

HOMeworld2

Launch, Dock, and Latch Paths

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1 Ship Path Pipeline Overview – Before You Begin

1.1 Maya

Many things are done in Maya with the help of various custom Maya plugins. These are designed to enable a developer to add additional content to the base *Homeworld2* ship meshes. In the case of the ship launch/dock/latch path pipeline, plugins are used to add and tweak these. Specifics on what each function pertaining to these paths are given in the Appendix. **Also note that sometimes paths fail to show up upon initial loading of a ship. This is a Maya bug and the quickest way to see these paths again is simply to just do a quick save over the original.** Once this is done, the paths should become visible again.

1.2 File Extensions and Directories (Folders)

There are a few general things that you must keep in mind regarding file extensions and directories (or folders in “Windows Speak”™) before you begin the process of adding launch/dock/latch paths to a ship (or any sort of other customization process as well).

Ships in *Homeworld2* begin as meshes saved as Maya ASCII files (.ma extension). These .ma files are stored in **Homeworld2/Datasrc/Ship/<name of ship>**, along with any associated textures (such as hull textures, badges, LOD textures, etc.). Exported files are exported into a file with a .hod extension, stored in **Homeworld2/Data/Ship/<name of ship>**.

With regards to enabling a ship’s launch/dock/latch paths, as mentioned earlier, certain values must be set in the appropriate places in **Shiptuning.xls** (found in **Homeworld2/Data/Ship**) and an appropriate .ship file (placed in **Homeworld2/Data/Ship/<name of ship>**) must be generated.

To summarize the files (and their directories) affected by launch/dock/latch paths:

Homeworld2/Datasrc/Ship/<name of ship>

- **<name of ship>.ma**
- associated textures

Homeworld2/Data/Ship/

Shiptuning.xls

Homeworld2/Data/Ship/<name of ship>

- **<name of ship>.hod**
- **<name of ship>.ship**

1.3 Explanation of the Differences Between Types of Paths

Docking paths are paths that ships follow to “dock” **into a hangar bay (or something similar)** of another ship. Usually this means a smaller craft docking into a larger ship. For example: a fighter going inside a carrier to repair or retire.

Launch paths are paths that ships follow to “launch” from another ship. This usually means a smaller craft launching **from a hangar bay (or something similar)** of another ship. For example: a freshly built frigate launching from a mothership. These are differentiated from docking paths through the use of an “exit path” flag while making the path in Maya. **Note that if no launch path exists for a specific class of ship, and if the player attempts to launch that specific type of ship from a parent ship, the specific ship will appear via hyperspace.**

Launch path and docking path use is determined by the use of flags that indicate what classes of ships can use them. **Enabling a ship to produce other ships of certain kinds though, is another topic.** However, note that a ship doesn't have to be a production ship in order to have other ships launching from it or docking into it. The best example of this are the races' battlecruisers, which can launch and dock a limited number of strike craft.

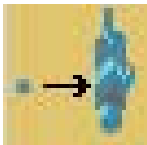
Latch paths are usually used by resource collectors to “latch” on to **and** off of a ship for dropping off their resources. For example: a Hiigaran resource collector follows a latch path to latch on to a mobile refinery to drop off resources. A separate latch path with an “exit path” flag is then used for the latch path that the resource collector follows to unlatch from the mobile refinery. Another example of latch path use would be for ultracaps docking on to certain ships in the *Homeworld2* single player campaign. Essentially, latch paths are used by ships that need to dock with something, but **don't disappear into a hangar bay or something similar.**

