. To release the selection status of all polygons, click **Cancel**.

- **Mode, Value**

Inputs the number of vertices of three or more, and chooses the relation of the number to the polygons to select. The conditions that can be selected are less than (< : under), less than or equal to (<= : below), equal to (= : exactly), greater than or equal to (>= : above), greater than (> : over).

- **Total**

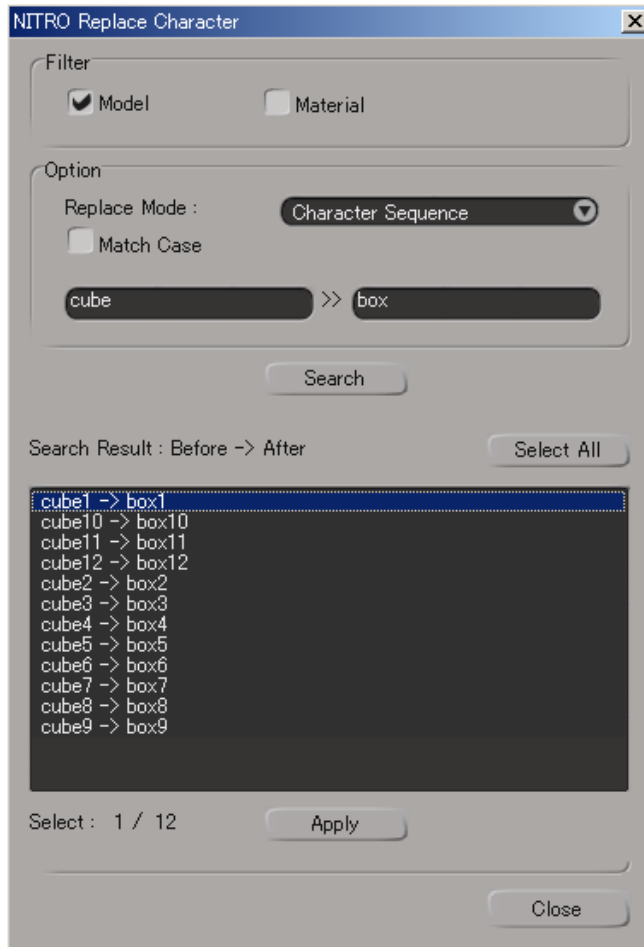
Displays the number of selected polygons meeting the conditions out of the total number of polygons targeted for searching.

## 5.14 Replacing Element Name Strings (NITRO Replace Character)

This plug-in replaces element name (node names, material names) strings in a batch. Lowercase letters in element names can be replaced with capital letters, and capital letters can be replaced with lowercase letters.

### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Replace Character**. The following dialog box appears.

**Figure 5-11 NITRO Replace Character Dialog Box**

Under **Filter**, select the element type to target.

Under **Option**, select the Replace Mode options.

- **Character Sequence**

In the **Search Result** box, the search string input Before is replaced with the After string.

When the **Match Case** check box is selected, uppercase and lowercase letters are differentiated when searching for elements that include the search string. When cleared, uppercase and lowercase letters are not differentiated.

When the following special symbols are used at the beginning of the search string, search or search and replace, can be limited to the start or end of the element name.

- **^**

This indicates the beginning of the element name. When the search string is only "^," the replace string is placed at the beginning of all targeted element names. For example,

When [ ^cube ] >> [ box ] is set, only [ cube ] that appears at the beginning of the element name is replaced with [ box ].

When [ ^ ] >> [ cube\_ ] is set, the string [ cube ] is added to the beginning of all element names.

- \$

This indicates the end of the element name. When the search string is only \$, the replace string is placed at the end of all targeted element names. For example,

When [ \$\_test ] >> [ ] is set, [ \_test ] is deleted from the end of all element names that end in [ \_test ].

When [ \$ ] >> [ \_test ] is set, [ \_test ] is added to the end of the element names.

