



Artists Guide

for Maya Tools

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1. Introduction

This guide has been created with the aim of helping artists make use of the Maya tools shipped with the RenderWare Graphics 3.10 SDK. It assumes a good working knowledge of Maya and access to RenderWare viewers.

2. Installation

The Maya tools included in the RenderWare Graphics 3.10 SDK consist of three file export plug-ins (mayabsp.mll, mayadff.mll & mayaspl.mll) and a custom mel script (RenderWareProperties.mel)

File Export Plug-ins

The RenderWare Graphics 3.10 install program should place all the necessary files in their correct locations. However should you need to copy files manually the tool files should be placed in the Maya directories as below:

mayabsp.mll, mayadff.mll and mayaspl.mll

copied to

\AW\Mayax.x\bin\plug-ins

and

bspTranslatorOpts.mel, dffTranslatorOpts.mel and splTranslatorOpts.mel

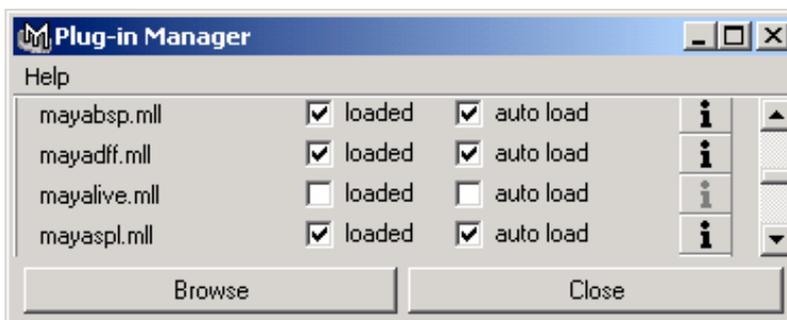
copied to

\AW\Mayax.x\scripts\others

After installation you will need to configure Maya to automatically load the RenderWare plugins when it starts. This is done from the Maya Plug-in Manager

Window->Settings/Preferences->Plug-in Manager

From this dialog check the loaded and auto load options for the Maya plug-ins (mayabsp.mll, mayadff.mll & mayaspl.mll).



The Maya plug-in Manager

Once installed these plug-ins will add three new file export types (.bsp, .dff and .spl) accessible from

File->Export All or

File->Export Selection

Please note that Export All and Export Selection are equivalent for the purposes of these plug-ins.

RenderWare Properties Script

Once again, the install program should place these files in their correct locations:

RenderWareProperties.mel

copied to

\AW\Mayax.x\scripts\others

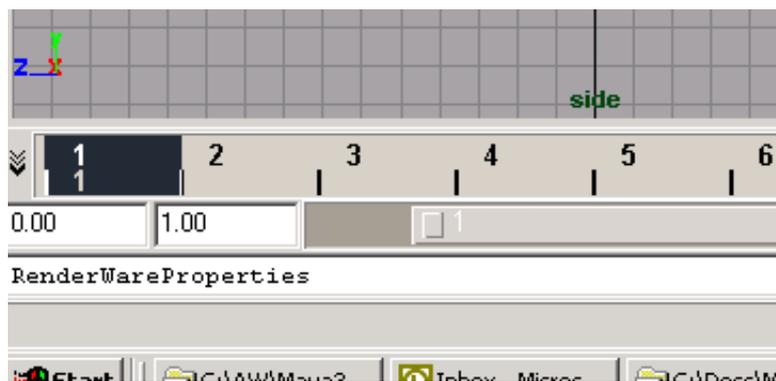
and

USERRENDERWARE.BMP

copied to

\AW\Mayax.x\extras\icons

Once installed the Maya script command `RenderWareProperties` will invoke the MEL script and bring up a modeless dialog box for setting RenderWare specific options.



The Maya command line editor with RenderWareProperties command entered

For ease of use you may wish to add the RenderWareProperties command to your shelf. This can be done by selecting the command text from the Maya command line and middle-click dragging it to the shelf area. The Maya shelf editor

Window -> Settings/Preferences -> Shelves.

can then be used to customize the icon that appears on the shelf for the RenderWareProperties command. The file USERRENDERWARE.BMP has been provided for this purpose. Please see section 15 of the Maya Essentials guide for more information on the shelf editor.



The Maya shelf with RenderWareProperties icon installed

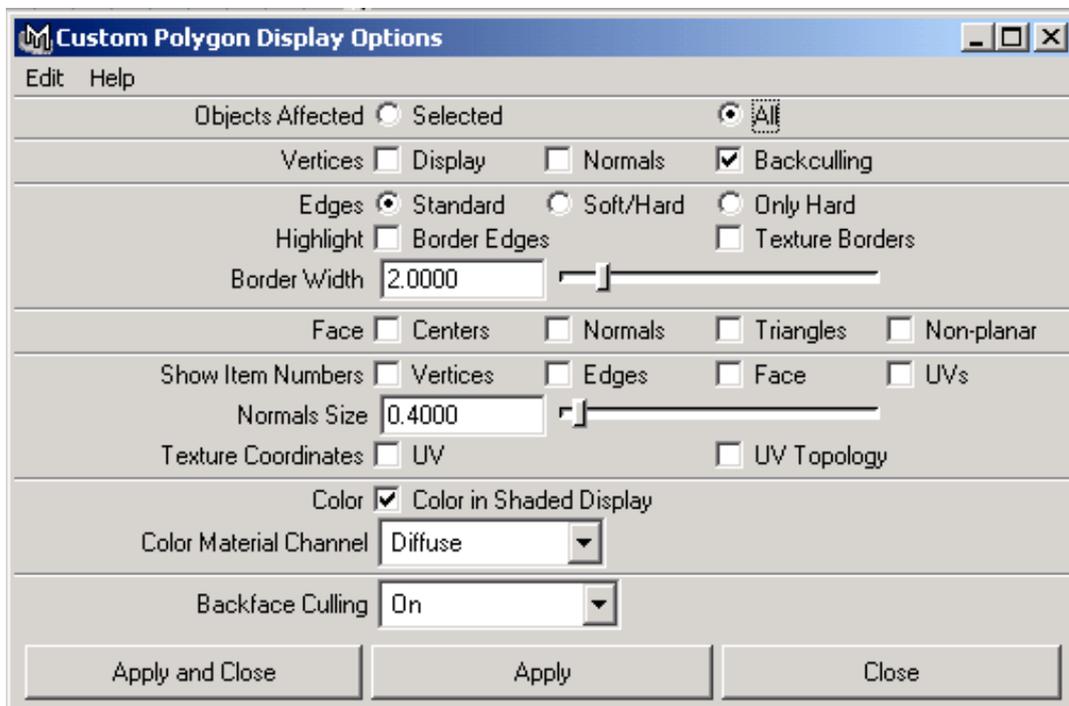
3. General Modeling

Backface Culling

By default Maya does not backface cull the polygons rendered in its viewports. Since RenderWare does backface cull by default we recommend you enable culling in Maya to ensure exported geometry matches the geometry in Maya. This can be set in the Custom Polygon Display Options dialog, found under

Display->Custom Polygon Display Options.