2 Tutorial on Paths

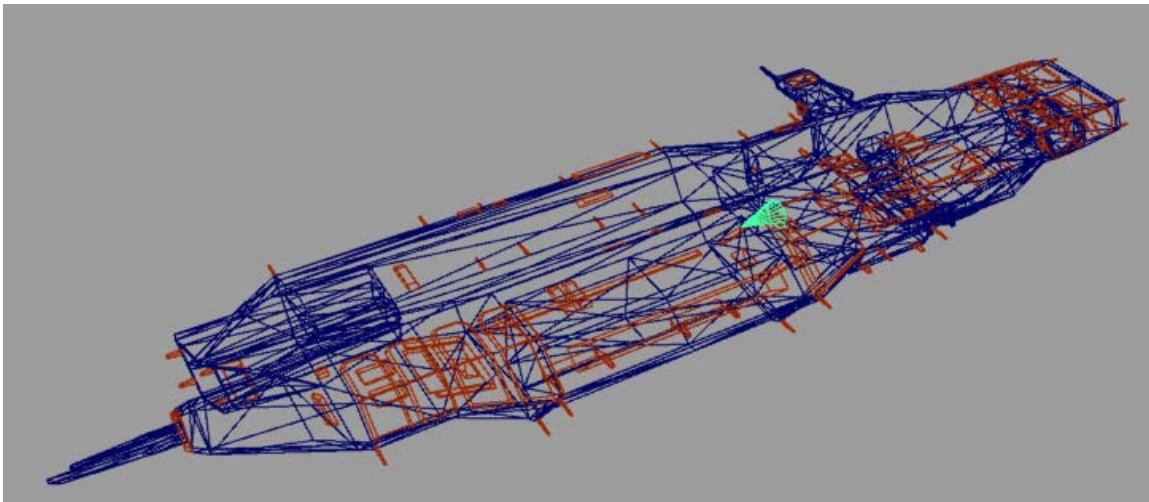
Using a base Hiigaran Carrier without paths as our demonstration ship, we will now show you how to make your own launch/dock/latch paths for your ships. This tutorial assumes that you have a working knowledge of Maya and that all plugins are installed. Paths are made up of points that are defined through keyframes and the flags that are defined within these keyframes.

2.1 How to Make Launch Paths – A Fighter Launch Path Example

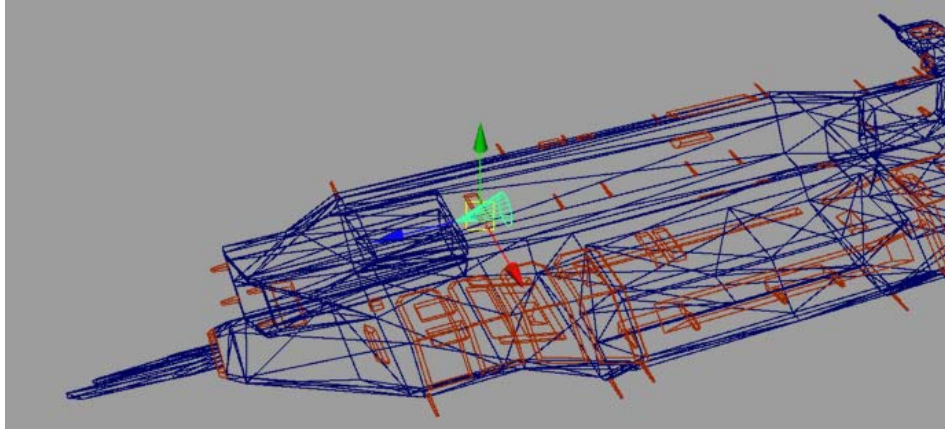
1. Fire up Maya and load up the ship in question.
2. Make sure you have your ship in perspective view and set the view's shading to "wireframe". To do this, click on Shading -> Wireframe in the viewport's Menu Bar. This will make your ship transparent so you can see where your paths are going.
3. Make sure that you have the Time and Range Sliders showing in Maya. To do this, go to Display -> UI Elements and check off the appropriate options.
4. Make sure that the working units for time is set to NTSC(30fps). To do this, go to Window -> Settings/Preferences -> Preferences... and in the Preferences window, select "Settings" from the column on the left. In the "Working Units" section, click on the drop box associated with "Time" and select NTSC(30fps).
5. Slide the Time Slider to 1 (not 0!).