- **Small to Capital Letter**

Replaces all lowercase letters with capital (uppercase) letters.

- **Capital to Small Letter**

Replaces all capital letters with lowercase letters.

When **Search** is clicked, the search results (the current element name and the element name after replacement) are displayed in the **Search Result** list.

Select the elements for which the names are to be replaced from the list (which can also be selected in XSI). Click **Select All** to select all elements in the list. Elements that do not have an element name after replacement are elements that lost their names because the replacement string was blank and the string was deleted. The elements cannot be changed even if selected. Be sure to review the settings.

When **Apply** is clicked, the replacement occurs. When the name cannot be changed to the element name after replacement, a warning suggesting a different name displays, or an error displays in the script editor.

## 5.15 Renaming Element Names Exceeding 16 Characters (NITRO Rename Over 16 Characters)

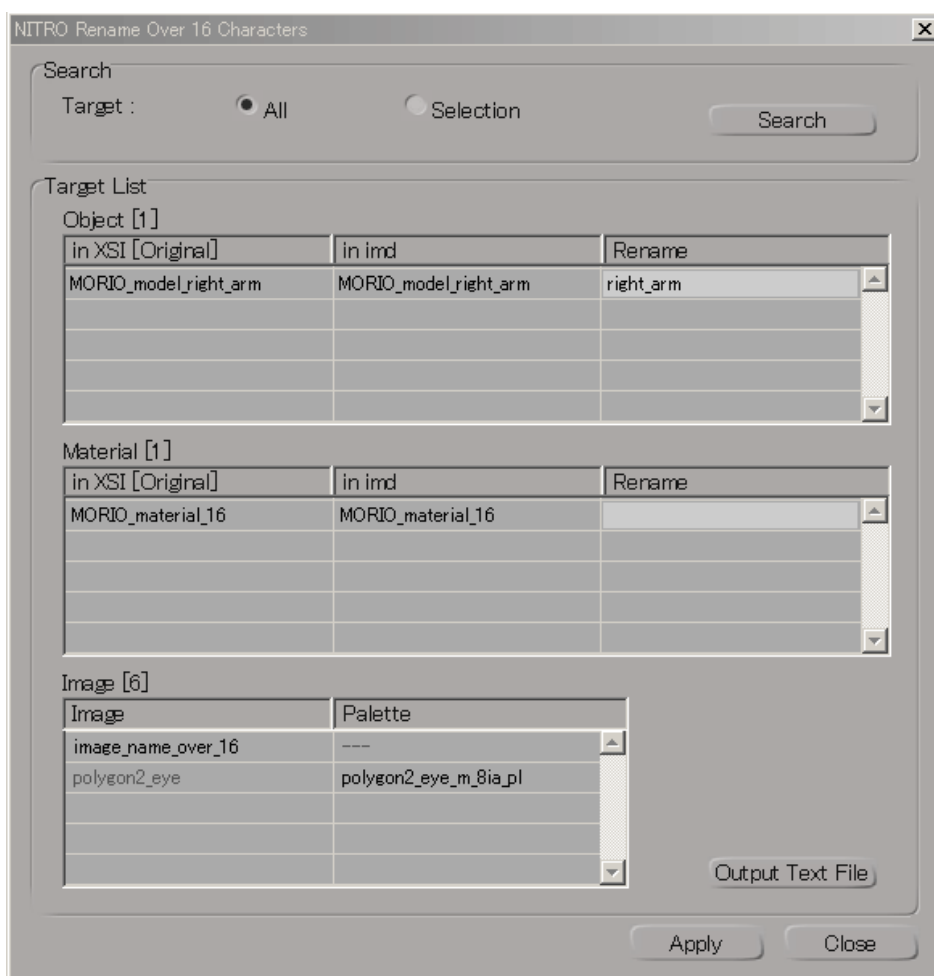
---

This plug-in searches for elements with names longer than 16 characters that are output to the intermediate file (node names, material names, texture image names, or texture palette names) and renames them.