To enable backface culling for all polygons set the Objects Affected option to All, the BackFace Culling drop down to On and hit Apply.



Set Backface Culling to on and 'Apply' to 'All' objects.

Model with care

There are a few conventions to consider when modeling geometry for use in RenderWare Graphics. Whilst they may seem a little restricting, they will ultimately save time and improve your workflow

We spend a lot of time here at Criterion, repairing and altering stuff to improve game performance. If things are built with the basics in mind up front, it can save a lot of pain and tedium later on.

Sound advice is: test work in RenderWare Graphics often. Ask your programmers to set you up with the RenderWare Graphics PC viewers (clmpview.exe for dff files and wrldview for bsp files), and use them to keep a check on performance and appearance.

Creating geometry

It may seem obvious but don't create unnecessary geometry. It may seem like just a few triangles here and there, but they really start to add up as the scene grows. Actual maximums depend on target platforms, graphics cards etc, and this is evolving constantly. You'll soon start to get a feel for what works and what doesn't.

Avoid over detailing things, try to let the textures do the work (One good texture is worth a thousand polygons, and all that stuff!). After all, if you're racing round a world at 90mph, you won't see all that stunning detailed modeling anyway. Remember this is *real-time*, not FMV (not yet anyway!). Delete any unseen polygons, you just don't need them, and every poly counts. If the cameras are going to follow a spline, build with that in mind. Present your geometry to the camera like a film set - a solid looking façade.

Try to save polygons for where they will really count. For example if you are using pre-lighting put extra triangles where the light gradients occur. This will make your shadows far more detailed and help keep them free of artifacts. If you have characters, give them the lions' share, as they will be the focal point of the scene.

Normal Smoothing

RenderWare and most current hardware will only support a single normal per vertex. In Maya, normal smoothing makes it possible to have multiple normals per vertex. In these situations the exporter has to duplicate vertices to maintain the different normals. If you wish to retain a low vertex count it is therefore necessary to ensure normals are shared between faces. This can be achieved by going to

Edit Polygons->Normals->Soften/Harden

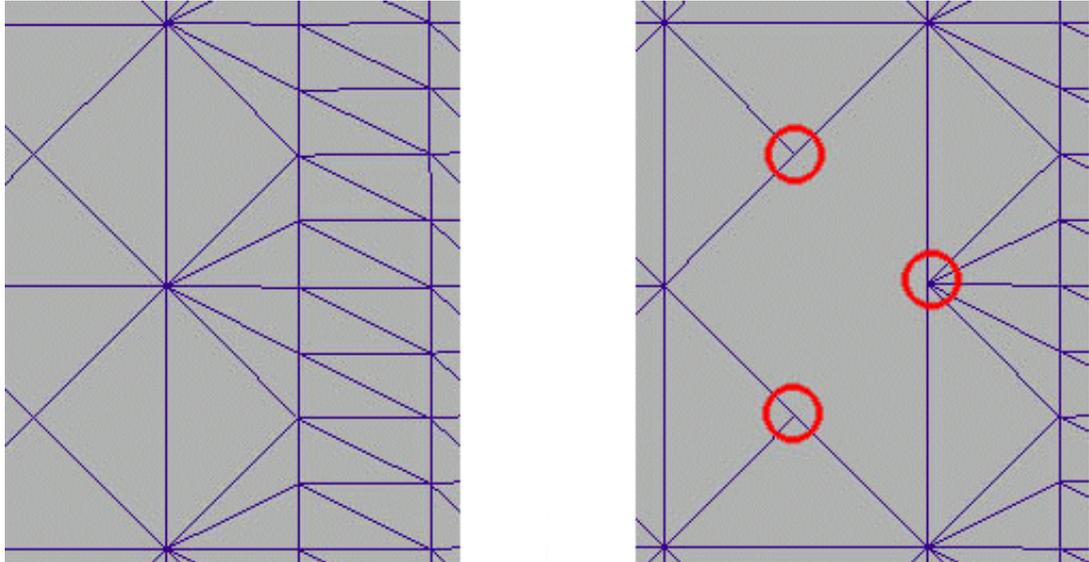
and setting the value of Angle to 180. Obviously some polygons (such as the edges of a cube) will need a lower value to retain a sharp edge.



Polygon Soften/Harden Tool

Keep Geometry Continuous

When building your geometry, especially adjacent parts of a world, be sure to keep the meshes continuous with no gaps or mismatches between vertices or edges. This is because when you have finished construction you will need to weld the various parts together into a continuous 'watertight' skin. Any discontinuities that do exist will manifest themselves as cracks or tears in the RenderWare Graphics world. This will have the QA and Games Testers complaining.



Always go from lower to higher tessellation smoothly and avoid any discontinuities like the above.

4. The BSP Exporter

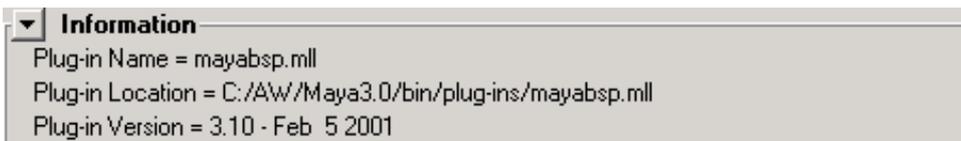
The BSP exporter is invoked from the

File->Export All or

File->Export Selected

commands (both commands are equivalent for this exporter). In the Export Options dialog the File Type is then set to RenderWare bsp. This exporter is used to export the entire scene as a RenderWare Graphics RpWorld object (saved as a .bsp file). Worlds do not contain any hierarchy or animation information and are typically used for static level geometry in a game. They are automatically split into sections (World Sectors) that RenderWare uses to speed up the rendering process.

