Animation using a Path in 3DSMax - By Zec Murphy

In this tutorial, we will be looking at how to animate an object using a path. Before we begin, this should only be used when you have no other choice, as it does increase the poly count. This tutorial only shows a basic setup in 2 dimensions (x/y dimensions), however it would also work on the Z axis with some work. I have also not investigated 'rotating' the object based on the path at this stage (I will add info on this at a later date). This tutorial has not been tested with GMax, and as such it may or may not work with GMax models. This tutorial has only been tested with the current 3DSMax exporters from the TrainzDev Wiki

It is expected that you have some experience with 3D artwork and animation before proceeding with this tutorial. If not, then I would recommend looking at the GMax tutorials (these are also applicable to most functions in 3DSMax) on http://www.44090digitalmodels.co.uk/ and the tutorials at http://www.worldoftrainz.com/Pages/Tutorials.htm

Basic path animation

First, create a box in the centre of the scene in 'top' view. I would recommend making the box about 5m*5m*5m, so it's easy to see in-game.

Next, open the 'shapes' section of the Create tab, and use one of the spline shapes to create a path. In this case, select the 'line' shape. Now click LMB and hold in the top view then drag the mouse a little way, then let go. Now do the same at another location in the scene, and repeat to add another section of line. You should see an 'S' shaped (or a curvy) line in the scene. Don't worry if it's not S shaped, you just want a curvy line to form the path. Make sure that the two ends are not connected.

Now, go to the 'modify' tab, and you should see the 'line' modifier. In here, open the 'rendering' rollout and tick the 'enable in renderer' and 'enable in viewport' options, as well as the 'generate mapping coords' option. Next set the thickness to a small number (e.g. 0.1 or 0.01m), and the sides to 3 (minimum). Now open the 'Interpolation' rollout and set the steps to 0. Although the line will look odd in 3DSMax, the path will follow the actual curves and not the visible object. This will minimise the poly count of the path. Do ***not*** add any modifiers apart from the 'edit spline' modifier to your path, as these will prevent it from acting as a path in the animation.

Now, in top view, add two dummies. Call the first dummy 'b.r.main' and the second dummy 'b.r.path'. Make sure the 'b.r.main' dummy is at the centre of the scene. Align the 'b.r.path' dummy to your box using the 'align' tool (ALT + A). Next, link the box to the 'b.r.path' dummy, and the 'b.r.path' dummy to the 'b.r.main' dummy. Do not link the path to the 'b.r.main' dummy. At this stage I am not sure if there is a performance impact on having the path visible (linked to the b.r.main dummy) or invisible (not linked).

Next, open the 'movement' tab, and then open the 'Assign Controller' rollout. Now, select the 'position' controller, then click on the 'Assign Controller' button at the top of the list. Next, select the 'Path Constraint' option, then click on 'ok'. This will apply the 'path' constraint to the position controller. In the 'Path Parameters' rollout, click on 'add path', then press 'H' to open the pick object panel, and select the path from the list. Now right click to cancel the 'add path' tool.

You should now be able to play the animation. Apply a texture to the box and the path, and then export in the usual way, then import/commit the asset into Trainz. You should then see the box moving around you path. Remember that Trainz animates objects at 30FPS by default, so adjust the number of frames (using the rescale time tool) accordingly. You can also adjust the speed using the " animation-loop-speed" tag in the mesh-table (if unsure, use CCP to create/edit the config file).

"Low Poly" Path Animation

This method is designed to reduce the poly count, incase the path itself does have an impact on performance. For simply paths, such as that created in the previous section, there shouldn't be too much of an impact. However, more complex (and useful) paths will have more polys, and as such may have a greater impact on performance.

Take the scene from the previous tutorial, and de-link the box from the 'b.r.path' dummy. Now, create a new dummy called 'b.r.box'. Link the box to this dummy, and then link the new dummy to the b.r.main dummy. Now, using the align tool (ALT + A), align 'b.r.box' to the 'b.r.path' dummy, and click on the 'set keys' tool (the 'key' button under the track bar). Now enable the 'auto key' tool, and go to frame 1 on the track bar. Next align the 'b.r.box' dummy to the 'b.r.path' dummy again, then go to the next frame and repeat. Repeat this for all frames in the animation. You can now hide/delete both the 'b.r.path' dummy and the path itself. This will reduce the poly count of the scene, and will give you what is effectively a standard animation (albeit based off a path).

I would recommend this version where possible, although it will take more time to complete the animation, as it will mean less polys in the scene no matter what.

Additional Settings

Under the the Path Parameters rollout, there are also a number of other parameters that may be useful for some path animations. These are as follows:

Follow - This will make the object 'follow' the orientation of the path. When turned off, the box will always point the same way (it 'slides' around the path). When turned on, the box will 'rotate' to always face along the path (as if you were driving a car along the path).

Bank (requires 'Follow' to be enabled) - This will 'bank' the object as it goes around the curves in the path, much like an aircraft would if following the path. You can adjust the amount that it will bank using the "Bank Amount" setting, and how smooth the banking is using the "Smoothness" setting.

Constant Velocity - When enabled the object will travel at the same velocity/speed along the entire length of the path. When disabled, the object will slow down/speed up depending on the shape of the path. It will still reach the end of the path at the same time.

Relative - This means that you can either have the object travel along the top of the path in the scene, or travel the path in its location. This may be useful if you have multiple objects following the same path in different locations in the mesh.

Please post any suggestions for paths, or any items that you've created with paths, on the Trainz forums at http://forums.auran.com/trainz/ so that others can share ideas for this style of animation.