**Note:** Texture image names and texture palette names can only be searched and cannot be renamed.

### Using the Plug-In

On the **NITRO-System** menu, click **NITRO Rename Over 16 Characters**. The following dialog box appears.

**Figure 5-12 NITRO Rename Over 16 Characters Dialog Box**

Under **Search**, select the search target. If the search is to be performed when the entire scene is exported to intermediate files, select **All**. If the search is to be performed when only selected nodes and the nodes under them are output, select **Selection**.

Next, if **Selection** is selected, select the nodes that are the output targets in XSI. If **All** is selected, nodes do not need to be selected.

When **Search** is clicked, a list of the elements that are output to the intermediate file and have names exceeding 16 characters is displayed in the **Target List** (they are selected in XSI) group box. The results displayed represent when the intermediate file export options Compress Node is None, Compress Material is None, and Output Texture is Only Used. An error displays if the texture file cannot be opened or if no model is found.

For objects and materials, the name in XSI is displayed in the **in XSI** column, and the name in the intermediate file is displayed in the **in imd** column. For textures, the texture image name is displayed in the **Image** column, and the texture palette name is displayed in the **Palette** column. Names that do not exceed 16 characters are displayed a lighter color. When the cursor is placed over an item in the in XSI column, the full path name for the object is displayed in a pop-up box; when the cursor is

placed over a texture Image item, the path name for the texture file is similarly displayed.

Next, enter the new name in the **Rename** column. The following names, however, cannot be input.

- Names that cannot be used in XSI node names
- Names exceeding 16 characters
- Names that already exist as node names in the scene
- Names that duplicate other **Rename** content

When **Apply** is clicked, the name is changed. However, the names of elements for which the **Rename** content is left blank are not changed. Elements that were renamed are selected in XSI and deleted from the Target List.

Click **Output Text File** to output the current Target List to a text file. For textures, the path name for the texture file is also output. This feature is convenient when later combining and revising texture file names and texture palette names, or when verifying element names before and after being renamed.

## 6 Information for Programmers

### 6.1 Calculating XSI Node Matrices

SOFTIMAGE|XSI has two methods for performing matrix calculations: general matrix calculations (=Hierarchical Scaling off) and Softimage proprietary matrix calculation (=Hierarchical Scaling on).

With general matrix calculations (=Hierarchical Scaling off, corresponding to the IMD file's `<model_info>` element attribute `scaling_rule = "standard"`), when coordinates are multiplied from the left, the following occurs.

$$[S] * [R] * [T]$$

[S] : Scale matrix [R] : Rotate matrix [T] : Translate matrix

With Softimage matrix calculations (=Hierarchical Scaling on, corresponding to the IMD file's `<model_info>` element attribute `scaling_rule = "si3d"`), when the parent-child structure is a (parent) -> b (child) -> c (grandchild), then the matrix for node c is as follows.

$$[Sc] * [Sb] * [Sa] * [Rc] * [Tc'] * [Rb] * [Tb'] * [Ra] * [Ta]$$

However, `[Ti']` is "the matrix that multiplies the Translate component by the parent scale value up until that time," resulting in the following.

$$[Ti'] = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ tx' & ty' & tz' & 1 \end{pmatrix}$$

$tx' = tx * (\text{the parent scale X value up until that time})$

$ty' = ty * (\text{the parent scale Y value up until that time})$

$tz' = tz * (\text{the parent scale Z value up until that time})$

**Note:** Hierarchical Scaling can be set at the node level in XSI, but at the present time, it is treated as an item that is set for the entire model, the same as Classic Scaling for SI3D.

### 6.2 Node Reduction Algorithms

#### 6.2.1 Algorithm When Specifying Cull Useless Node

1. Delete nodes that do not have child nodes and for which matrices are not used for polygon display (that also are not used by envelopes, etc.). If those nodes have polygons, those polygons are moved to the root node.
2. Repeat step 1 until all nodes that can be deleted have been deleted.