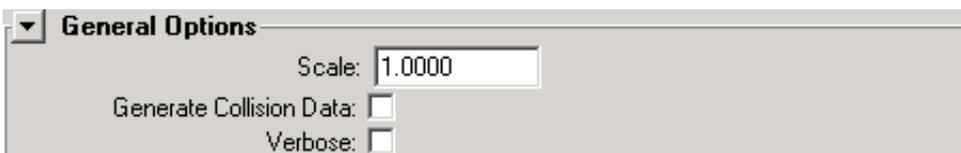
Information



BSP Exporter Information

This section of the BSP exporter provides useful information about the location and version of the BSP exporter you are using. The exporter version number is useful if you need to contact RenderWare support regarding exporter issues.

General Options



BSP Exporter General Options

Scale: Scale value for the world. This controls the relative scale of the exported world geometry. A value of 2 will be twice the size of the original, 0.1 is one-tenth etc.

Generate Collision Data: This option tells the exporter to generate RenderWare collision data with the exported world. This increases the execution time of the export and increases the size of the exported file. It should only be used if you intend to use RenderWare Graphics collision testing in your application.

Verbose: Generates more verbose output in the output window.

Geometry Options



BSP Exporter Geometry Options

Export Pre-Light Colors: This option is used to convert Maya vertex colors to RenderWare pre-light values when exporting. Lighting colors can be 'baked' into vertices within Maya using the

Edit Polygons->Colors->Prelight

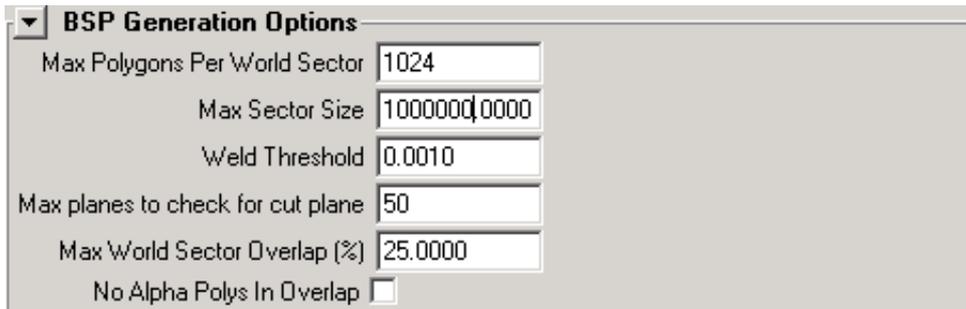
tool. To see the effect of the pre-light colors you will then need to view the world with a RenderWare viewer that allows you to turn off dynamic lights.

Export Normals: This option controls whether the exported world will contain vertex normals. You will need normals in your world if you intend to light it with dynamic RenderWare lights. If you intend to only pre-light the world you can save memory space by not storing normals.

Tri-Strip: This checkbox controls whether the world will be stored as triangle strips or triangle lists when exported to RenderWare format. Under most circumstances you will want this option to be enabled for maximum rendering performance in your application.

Tri-Stripper: This drop box is greyed out unless the Tri-Strips options is selected. It controls the algorithm RenderWare uses to generate triangle strips. By default you should leave this option set to Default. The other options may improve the triangle strip length (and therefore rendering performance) but are likely to increase export time significantly.

BSP Generation Options



BSP Exporter Generation Options

These values should be left at their default values for the majority of scenes.

Max Polygons Per World Sector: This controls the maximum number of polygons in a world sector. The default value of 1024 should be fine for most worlds. Going higher will reduce the number of world sectors but with the risk of world collision data being lost. This would manifest itself in objects falling through the world in RenderWare. Going lower increases the world sector generation with consequent increase in geometry.

Max Sector Size: This option controls the maximum size of sectors in the world. This option should only be changed if your application has specific need to reduce the size of the generated world sectors.

Weld Threshold: This setting controls the distance between vertices before they are welded together by the exporter.

Max planes to check for cut plane: This option controls the number of planes that are tested when trying to determine the best plane to divide a sector whilst generating BSP data. A higher figure generally generates fewer polygons or less splits. Too high though, and it will start to falloff. Basically it is a case of experimentation to find the optimum value.

Max World Sector Overlap (%): This option controls the percentage of the size of the world sector that polygons are allowed to overlap when the world sector is split.

No Alpha Polys in Overlap: This option controls whether polygons with alpha are allowed into the world sector overlap area. Enabling this option may improve efficiency of your world sectors but it may also mean that alpha polys are no longer rendered back to front correctly.

Texture options



BSP Exporter Texture Options

Limit UV Values: Some platforms (e.g. PlayStation 2) generate texturing artifacts if UV values exceed certain limits. This options controls whether the exporter tries to limit the magnitude of UV values in the scene when exported. It does this by detecting when UV values are increasing slowly over a connected set of triangles and changing the values. If you use a UV spread of 0-100 over a single polygon the exporter will not be able to help.

UV Maximum Value: This option is greyed out unless the Limit UV Values option is selected. It controls the value that the exporter tries to limit UVs to.

5. The DFF Exporter

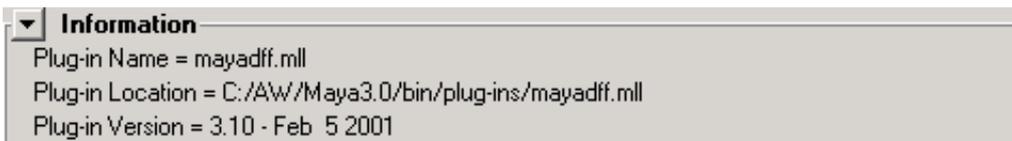
The DFF exporter is invoked from the

File->Export All or

File->Export Selected

commands (both commands are equivalent for this exporter). In the Export Options dialog the File Type is then set to RenderWare dff. This exporter is used to export a single hierarchy within the Maya scene as a RenderWare RpClump object (saved as a .dff file). In Maya you can select any object within the hierarchy you wish to export before invoking the exporter. Depending on the options you select the RpClump file saved will contain the object hierarchy, hierarchical animation, skinned animation and morph target animation.

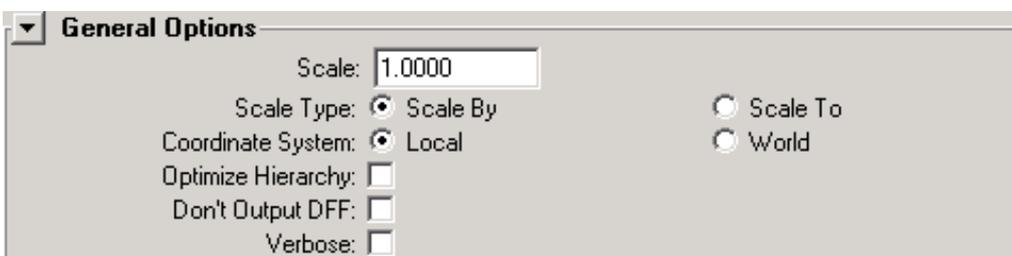
Information



DFF Exporter Information

This section of the DFF exporter provides useful information about the location and version of the DFF exporter you are using. The exporter version number is useful if you need to contact RenderWare support regarding exporter issues.