6. Click on the "**Docking Path**" icon (shown on the left) in the Relic Tools Shelf. This will create a docking path cone shape in the middle of the carrier. You can rescale this if you like, but because the game only looks at the points along a path to determine how the ship moves along, it doesn't really matter. It's position in relation to the carrier should be like this:



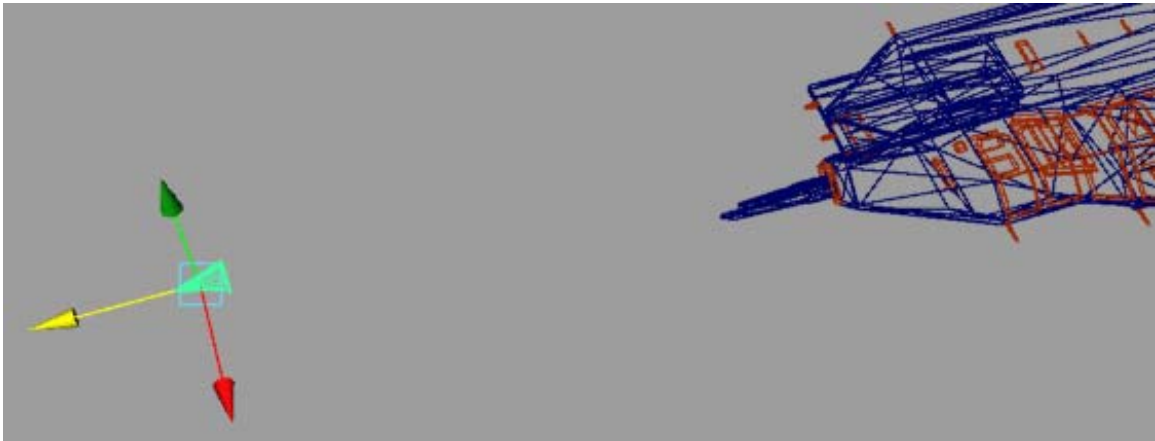
7. Making sure that the cone stays selected, look at the Channel Box on the right hand side and type in “on” beside “Exit” and “Fighters”. Alternatively, bring up its Attribute Editor and then open up the Extra Attributes section. Check off the check boxes labeled “Exit” and “Fighters”.
8. In the Channel Box, enter “on” for Use Rotation.
9. Set Point Tolerance to “5” or some other low number, but make sure the value is not “0”.
10. Set the Max Speed to “200”.
11. Move the cone to the desired start position. Let's make this path originate from just inside the top hangar bay of the carrier:



12. Select and drag the entire selection of attributes and values in the Channel Box that are under “path1” (don't select the things that are under “SHAPES”). It should look similar to the picture on the right.
13. Right click and hold on the selection. A menu should come up. Select “Key Selected”. This will make the first position of this launch path for fighters originate from just inside the top hangar bay with a speed of 200 at keyframe 1. You will notice that the position of this first keyframe is indicated on the Time Slider by a small, thin red line.
14. Let's move the cone out so that any ships following this path will exit the carrier. Slide the Time Slider to 10. Move the path cone a fair distance away from the carrier, along the axis parallel to the facing of the hangar bay (in this case, along the Z-axis). **This point must be far away from the carrier otherwise the ships following the path will be stuck due to interference from the avoidance box around the carrier.**
15. Change Clear Reservation to “on”. This means that at once a ship passes this point, ships that are launching along the same path can start along the same path from the beginning point. Also, change the Point Tolerance to something higher, like “50” or “100”.
16. Repeat step 12. Select “Key Selected”. If you move your slider out of the way, you will notice that a second thin, red line has appeared on the Time Slider at 10.