If the root node is the `world_root` added by the plug-in, and if `world_root` has a single child node, the `world_root` node is also deleted. The `world_root` node polygons are moved to the child node.

### 6.2.2 Algorithm When Specifying Merge Useless Node

---

1. Perform the same procedure used for **Cull Useless Node**.
2. For the remaining nodes except for root, if a node's parent node's matrix is not used for display, the matrix of that node and the matrix of the parent node are combined, and the parent node is deleted. If a parent node has multiple children, the matrices of each child node are combined. If the parent node has polygons, those polygons are moved to the root node.
3. Repeat step 2 until all nodes that can be deleted have been deleted.

If the root node has a single child node, and the root node matrix is not used for display, the root node is also deleted. The root node polygons are moved to the child node.

### 6.2.3 Algorithm When Specifying Unite

---

All vertex coordinates are output as a single node of global coordinate values centered on the global coordinate axis origin (the node name is `world_root`). That single node stores all material information and polygon information. However, polygon groups that originally belonged to a different node (corresponding to the IMD file's `<polygon>`) are output individually.

### 6.2.4 Algorithm When Specifying Unite and Combine Polygon

---

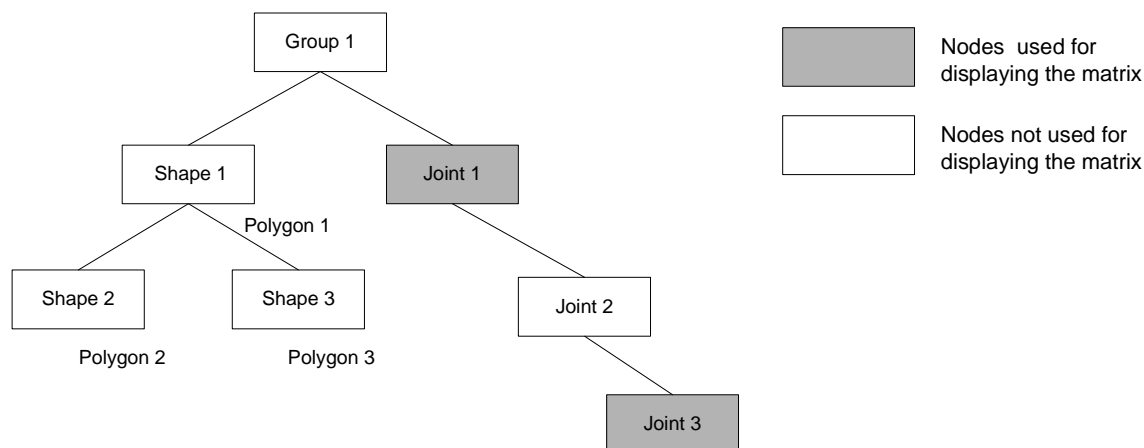
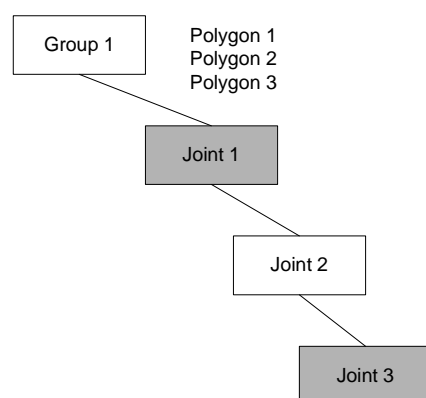
In addition to the Unite process, polygon groups (corresponding to the IMD file's `<polygon>` element) displayed with the same material (corresponding to the IMD file's `<material>` element) are combined.

However, polygons that differ in the existence of a vertex color will not be combined even if they have the same materials.