General Options



DFF Exporter General Options

Scale: Scale value for the exported geometry. This controls the relative scale of the exported geometry. A value of 2 will be twice the size of the original, 0.1 is one-tenth etc.

Scale Type: Scales By scale the object by the Scale value entered. Scale To scales the object so that the Scale value entered is the largest dimension of the clump's bounding box.

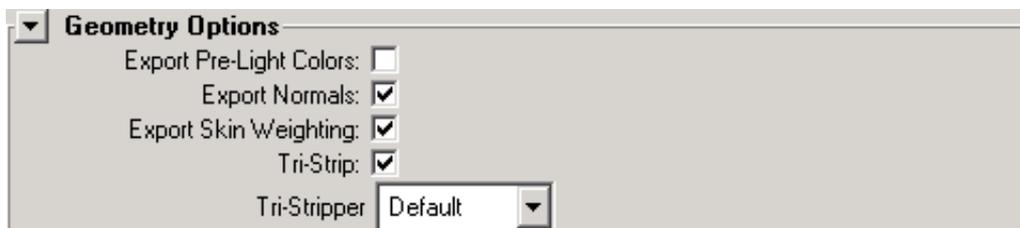
Coordinate System: This option controls the coordinate system of the exported clump. If set to Local the transformation on the root object of the hierarchy will be removed. If set to World the transformation will be left, leaving the hierarchy in world space.

Optimize Hierarchy: This option will tell the exporter to try to remove unused nodes from the exported hierarchy. This is useful if you have modeled a hierarchy with non-rendering nodes such as locators and groups that you do not need in the final clump. Animation on any optimized nodes will be passed onto the nodes children. Nodes with 'RwObjectTag' attribute will not be removed. The output window will print information on any nodes that have been optimized out of the hierarchy.

Don't Output DFF: This option tells the exporter not to generate a DFF file during the export. This can be useful if you are exporting .ska or .anm animation files and do not need the geometry. Since the exporter does not need to process any geometry the export will run quicker. If this option is selected and you attempt to overwrite an existing DFF the file will be deleted.

Verbose: Generates more verbose output in the output window.

Geometry Options



DFF Exporter Geometry Options

Export Pre-Light Colors: This option is used to convert Maya vertex colors to RenderWare pre-light values when exporting. Lighting colors can be 'baked' into vertices within Maya using the

Edit Polygons->Colors->Prelight

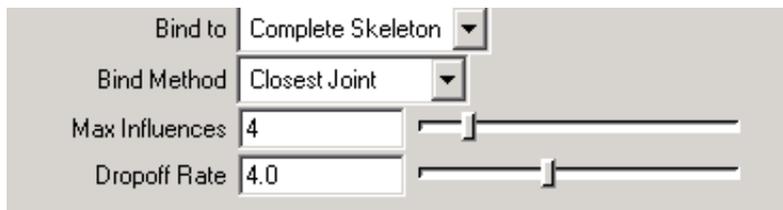
tool. To see the effect of the pre-light colors you will then need to view the exported clump with a RenderWare viewer that allows you to turn off dynamic lights.

Export Normals: This option controls whether the exported clump will contain vertex normals. You will need normals in your clump if you intend to light it with dynamic RenderWare lights. If you intend to only pre-light the clump you can save memory space by not storing normals.

Export Skin Weighting: This option is used to store RpSkin vertex to bone weighting information with the exported clump. You should use this option if you have used Maya Smooth Skin Binds to create geometry animation in your scene. This option does not export any of the animation on the bones (joints) in the scene. For this you need to use the Export RpHAnim Data (.anm) or Export RpSkin Data (.ska) options in the animation sections of the DFF exporter. When using this option you must ensure you select a node in the hierarchy containing the skeleton joints. The bound skin meshes do not need to be in the same hierarchy but will still be included in the exporter clump.

Some hardware platforms have restrictions on the number of RpSkin bones that can be used in a single skeleton hierarchy. In particular, PlayStation 2 is currently limited to 64 bones in one hierarchy. The exporter generates RpSkin bones for all nodes in the selected skeleton hierarchy. Therefore, you should endeavor to use only the necessary nodes in the skeleton hierarchy (joints with skin influences). The Optimise Hierarchy may be of use if you have non-joint nodes in your skeleton hierarchy. The exporter prints a message in the Maya Output Window with the number of bones (nodes) it has created on a given export.

RpSkin animation can store up to 4 joint influences per vertex. If your scene contains more than 4 influences on any vertices then the highest 4 will be exported. When doing a smooth skin bind you can limit the number of influences Maya creates by default in the Smooth Bind Options dialog.

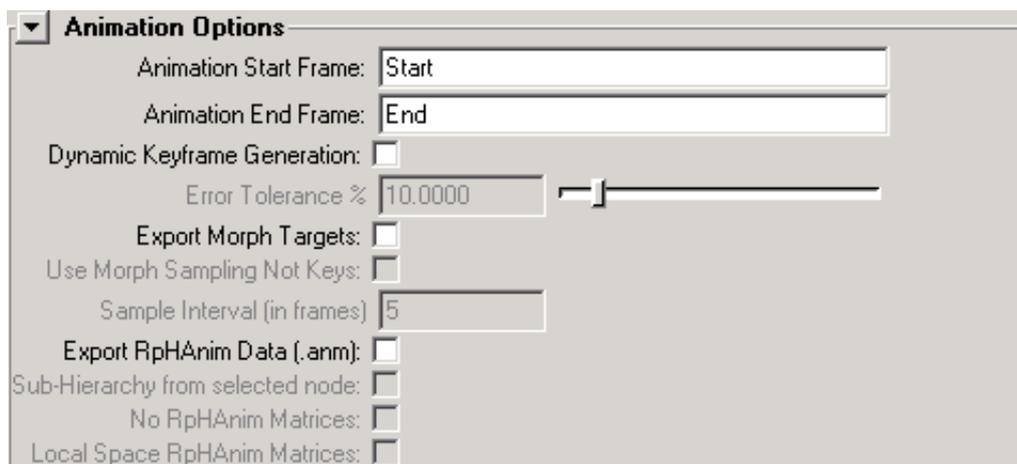


Smooth Skin Bind Options Dialog with Max Influences set to 4

Tri-Strip: This checkbox controls whether the clump will be stored as triangle strips or triangle lists when exported to RenderWare format. Under most circumstances you will want this option to be enabled for maximum rendering performance in your application.