17. Try sliding the time slider back and forth to see the launch path of the fighters. You will notice that it moves out from the carrier along the Z-axis, as expected:



And that's how you do a simple launch path! This specific path was easy because it was in a straight line. However, more complex paths can easily be made. At the desired keyframe (or point along the path, if you wish to call it that instead), all you have to do is make sure the cone is in the desired position and with the correct attributes entered and collected, right click on the selected attributes and then select "Key Selected". Also, you might want to increase the point tolerance as

2.2 How to Make Docking Paths – A Fighter Docking Path Example

The process used to make a docking path is slightly more complex than making a launch path. You have to specify a queue point in the beginning of the path in order to tell ships where to queue up for that path, as well as make sure that docking ships don't act weirdly when trying to dock. Also, docking is very much affected by collision avoidance. The first point that the ship actually uses to go along the path is the one that is put in after the queue point. Let's make a docking path for fighters as an example.

1. To start, deselect anything that you may have selected.
2. Slide the Time Slider back to 1.
3. Hit the **Docking Path** icon in the Relic Tools Shelf.
4. Move the path cone to where you want the ships to start lining up. Make sure that it is sufficiently far enough from the target ship. It is advisable to put this path cone to the rear of the ship, rather than coming in at the side. This is because some ships are poor at moving side to side (lateral movement) and may not be able to move fast enough to make it to points along its dock path while the target ship is moving.
5. With the cone still selected, go to the Channel Box and type in "on" in the box beside "Fighters". Alternatively you can bring up the Attribute Editor, and expand the Extra Attributes section and check off the check box beside "Fighters".

6. In the Channel Box, enter “on” for Use Rotation.
7. Add “100” for Point Tolerance.
8. Enter “on” where it says Player Is In Control.
9. Enter “on” where it says Queue Origin.
10. Drag select the entire contents of the top part of the Channel Box (see step 12 in **Section 2.1**).
11. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create a queue point for fighters at keyframe 1.
12. Move the Time Slider to 10.
13. Move the path cone to where you want the ship to start its docking run. In our case, lets move the path cone a bit forward.
14. Change the Queue Origin to “off”.
15. Change the Max Speed to 200.
16. Drag select the entire contents of the top part of the Channel Box again.
17. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create the first point in the docking path for fighters at keyframe 10.
18. Move the Time Slider to 20 or any other number higher than 10.
19. Move the path cone to the next desired position.
20. Change the Point Tolerance or Max Speed to something lower. Turn off Player Is In Control if desired.
21. Repeat steps 16 and 17. This will create the next point at wherever you moved the Time Slider in step 18.
22. Repeat steps 18 - 21 as desired.
23. Make sure that at the last position, you have Clear Reservation set to “on” before you drag select and set a keyframe.

And that’s how you add a docking path for fighters. For ships with a larger mass (like frigates or supercaps), you can make ships move sideways by using “Force Close Behaviour” in conjunction with sideways movement. “Check Rotation” is also useful when you want to make sure a ship is pointing in the correct direction before continuing. Furthermore, and especially in the case of larger ships, you might want to consider enabling “Use Clip Plane” at the point where a ship passes through the wall if that ship is larger than the ship it is docking with (otherwise it will poke through the other side).

2.3 How to Make Latch Paths – Sample Resource Collector Latch Path

Making latch paths is different in that we usually start by making the incoming path first. That being said, creating an incoming path is exactly the same as creating a docking path, except that the last point in the path ends up at an external location on the outside of a target ship rather than inside a hangar bay. **An outgoing path must be made in order for a latching ship to unlatch from a target ship and move away.** This path is made the same way as a launch path, except that **it must start at exactly the same location as the last point of the outgoing path** (but at frame 1). For both of these situations, you will need to check off the “Latch Path” box in the Extra Attributes for the paths in question. Let’s make a sample resource collector latch path for a Vgr_ResourceController. We’ll do one side (these instructions would apply to either side because we’ll make the paths symmetrical).