### 6.2.5 Node Reduction Example

---

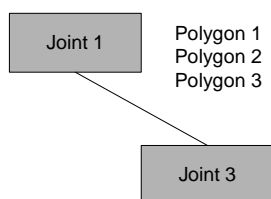
Node structure examples for no node reduction, Cull Useless Node, and Merge Useless Node are diagrammed below.

**Figure 6-1 Node Reduction Examples****1****No node culling****2****Cull Useless Node**

1. Shape 2, which does not have a child, is culled and polygon 2 is moved to group 1, which is the root node.

2. Similarly, childless shape 3 is culled and polygon 3 is moved to group 1.

3. Shape 1's children are gone, so it is culled too and polygon 1 is moved to group 1.

**3****Merge Useless Node**

1. Joint 2 is culled and its matrix is merged into joint 3.

2. Group 1 is culled and its matrix is merged into joint 1. Polygons 1, 2, & 3 are moved to joint 1.

## 6.3 SOFTIMAGE|XSI Texture Matrix

The C-language source shown below explains how to use the Scale, Rotate, and Translate values of the texture output from XSI to create a texture matrix on the TWL or NITRO that is the same as the texture matrix on XSI.



**Code 6-1 Texture Matrix**

```

// Ss and St are the Scale values in the S and T directions
// R is the Rotate value
// Ts and Tt are the Translate values in the S and T directions
// W is the texture image width (original_width of <tex_image>)
// H is the texture image height (original_height of <tex_image>)
// Creating a 4x3 matrix using the above results in the following

const int MTX_SHIFT = 12;
void CreateTexMtx_for_XSI(      MtxFx43 *dstp,
                               const s32  Ss,
                               const s32  St,
                               const u16   R,
                               const s32  Ts,
                               const s32  Tt,
                               const s32  W,
                               const s32  H)
{
    fx32    sinR = FX_SinIdx(R);
    fx32    cosR = FX_CosIdx(R);
    s32      ss_sin = (s32)((s64)Ss * sinR >> MTX_SHIFT);
    s32      ss_cos = (s32)((s64)Ss * cosR >> MTX_SHIFT);
    s32      st_sin = (s32)((s64)St * sinR >> MTX_SHIFT);
    s32      st_cos = (s32)((s64)St * cosR >> MTX_SHIFT);
    s32      Ts2, Tt2;

    dstp->m[0][0] = ss_cos;
    dstp->m[0][1] = st_sin * H / W;
    dstp->m[0][2] = 0;

    dstp->m[1][0] = ss_sin * (-W) / H;
    dstp->m[1][1] = st_cos;
    dstp->m[1][2] = 0;

    dstp->m[2][0] = 0;
    dstp->m[2][1] = 0;
    dstp->m[2][2] = 0;

    Ts2 = (s32)(((s64)Ts * cosR + (s64)Tt * sinR) >> MTX_SHIFT);
    Ts2 = Ts2 * Ss >> MTX_SHIFT;
    Tt2 = (s32)(((s64)Ts * sinR - (s64)Tt * cosR) >> MTX_SHIFT);
    Tt2 = Tt2 * St >> MTX_SHIFT;

    dstp->m[3][0] = W * (ss_sin - Ts2) << 4;
    dstp->m[3][1] = (-H) * (st_cos + Tt2 - FX32_ONE) << 4;
    dstp->m[3][2] = 0;
}
// Ss, St, sinR, cosR, Ts, and Tt are fixed decimal numbers with a 12-bit decimal
// portion.
// W and H are integers without a decimal portion.
// If the matrix created with the above function is set in the current texture
// matrix, the application method is the same as that for XSI.

```

## 6.4 Custom Parameters

The intermediate file plug-ins and data creation plug-ins use the following custom parameters.

All custom parameter identifiers begin with "nns\_".