Tri-Stripper: This drop box is greyed out unless the Tri-Strips options is selected. It controls the algorithm RenderWare uses to generate triangle strips. By default you should leave this option set to Default. The other options may improve the triangle strip length (and therefore rendering performance) but are likely to increase export time significantly.

Animation Options



DFF Exporter Animation Options

Animation Start and End Frame: Sets the start and end range of the animation to use in exports. The words "Start" and "End" will query the values from the animation range slider in Maya.

Dynamic Keyframe Generation: This option tells the exporter to create extra RpHAnim, RpAnim and RpSkin keyframes based on the error of exported animation compared to the Maya curve. This may be useful if you have used AnimCurves with spline tangents at the keys (current RenderWare animation systems perform linear interpolation only). This option is likely to add a lot of extra keyframes to your animation and it is usually preferable for the artist to add extra keyframes in Maya on the most important objects.

Error Tolerance %: This option is greyed out unless the Dynamic Keyframe Generation option is selected. It controls the percentage error allowed at integer keyframe times before the exporter will introduce a new keyframe in the exported animation.

Export Morph Targets: This option tells the exporter to query the object vertices from keyframed vertex animation and generate RenderWare morph targets in the atomic at the keyframe times.

Use Sampling Not Keys: This option is greyed out unless the Export Morph Targets option is selected. This allows a sampling frequency to be set for the morph targets rather than using the keys as set by Maya. This allows a greater or lesser number of targets to be exported.

Sample Interval: This option is greyed out unless the Export Morph Targets option is selected. The value entered here controls the interval for the above option.

Export RpHAnim Data (.anm): This option tells the exporter to generate an RpHAnim animation file based on the animation of the objects in the hierarchy. The animation data will be stored as a correspondingly named anm file in the same directory as the dff file. This option can be used with both skinned hierarchies and hierarchies of rigid objects.

RpHAnim keyframes are generated according to the keyframe times of the Maya AnimCurves attached to the objects. RpHAnim performs linear interpolation between these keyframes. This means that unless you use linear in and out tangents on AnimCurve keys the RpHAnim animation will not necessarily match the Maya animation perfectly. If you have animation with spline tangents that looks incorrect when exported you can either change the tangents to linear and add extra keyframes or experiment with using the Dynamic Keyframe Generation option in the exporter.

If you need to mark nodes in a hierarchy to be exported with RpHAnim animation then you should use the RwObject tag attribute. Please see section 7 for more details. This is exported with the animation data and will allow programmers to identify the node you have tagged.

You should consult with the programmers on your project whether RpHAnim animation is needed in your exports.

Sub-Hierarchy from selected node: This option is greyed out unless Export RpHAnim Data is selected. It tells the exporter to restrict the RpHAnim animation generated to the selected node and its children. An anm file is still exported but it contains a subset of the normal animation keyframes. This functionality is typically used when your application needs to override the standard animation on a sub-hierarchy of the main hierarchy (e.g. overriding the right arm animation of a running character to pull a gun from a holster). When this option is used the exporter prints a line in the Maya Output Window of the form:

RpHAnim sub-hierarchy starts at frame index n

The frame index number printed will be needed by your programmers to link the sub-hierarchy animation to the main hierarchy.

No RpHAnim Matrices: This option is greyed out unless Export RpHAnim Data is selected. It controls whether the RpHAnim hierarchy created will store local copies of object matrices. Not storing the matrices saves memory but also degrades performance. You should consult your programmers on whether this option should be used.

Local Space RpHAnim Matrices: This option is greyed out unless Export RpHAnim Data is selected. It controls whether the local RpHAnim matrices are stored as modeling matrices or as hierarchy space matrices.

Legacy Animation Options

These options are now regarded as legacy support within RenderWare. If you are using RpAnim or RpSkin we recommend you investigate switching to the RpHAnim animation system.



DFF Exporter Legacy Animation Options

Export RpAnim Data (embedded): This option tells the exporter to generate RpAnim animation keyframes on the exported clump. The RpAnim data is embedded in the dff file. RpAnim is used for rigid body, hierarchical animation. This option will not export any skinning or mesh deformation animation.

RpAnim keyframes are generated according to the keyframe times of the Maya AnimCurves attached to the objects. RpAnim performs linear interpolation between these keyframes. This means that unless you use linear in and out tangents on AnimCurve keys the RpAnim animation will not necessarily match the Maya animation perfectly. If you have animation with spline tangents that looks incorrect when exported you can either change the tangents to linear and add extra keyframes or experiment with using the Dynamic Keyframe Generation option in the exporter.

You should consult with the programmers on your project whether RpAnim animation is needed on your exports.

Default Animation Name: This option is greyed out unless Export Hierarchical Keyframes is selected. The string entered controls the name of the single, default RpAnimSequence exported.

Export RpAnim Sequences: This option is greyed out unless Export Hierarchical Keyframes is selected. When set it exports the main (selected) hierarchy as a static hierarchy of objects, whilst exporting other hierarchies in the scene as RpAnim animations, named via their root objects. The objects in all the hierarchies must be tagged to match them to the base hierarchy. Please see section 7 for details on setting object tags.

All the animating hierarchies must have a non-animating placeholder object at their root (a Maya Locator for example). The name of this object is used as the name for the RpAnim animation. It also allows the hierarchy to be translated around the world without overwriting the animation on the root object.

Export RpSkin Data (.ska): This option tells the exporter to generate an RpSkin animation file based on the animation of the objects in the scene. The animation data will be stored as a correspondingly named ska file in the same directory as the dff file. This option should normally be used in conjunction with the Export Skin Weighting option. You should select any nodes in the hierarchy of skeleton joints.

RpSkin keyframes are generated according to the keyframe times of the Maya AnimCurves attached to the bones of your skeleton. RpSkin performs linear interpolation between these keyframes. This means that unless you use linear in and out tangents on AnimCurve keys the RpSkin animation will not necessarily match the Maya animation perfectly. If you have animation with spline tangents that looks incorrect when exported you can either change the tangents to linear and add extra keyframes or experiment with using the Dynamic Keyframe Generation option in the exporter.

If you need to mark nodes in a hierarchy to be exported with RpSkin animation then you should use the RwObject tag attribute. Please see section 7 for more details. This is exported with the animation data and will allow programmers to identify the node you have tagged.