Making a Latch Entry Path

1. Let’s start off with the queue point. We’ll assume that nothing is selected and no other paths have been made. **Make sure the Time Slider is set to keyframe 1.**
2. Click on the “Docking Path” icon (see Section 2.1 Step 6).
3. Move the path cone to where you want the ships to start lining up. Make sure that it is sufficiently far enough from the Vgr_ResourceController so that it doesn’t conflict with the Vgr_ResourceController’s avoidance box. It’s advisable to move this origin point to somewhere behind the ship. This is because collectors are poor at moving side to side (lateral movement) and may not be able to move fast enough to make it to points along its dock path while the target ship is moving.
4. With the cone still selected, go to the Channel Box and enter “on” in the box beside “Utility”. **Enter “on” for Latch Path as well.** Alternatively you can bring up the Attribute Editor, and expand the Extra Attributes section and check off the check boxes beside “Utility” and “Latch Path”.
5. In the Channel Box, enter “on” for Use Rotation.
6. Enter “100” for Point Tolerance, and something appropriate in Max Speed for collectors.
7. Enter “on” where it says Player Is In Control.
8. Enter “on” where it says Queue Origin.
9. Drag select the entire contents of the top part of the Channel Box (see step 12 in **Section 2.1**).
10. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create a queue point for fighters at keyframe 1.
11. Move the Time Slider to 10.
12. Move the path cone to where you want the resource collector to start its RU drop-off run. In our case, lets move the path cone a bit forward. However, make sure it is still far away from the target ship, to avoid interfering with the avoidance box of the controller.
13. Change the Queue Origin to “off”.
14. Change the Max Speed to something appropriate for a collector.
15. Drag select the entire contents of the top part of the Channel Box again.

16. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create the first point in the latch path for collectors at keyframe 10.
17. Move the Time Slider to 20 or any other number higher than 10.
18. Move the path cone to the next desired position.
19. Change the Point Tolerance or Max Speed to something lower. Turn off Player Is In Control if desired.
20. Repeat steps 15 and 16. This will create the next point at wherever you moved the Time Slider in step 17.
21. Repeat steps 17 - 20 as desired. In our case, repeat until the cone gets inside the docking clamps of the Vgr_ResourceCollector. **Make a note of its XYZ and rotation values at this point.**

Making a Latch Exit Path

22. Deselect everything.
23. **Slide the Time Slider back to 1.** Click on the “Docking Path” icon again. This will make a new cone.
24. **Manually enter the XYZ and rotation values that you just copied down.**
25. With the cone still selected, go to the Channel Box and enter “on” in the box beside “Utility”. **Enter “on” in Latch Path and enter “on” in Exit as well.** Alternatively you can bring up the Attribute Editor, and expand the Extra Attributes section and check off the check boxes beside “Utility”, “Latch Path”, and “Exit”.
26. In the Channel Box, enter “on” for Use Rotation.
27. Set Point Tolerance to “5” or some other low number, but make sure the value is not “0”. You might also want to set Force Close Behavior to “on”.
28. Give Max Speed an initial value that would be logical for a ship of a collector’s mass.
29. Drag select the entire contents of the top part of the Channel Box (see step 12 in **Section 2.1**).
30. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create the first point in the exit latch path for collectors at keyframe 1.
31. Move the Time Slider to 10 or some higher number.
32. Move the path cone to the next desired position. For our purposes, lets move it straight to the side along the X-axis, away from the controller. Make sure that subsequent points are well clear of the Vgr_Controller’s avoidance box.
33. Change the Point Tolerance or Max Speed to something higher. Somewhere along the line during this path’s creation you may want to enable Player Is In Control. Use your judgment.
34. Drag select the entire contents of the top part of the Channel Box (see step 12 in **Section 2.1**).

35. Right click and hold the selection. Select “Key Selected” from the menu that comes up. This will create the first point in the exit latch path for collectors at keyframe 10 (or another number that the Time Slider is at).
36. Repeat 31 – 35 as desired. Remember to move the Time Slider before moving a cone and setting its keyframe.

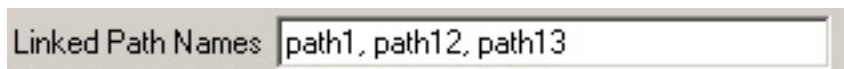
And that’s how you create a path for resource collectors!