**Table 6-1 Custom Parameter List**

Type	Setting Target	Identifier	Format	Values
Light0 Enable Flag	Material	nns_lighting	bool	0 = Light0 has no effect 1 = Light0 has an effect
Light1 Enable Flag	Material	nns_lighting1	bool	0 = Light1 has no effect 1 = Light1 has an effect
Light2 Enable Flag	Material	nns_lighting2	bool	0 = Light2 has no effect 1 = Light2 has an effect
Light3 Enable Flag	Material	nns_lighting3	bool	0 = Light3 has no effect 1 = Light3 has an effect
Specular reflection luminance table Enable Flag	Material	nns_shininess_table	bool	0 = Do not use the specular reflection luminance table 1 = Use the specular reflection luminance table
Fog Enable Flag	Material	nns_fog	bool	0 = Do not apply fog 1 = Apply fog
Wire Frame Display Flag	Material	nns_wire_mode	bool	0 = Wire frame display off 1 = Wire frame display on
Depth for Decal Polygons Test Flag	Material	nns_depth_test_decad	char	0 = No depth test for decal polygons 1 = Depth test for decal polygons
Depth Value for Translucent Polygon Update Flag	Material	nns_xlu_update_depth	char	0 = Do not update the depth buffer when rendering translucent polygons 1 = Update the depth buffer when rendering translucent polygons
1-dot Polygon Rendering Flag	Material	nns_render_1_pixel	char	0 = Do not render resulting 1-dot polygons 1 = Render even if a 1-dot polygon results
FAR Clipping Flag	Material	nns_far_clip	char	0 = Delete if intersects with the FAR plane 1 = Clip if intersects with the FAR plane

Type	Setting Target	Identifier	Format	Values
Polygon ID	Material	nns_poly_id	char	Polygon ID value (0 - 63)
Polygon Display Face	Material	nns_disp_face	char	0 = Display front face only 1 = Display back face only 2 = Display both faces
Polygon Mode	Material	nns_poly_mode	char	0 = Modulation mode 1 = Decal mode 2 = Toon / Highlight Shading 3 = Shadow polygon
Texture Coordinate Conversion Mode	Material	nns_tex_gen_mode	char	0 = No texture coordinate conversion 1 = TexCoord source 2 = Normal source 3 = Vertex source
Texture Coordinate Export Flag (When Texture Coordinate Conversion Mode is Normal or Vertex)	Material	nns_tex_gen_st_src	char	0 = Output polygon texture coordinates 1 = Do not output polygon texture coordinates
Matrices that affect texture coordinate conversion	Material	nns_tex_effect_mtx00 nns_tex_effect_mtx01 : nns_tex_effect_mtx33	float	4 x 4 matrix expressed by 16 values
Material Compression Prohibit Flag	Material	nns_no_compress	char	0 = Compression possible 1 = Compression not possible
Polygon Rendering Priority	Material	nns_render_priority	char	Rendering priority value (0 - 255)
Billboard Flag	Nodes	nns_billboard	char	0 = None 1 = Billboard display 2 = Y-axis billboard display
Prohibit Node Deletion Flag	Nodes	nns_no_cut	bool	0 = Deletion possible 1 = Deletion not possible

**Note:** The custom parameters for nodes are added as NNS\_NodePSet, and the custom parameters for materials are added as NNS\_MaterialPSet.

The description of the NNS\_TexPatternPSet and NNS\_ExpDialogPSet custom parameters added to scenes has been omitted.

Windows is either the trademark or registered trademark of the Microsoft Corporation in the United States and internationally.

Softimage, SOFTIMAGE|3D, and SOFTIMAGE|XSI are either the trademarks or registered trademarks of Autodesk, Inc., in the United States and other countries.

Photoshop is the trademark or registered trademark of Adobe Systems Incorporated.

All other company and product names in this document are the trademarks or registered trademarks of the respective companies.

© 2004-2009 Nintendo

The contents of this document cannot be duplicated, copied, reprinted, transferred, distributed, or loaned in whole or in part without the prior approval of Nintendo.