You should consult with the programmers on your project whether RpSkin animation is needed in your exports.

Texture Options



DFF Exporter Texture Options

Limit UV Values: Some platforms (e.g. PlayStation 2) generate texturing artifacts if UV values exceed certain limits. This options controls whether the exporter tries to limit the magnitude of UV values in the hierarchy when exported. It does this by detecting when UV values are increasing slowly over a connected set of triangles and changing the values. If you use a UV spread of 0-100 over a single polygon the exporter will not be able to help.

UV Maximum Value: This option is greyed out unless the Limit UV Values option is selected. It controls the value that the exporter tries to limit UVs to.

6. The SPL Exporter

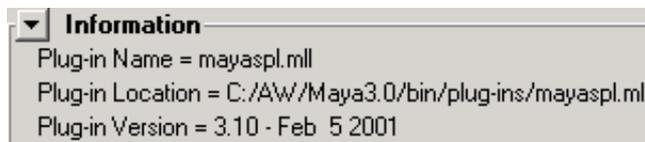
The SPL exporter is invoked from the

File->Export All or

File->Export Selected

Commands (both commands are equivalent for this exporter). It is used to export RenderWare RpSpline objects (saved as a .spl file). Any Maya curve may be selected when exporting as a spline. The control points of the curve will match the exported spline but the actual shape of the curve may vary (RenderWare supports cubic B-splines).

Information



SPL Exporter Information

This section of the SPL exporter provides useful information about the location and version of the SPL exporter you are using. The exporter version number is useful if you need to contact RenderWare support regarding exporter issues.

General Options



SPL Exporter General Options

Scale: Scale value for the control points of the exported spline. A value of 2 will be twice the size of the original, 0.1 is one-tenth etc.

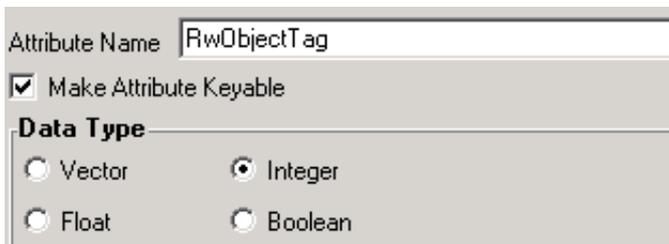
7. Object Tagging

Tagging is a process by which you can assign a unique number to certain nodes in the object hierarchy you wish to export. Tagging information is only exported by the DFF exporter. A typical usage would be to tag the hand joint of a character. The tag number assigned to the bone would then be passed onto your programmers so that they can find the tagged node during the game and dynamically attach objects to it.

Setting the RwObjectTag

Nodes are tagged by adding an unkeyable integer named 'RwObjectTag'. This can be done from the Attribute editor using the command

Attributes->Add Attributes



Adding the RwObject Tag attribute.

You should ensure that the tag numbers you assign to nodes within a single hierarchy are all unique. Any nodes that you do not assign tags to will be given an automatically generated tag number.

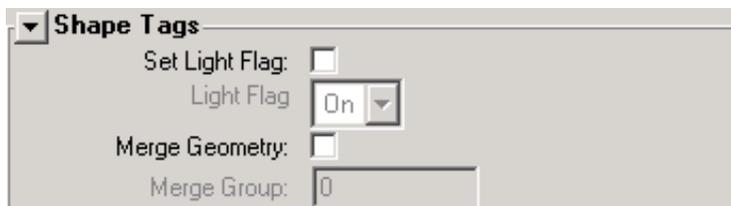
8. The RenderWare Properties Dialog

The RenderWare Properties dialog is a modeless dialog which is used to set certain RenderWare specific data on nodes in your scene. The dialog is invoked by entering the command `RenderWareProperties` in the Command Line at the bottom of the Maya Window. Alternatively you can add an icon for the command to your shelf as detailed in the Installation section of this guide.

The dialog box display the properties set on the currently selected node. It automatically updates when you change the selection. Some options may be greyed out depending on the type of the selected node. The RenderWare options you set are saved and loaded with the Maya scene file.

The dialog works by adding Maya Extra Attributes to the nodes which the exporter then queries at export time.

Shape Tags



The Shape Tags section of the RenderWare Properties Dialog

These options are only available if the currently selected node is of type transform or shape.

Set Light Flag: This option controls whether to set the lighting flag on RenderWare RpGeometry objects created from this node.

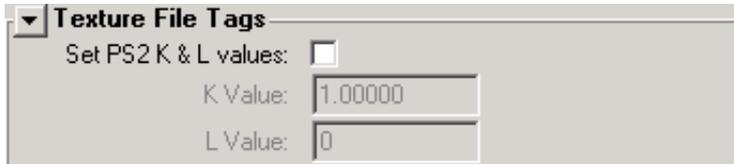
Light Flag: This option is greyed out unless the Set Light Flag option is selected. It controls whether the RpGeometry light flag should be on or off.

Merge Geometry: This option controls whether any geometry created from this node should be merged with other geometry in the scene.

Merge Group: This option is greyed out unless the Merge Geometry option is selected. The value is an integer describing the Merge this node is a member of. The geometry from all nodes with the same Merge Group will be combined.

For two nodes to be merged they must, in addition to being in the same Merge Group, have the same lighting flag, both be skinned or not and both be textured or not.

Texture File Tags



The Texture File Tags section of the RenderWare Properties Dialog

These options are only available if the currently selected node is of type file.

Set PS2 K&L values: This option controls whether any RenderWare textures created from the selected file node will have specific PS2 K&L values set. Otherwise they will default to standard values. K&L values control the biasing of MipMap levels on PS2. You should consult the programmers on your project whether specific K&L values need to be set on your textures.

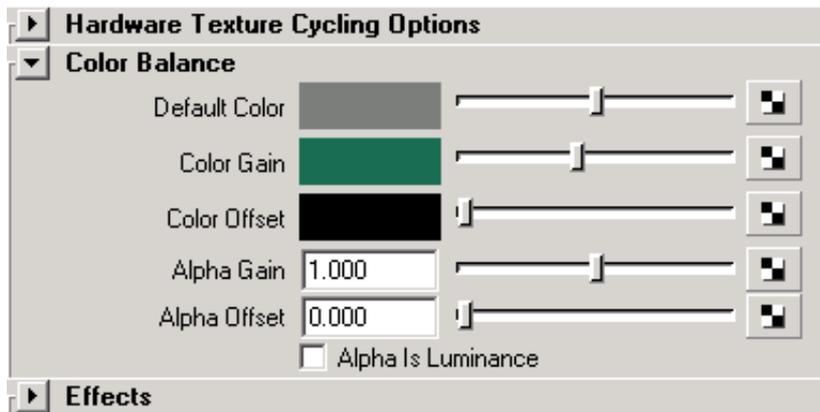
K Value: This option is greyed out unless the Set PS2 K&L values option is set. It is the floating point K value to set.