2.4 Path Sharing

Sometimes there are several launch/docking paths sharing the same bay. Normally you don’t want them to collide and conflict with each other if they are too close together (i.e. a frigate that has just been built is coming out of a bay but because it takes up most of the bay, another frigate that has just been retired will collide or interfere with the first frigate as it comes out). The solution to this is to enter the names of the paths that it shares space with in “Linked Path Names” in the path cone’s Extra Attributes in its Attribute Editor. Here is an example:



Let’s pretend that the path that this is for belongs to “path1”. The picture above indicates that this “path1” is linked to paths 6, 12, and 13. If you go to path6 and examine its Linked Path Names, you’ll notice:



Note that path1 is listed, but not itself. Likewise, path12 and path13 will be similar in that all the other paths will be listed except for the path in question. Used in conjunction with “Clear Reservation” you can have solve a lot of docking and launching path problems. Latch paths don’t normally need path sharing since they are usually far apart enough to not interfere with each other.

2.5 Exporting It All

1. Make sure you select Edit -> Delete All by Type -> History to delete unnecessary history that may clutter up the file. Save your work.
2. Click on the box beside File -> Export All. This will open the “Export All Options” window.
3. Beside where it says “File Type,” there should be a drop box. Click on it, and select “**hod**” from the list.
4. Make sure that the “**Ship**” radio button is selected in the “Export Type” section.
5. Make sure that “DXT5(rgba)” is selected in “Texture Options.”
6. Make sure that in the “Optimization Options” that Triangle List is selected and Merge is selected.
7. Once this is done, click on the “Export All” button.
8. Select the directory the .hod is going into. In the case of our test Hiigaran Carrier, we will place its Hgn_Carrier.hod in “Homeworld2/Data/Ship/Hgn_Carrier”. In the case of the Vaygr Resource Controller, we will place its Vgr_ResourceController.hod in “Homeworld2/Data/Ship/Vgr_ResourceController”.

2.6 Summary - Tips

1. Docking paths are for ships to follow to dock into a hangar bay of a larger ship. Launch paths are the opposite – these allow ships to launch from a hangar bay of a larger ship.
2. Latch paths are usually used for things like special single player specific uses, or for enabling collectors to latch onto something to offload their resources.
3. **Docking and incoming latch paths have to start off with a queue point far from a ship’s avoidance boxes.**
4. The last point of an incoming latch path is the same as the first point of an outgoing latch path.
5. Paths are represented by cone shaped markers.
6. Paths are created through the use of keyframes or “points”. These are created when a point’s values are highlighted, right clicked, and then “Key Selected” is selected after necessary changes are made to said values. After this is done, the Time Slider is moved to a future point in time, values are adjusted if need be, and “Key Selected” again.

3 Appendix

3.1 Definitions of Path Parameters

path17	
Translate X	0
Translate Y	0
Translate Z	0
Rotate X	0
Rotate Y	0
Rotate Z	0
Scale X	1
Scale Y	1
Scale Z	1
Visibility	on
Use Rotation	off
Point Tolerance	0
Drop Focus	off
Max Speed	0
Check Rotation	off
Force Close Behavi	off
Player Is In Control	off
Queue Origin	off
Use Clip Plane	off
Clear Reservation	off

To the left is a picture of all the parameters in the path system.

There are two sections. The first section is shown in the picture with "path17", and the other section shown on the right is labeled pathShape17. Maya works with nodes and shape nodes. The parameters on the shape node (the ones covered in the section with pathShape17) are meant to be 'general' parameters, or parameters that don't change per path point.

The node parameters on the other hand, are supposed to be animated.

Maya shows a yellow background for parameters that have animation keys assigned to them, and a white background shows that the parameter has keyframes, and therefore is global for the whole path.

pathShape17	
Tolerance	0
Exit Path	off
Latch Path	off
Fighters	off
Corvettes	off
Frigates	off
Platform	off
Utility	off
Controller	off
Super Cap	off
Flag Ship	off
Resource	off
Mover	off
Inhibitor	off
Salvage	off
Ultra Cap	off
Battle Cruiser	off
Transport	off

3.2 Shape Parameters

The Shape parameters are the parameters that define what the whole path is used for. Don't keyframe these parameters! These can be found in the path cone's Attribute Editor and some in the Channel Box when the path cone in question is selected.

Tolerance - Is obsolete and not used anymore.

ExitPath - Should be tagged if this path is used to launch ships. If it's used to bring ships in, this should not be tagged.

LatchPath - Should be tagged if this path is a latch path. *Latching* means that the ship doesn't go into a docking/hangar bay, but sticks itself to the outside of the docking ship (and remains visible for the duration of the docking operation).

Fighters...Transport - Enables this path for this specific docking family. This enables you to make certain docking paths accessible for a specific type of ship. Be careful though. **Utility** is for the resource collector, while the **Resource** parameter enables collectors to bring in containers for salvaging. The **Salvage** parameter is for the salvaging of objects in the game that aren't resource related (i.e. salvaging something in the single player campaign, for example).

UseAnimation means use the ships docking and launching animations to control the use of the path.

LinkedPathNames is a comma-separated list of path names. If any of the paths listed here are busy then this path counts as busy. This lets you link paths that use the same airspace so that only one can be in use.

3.3 Node Parameters

When a ship is flying along a launch/dock/latch path, it will use the parameters of the point it is flying towards. The different parameters can be set to a point by creating a key for the translation, and generating keys for all the other parameters.

Translate, Rotate, Scale, Visibility: Maya specific parameters. These will define the position and rotation of the docking/launch/path point. Don't scale or change the visibility for the launch/dock/latch path points.

Use Rotation: This specifies if the ship tries to match the rotation of this launch/dock/latch path point, or if the ship just tries to fly straight to the point. If you want the ship to turn a certain way, you can tag this. This will make the ship try to match the rotation. It might happen that the ship can't get to the exact rotation, but at least it will try. See 'Check Rotation' if you want to also *make sure* that the ship will reach the rotation.

Point Tolerance: Point tolerance is the tolerance the ship uses to mark this launch/dock/latch path point as 'done', and focus on the next point in the path. The tolerance is the distance in meters. If you want the ship to closely fly to this point, you want to set this to something small, like 20. If you don't really care if the ship is exactly on the spot, set this tolerance to something bigger, this will speed up the path, because it is less precise. Usually you set the point tolerance to lower values when the ship and the dock-ship are close, so close to the hull of the dock-ship.

Drop Focus: This is the point where the camera loses focus if you were focused on a squadron that just docked with a target docking ship. Not sure if this works.

Max Speed: This is the maximum speed the ship can fly at this point in the path. If you want the ship to stop at a certain path-point, set this to 0. If you don't care about the speed of the ship, you could set this to something really high. The ships will never fly faster than their maximum speed. There is one exception. If this path is a launch path, the maximum speed of the first point in the path is used as the initial speed. This is done so that we can have fighters quickly launching out of ships, like torpedoes.

Check Rotation: Use this only if you really want to make sure the ship reaches the specified rotation. This is useful for launch/dock/latch paths of frigates for example. If you want to rotate the frigate before entering the hangar, you want to make sure that the frigate is rotated correctly, before you move the frigate in. This is when you mark 'Check Rotation'. Usually a ship only checks the Point Tolerance to a launch/dock/latch path point, but if this parameter is checked, also the rotation is checked before the ship continues with the next point.

Force Close Behaviour: Ships that are doing close behaviour basically slide (sideways, backwards, etc) to the target. If you want a frigate to move sideways along a path, you should turn on this parameter. If you use this, also use 'Use Rotation' - it would make no sense otherwise.

Player Is In Control: This is used in launch paths. The player can issue orders when the ships are launched a certain way along the path. Make sure **only one** point of a launch/dock/latch path is tagged with this. The game looks for the first point in the path that has this parameter checked. If the last ship in the squadron is launched, and passed this point, the player can issue new

commands. If the player does this, the ships will not finish their launch procedure, but they will obey the player immediately.