L Value: This option is greyed out unless the Set PS2 K&L values option is set. It is the integer L value to set. You should use values in the range 0 – 3.

9. Details of Material Export

General Settings

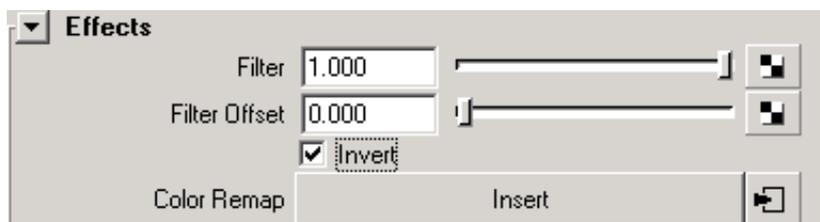
The color of the exported RenderWare material on an object is based on the color in the Maya material. If a file texture is applied to the color channel the name of the texture filename (stripped of path and extension) will be used to set the RenderWare texture name. In this case the color gain of the texture file will be used to set the Material color (to modulate the texture color).



The Color Gain setting on a File node

Only file textures are currently exported, all procedural textures will be ignored.

If a texture is applied to the color channel the transparency channel will also be queried for a texture to use as an opacity map. Because Maya uses transparency whereas RenderWare Graphics uses opacity you need an inverted map. The easiest way is to use an opacity map and check Invert under the file nodes options in Effects.



The Invert option on a File node

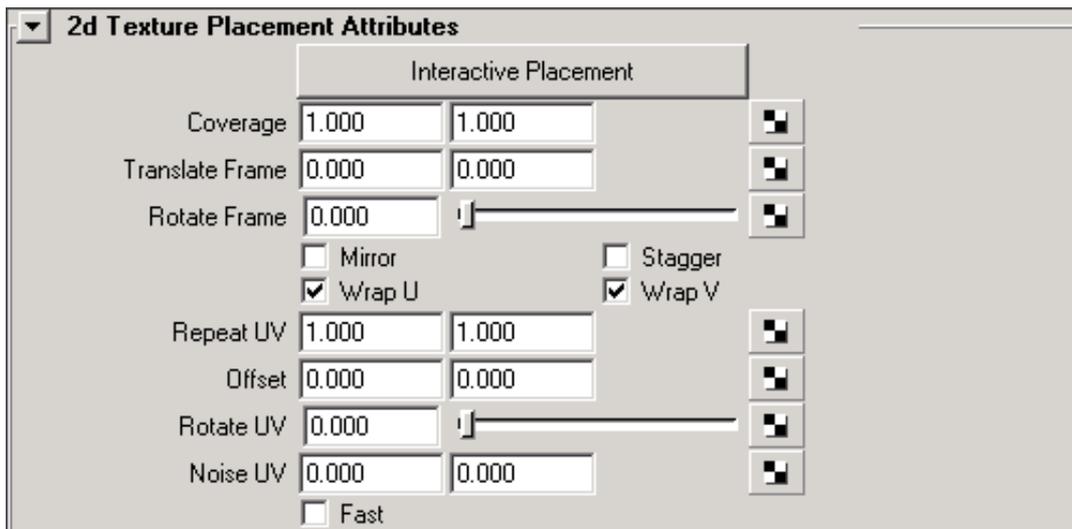
If no color texture or no transparency texture is found the transparency value is read from the Maya material and inverted for use as an alpha value in the color, otherwise the alpha value is set to 255.

Texture Addressing Modes

The texture addressing mode of the exported RenderWare texture is controlled by the Wrap U, Wrap V and Mirror options in the Placement Attributes of the place2dTexture node. The table below illustrates how the Maya options affect the RenderWare texture addressing mode. Wrap V affects the RenderWare V addressing mode correspondingly.

WRAP U / WRAP V	MIRROR	RENDERWARE U/V ADDRESSING MODE
Off	Off	Clamp
On	Off	Wrap
Off	On	Clamp
On	On	Mirror

Affect of Wrap U/Wrap V and Mirror on RenderWare U Texture Addressing Mode



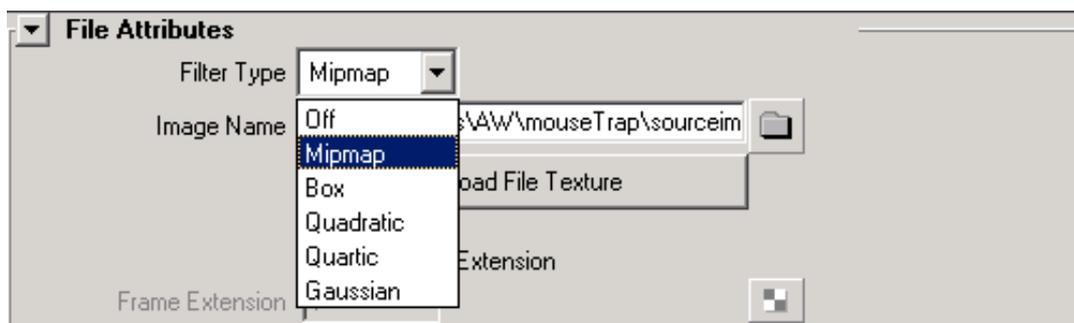
Placement Attributes of place2dTexture

Texture Filter Modes

The filter mode of the exported RenderWare texture is controlled by the Filter Type setting on the Maya texture file node. The table below illustrates how the Maya Filter Types map to the RenderWare filter mode.

FILTER TYPE	RENDERWARE FILTER MODE
Off	Nearest
Mipmap	Linear Mipmap Linear
Box	Linear
Quadratic	Linear
Quartic	Linear
Gaussian	Linear

Mapping from Maya Filter Type to RenderWare texture filter mode



Filter Type Options in Maya file node

Environment Mapping

To export a RenderWare environment mapping effect you should use a blinn, phong or other material with specular shading attributes. You add an environment map to the material's reflected color attribute. RenderWare's environment mapping most closely resembles Maya's Env Ball environment mapping, so it's best to choose that type of environment texture. However, be warned it is far from a perfect match so check your work often in RenderWare.