Queue Origin: Every docking path has a queue. The queue stacks ships up at the queue point. The first point of a *docking* path (so not an exit/launch path) should contain a queue origin flag to set the position and orientation of the queue. The second point in that launch/dock/latch path is the actual first point in the launch/dock/latch path.

Use Clip Plane: Only one point on the path should have this set. The game uses this point and the next one to define a clip plane that intersects this point. Anything before the plane will not be drawn. Use this when ships need to spawn behind a wall but there's no space back there to hold the ship. By default all paths have the first point set as the clip plane. Use this to change the plane to a further point. An example of this can be found in the super capital ship launch path of the Hgn_Shipyard.

Clear Reservation: Clears the path reservation so that the next ship to use the path can start its operation.

3.4 Animating points in Maya

To animate the cones in Maya, look at the bar at the bottom of the screen (picture on the right).



The red lines are the keyframes for the currently selected cone.

The exporter looks of keys on the **translation** parameter of the cone, so make sure that you key those every time you want to create a point.

Create a keyframe by dragging the time slider to the frame you want to create the key at. Then move the cone parameters to the right value. Then, after shift selecting the parameters you want to create animation keys for, right click and hold them. This brings up a menu. Select 'Key Selected' to create the key. **Remember to only create keys for the node parameters, not the shape parameters!**

One really important thing to remember is to

NEVER create keyframes at frame 0! Start at frame 1

This is because of exporter problems a long time ago.

3.5 **Console Commands**

When the game is running, there are a few handy tools to keep in mind when troubleshooting them.

+ShowShipDebug - Will show all the docking paths on the selected ship. Yellow is for launch paths, while blue is for docking paths.

+ShowPathTolerance - Will show all the point tolerances of each of the points in the dockpath. This only works if ShowShipDebug is enabled.

+ShowDebugVectors - Will show all debug vectors for ships. This might look a bit overwhelming at first, but it allows you to see what target the ship is currently going for. Also, it shows you the avoidance boxes around ships when a pathfinding action is done.

+ShowCollision - Shows the collision box for ships. This is handy to see what the collision limits are of the ships.

3.6 Avoidance, Collision, Paths, and You!

The avoidance and collision systems can be annoying when you are creating launch/dock/latch paths. If you are having problems with these it probably is because you need to alter your settings a little so that the avoidance and collision systems don't get frustrated with the position of the ships.

The avoidance and collision systems are there to avoid ships ramming into each other. This means they make sure that there is a considerable distance between all the ships. The distance is minimized already to make sure there can't be a collision under 90% of the circumstances. Even if the avoidance box looks too big, there is always a reason why it is that big.

One important thing to know is that:

The starting point of a docking path needs to be outside the avoidance box of the dock-ship for that type of ship.

The avoidance boxes don't have a set size. They resize dynamically to match the sizes of both ships that are avoiding each other.

For example, say a resource collector is trying to avoid a mothership. The avoidance box of the mothership is defined by the collision box of the mothership plus the width, height, and depth of the resource collector, plus a small distance, plus a factor of the velocity of both ships. The small distance is there to have the ships not clip each other. This way, we only need to check the midpoint of the collector to see if it needs to find a path around the mothership. This will result in an avoidance box that is slightly bigger than the mothership's collision box.

Now, imagine a battlecruiser that is trying to avoid a mothership. The battlecruiser is a lot bigger than the resource collector. This means that the avoidance box of the mothership is a lot bigger as well. The midpoint of the battlecruiser needs to be a lot further away to avoid clipping of the two ships.

Hopefully this makes the point why the docking paths for certain ships need to be further out than others.

You can see how big the avoidance box is for a certain type of ship by typing '**+ShowDebugVectors**' in the console. Have the ship dock with the dock-ship. If the dock-ship is a carrier type ship or bigger, you should see a brown-ish box pop up shortly when you give the small ship the order. This is the avoidance box that is used for that type of ship. These boxes are not set, but calculated, so there isn't really a way to display them constantly.