The material's reflectivity parameter is used by RenderWare to control how much the environment map is blended with the diffuse map - 0 means no environment and all diffuse, 1 means all environment and no diffuse, and something in between is a mixture of the two.

The name of the environment texture is picked up from EnvBall's image attribute. Note that RenderWare only accepts file textures as images for environment mapping.

All other specular parameters are ignored by the exporter. Environment mapping is currently only supported by the RenderWare DFF exporter, and not the BSP exporter.

Bump Mapping

RenderWare's bump mapping works only with file textures. When creating applying a texture to the Bump Mapping channel of the material be sure to choose

2D Textures->File

The name of the file texture applied to the Bump Value of the bump2d node specifies the bump map file name that is exported. The Bump Depth value is exported to give you some control over the height of the bumps, but RenderWare uses a different bump mapping algorithm than Maya so check your work often.

Note that the bump texture must use the same texture co-ordinates as the diffuse texture because of performance implications. (In fact the RenderWare Maya DFF exporter exports only the texture co-ordinates for the diffuse map and the bump texture co-ordinates are assumed to be the same) You can make sure that the texture co-ordinates are the same by assigning your diffuse file texture node and your bump file texture node the same Place 2d texture node in Hypershade.

Also note that you may not have a diffuse map with an alpha channel at the same time as bump mapping (this functionality is not provided because the performance implications are severe).

You may have diffuse, bump and environment textures all on the same object and they will export. Unfortunately, having the bump mapping effect the surface normals used for environment mapping would have severe performance implications, so that functionality is not provided.

Bump mapping is currently only supported by the RenderWare DFF exporter, and not the BSP exporter.

10. Blind Data Export

Introduction

The Maya exporter now supports export of Blind Data on faces and vertices (object Blind Data is not exported). Blind data is typically used to tag areas of scenes with user defined attributes. Export of this data enables your application to query this data and use it appropriately (e.g. if the character steps on a certain polygon area then have it crumble away).

General

The Maya exporter uses the RenderWare Graphics plugin RpUserData to store Blind Data. This plugin allows arrays of user defined data to be stored with RenderWare geometries (dff export) and world sectors (bsp export). On dff exports, if any faces or vertices of an object have a Blind Data type set on them then the generated RenderWare geometry will have a corresponding RpUserData array set on it. Similarly on bsp exports, if any objects in the scene have a Blind Data type set on them then all generated RenderWare world sectors will have a corresponding RpUserData array set on them. Faces or vertices that do not have the Blind Data type set will have a default value in the RpUserData array. The size of the array will correspond to the number of faces or vertices in the geometry or world sector (dependent on the Association Type of the Maya Blind Data).

If the Blind Data type contains multiple attributes then a separate RpUserData array will be generated for each. The name of the RpUserData array will be generated from the Blind Data type name and the Long Name of the attribute:

Type name.Long Name

The format of the RpUserData array will depend on the Data Type of the Blind Data attribute. The table below illustrates the conversion.

MAYA BLIND DATA ATTR TYPE	RENDERWARE USER DATA TYPE	DEFAULT VALUE
Double	rpREALUSERDATA	0.0
Int	rpINTUSERDATA	0
Hex	rpINTUSERDATA	0
Boolean	rpINTUSERDATA	0
String	rpSTRINGUSERDATA	NULL
Binary	rpSTRINGUSERDATA	NULL

Conversion from Maya Blind Data types to RenderWare UserData types

As an example, the following Maya Blind Data Type will generate two RpUserData arrays:

Surface.Collapse of type rpINTUSERDATA and

Surface.Stickiness of type rpREALUSERDATA.

As the Association type of the type is set to face the RpUserData array will have the same number of entries as the relevant geometry or world sector.

The screenshot shows a configuration window for Maya Blind Data Types. It is divided into two sections by a horizontal line. The top section defines an attribute with the following settings: Id: 34, Name: Surface, Association type: face (dropdown), Free set: checked, Long name: Collapse, Short name: col, and Data type: boolean (dropdown). A 'New Attr' button is located to the left of the Long name field. The bottom section defines another attribute with the following settings: Long name: Stickiness, Short name: sti, Data type: double (dropdown), and Ranged: unchecked.

Maya Blind Data Type

11. Conclusion

We hope this document has answered most of your questions about using the Maya tools that come with the RenderWare Graphics 3.10 SDK. Additional support is available from our online forum on the RenderWare Graphics website at: <http://developer.renderware.com>.

RenderWare Glossary

RpAnim – The simplest RenderWare animation system. It is used to animate RpAtomics relative to each other. It can therefore only be used for rigid body animation. RpAnim animation data is embedded into the RpClump object and therefore the exported **.dff** file. This animation system is now obsolete and we recommend new projects make use of *RpHAnim*.

RpAtomic – A RenderWare atomic is used to store information about a single object in a hierarchy. Typically, each node in a Maya scene that has polygons associated with it will generate an RpAtomic. Each exported RpAtomic will have a single RpGeometry to store the triangles and polygons in it.

RpAtomics are intended for use in dynamic models and represent all or part of a character, prop or similar moveable model. Static models are processed separately as RpWorld and RpWorldSector objects.

RpClump – a RenderWare clump is used to store information about a hierarchy of objects. The clump will contain a number of RpAtomics and the hierarchy information relating them. The atomics in the clump can be animated relative to each other using one of the RenderWare animation systems. A **.dff** file contains a single RpClump. Typically you will export a separate clump for each animated hierarchy in your application (e.g. characters, stacks of crates etc).

RpGeometry – A RenderWare geometry stores the triangle and vertex data for a single object.

RpHAnim – The newest RenderWare animation system. This system can be used to drive either hierarchies of rigid objects or hierarchies of bones that deform a skin. The RpHAnim animation data is exported as a **.anm** file.

RpSkin – This RenderWare component consists of two parts. The first part is an animation system to store the motion of a hierarchy of bones relative to one another. This animation data is stored as a **.ska** file. This animation system is now obsolete and we recommend new projects make use of *RpHAnim*.

The second part of RpSkin is a vertex deformation system that links vertices to up to 4 bones and deforms them as the bones move. This part of RpSkin is *not* obsolete.

RpUserData – a RenderWare object used to store user-defined data with model geometry. This data can be attached to RpGeometry or RpWorldSector objects. Maya Blind Data is converted to RpUserData by the exporter.

RpWorld – A RenderWare World defines a static scene. The scene data consists of one or more *RpWorldSector* objects which contain the actual model data. These objects are organised in a specific way to maximize rendering speed.

RpWorldSector – Contains the triangle data used to describe a static model. Generally used for scenery as the data cannot be changed.