

Time	Subject – Total video time – 26:20
00:00	<b>Introduction about:</b> <ul style="list-style-type: none"> <li>- tail wheel animation</li> <li>- setting up control cables</li> <li>- setting up Blender object/animation constraints</li> </ul>
NOTE	<b>The Jodel D112X – exterior aircraft model used in this video</b> More information about the project over here: - <a href="http://kp-coolstuff.com/3d_project1">http://kp-coolstuff.com/3d_project1</a>
01:10	<b>Download location of the example files:</b> - <a href="http://www.fsdeveloper.com/forum/resources/jodel-blender-project.152/">http://www.fsdeveloper.com/forum/resources/jodel-blender-project.152/</a>  <b>Install the Jodel project on your computer first!</b>
01:30	<b>Open Blender with the Jodel exterior model:</b> <ul style="list-style-type: none"> <li>- take a closer look at the tail wheel</li> </ul>
01:50	<b>Explanation about:</b> <ul style="list-style-type: none"> <li>- the mechanical anatomy of the Jodel's tailwheel</li> <li>- the usages of Blender's “Empty's” (minimal objects) and why they are used</li> </ul>
03:30	<b>3D View,Panel-Properties,[Object],[Display]:</b> <ul style="list-style-type: none"> <li>- [x] XRay to keep seeing the object true everything around it</li> </ul>
04:00	<b>3D View:</b> <ul style="list-style-type: none"> <li>- select both Empties on the rudder control horn</li> <li>- select rudderControlHorn</li> <li>- [Ctrl-P],[Object] to parent the selected objects</li> </ul> <b>3D View,Panel-Outliner:</b> <ul style="list-style-type: none"> <li>- select both tailwheel_lower_x_constrains</li> <li>- select the tailwheel</li> <li>- [Ctrl-P],[Object] to parent the selected objects</li> </ul>
05:00	<b>Top View:</b> <ul style="list-style-type: none"> <li>- select both rudder_control_empties</li> <li>- select the body</li> <li>- [Ctrl-P],[Object] to parent the selected objects</li> </ul> <b>3D View,Panel-Properties,[Object],[Relations],[Parent]:</b> <ul style="list-style-type: none"> <li>- Confirm the parent object of all Empties [Body] / [rudderControlHorn] / [backLandingGear]</li> </ul>

06:40	<b>Setting the object animation constrains to the lower-rudder-cable-objects</b>
	<b>3D View:</b> - Select “rdLftCntrlRod1”
	<b>Explanation on:</b> - how the 4 rudder cable control objects are parents to 2 empties - which objects are parented/connected to which other object - which objects are constrained to which other objects so the keep pointing towards them
08:30	<b># Warning about resetting the scale</b> <b># [Ctrl-A],[Rotation &amp; Scale] to each individual (modified , constrained) object in the model.</b> >> <b>3D View,Panel-Properties,[Constraints]:</b> - [Add Object Constraint] “Track to” - Target: “TailWheelLowerLFTConstraint” <b>(not present in the Jodel example file!)</b> or “Empty_BLGCntrl” - To: [-Z] - Target Z: [.] - Up: [Y] - Space: [World Space] to [World Space] Object now (always) will point to the selected Empty object >>
10:45	<b>Repeat this process for the other – right sided parts of the lower control cable</b>
11:20	<b>Setting the object animation constrains to the upper-rudder-cable-objects</b>
11:50	<b>3D View:</b> - select “left upper control cable object” <b>3D View, Panel-Properties,[Constraints]:</b> - [Add Object Constraint] “Track to” - Target: “RudderCableLFTConstraint” <b>(not present in the Jodel example file!)</b> or “Empty_LftRdCbCntrl” - To: [Y] - Target Z: [.] - Up: [Z] - Space: [World Space] to [World Space] >> Object now (always) will point to the selected Empty object
12:40	Repeat this process for the other – right sided part of the upper control cable
13:30	<b>3D View:</b> - select the “backLandingGear” object. - [R][Z] to rotate it around the Z-axis - check it all lower-cable-animated parts follow the rotation
13:45	<b>Top View:</b> - select the “rudderControl” object. - [R][Z] to rotate it around the Z-axis - check it all animated rudder-cable-animated-parts follow the rotation of the rudder

14:40	<b>Setting up the animation:</b>
	<b>Animation Window:</b> - set Start: 0 and set End: 100 - set framecounter to:0
15:00	<b>Explanation about Animations and FSX related Animation Tags</b>
15:40	<b>3D View:</b> - select “backLandingGear” <b>3D View,Panel-Properties,[Object],[FSX Properties]:</b> - check the Animation Tag (rudder_percent_key) and animation length (0-100) <b>3D View,Toolbar-Left,[Blender2FSX],[FSX File Properties]:</b> - [Initialize Toolset]
16:25	<b>3D View,Toolbar-Left,[Blender2FSX],[FSX Animation Tool]:</b> - [+] search on “rudder-percent_key” - [Assign]
	<b>3D View,Panel-Properties,[Object],[FSX Properties]:</b> - check the Animation Tag (rudder_percent_key) and animation length (0-100)
16:35	<b>Explanation which (other tailrudder) parts need to be tagged with the “rudder_percent_key” tag</b>
	<b>3D View:</b> - select the parts – one by one - (empties, ruddercontrol, control_horn, upper and lower cable parts): → that are animated in the tail rudder animation themselves → that are used to control the movement of other parts in the tail rudder animation - check that all parts also have the “rudder_percent_key” in their object's FSX Properties
18:00	<b>Complete “Tailrudder” animation sequence:</b>
	<b>Animating the Tailrudder - control surface:</b> <b>3D View:</b> - select “rudderControl” <b>Animation Window:</b> - Set framecounter to:0 <b>3D View:</b> - [R][Z]-20[Enter] to rotate the rudder in the leftmost position - [I][R]otation to insert the 1 <sup>st</sup> keyframe for the rudder
19:14	<b>Animating the Tailrudder - landing gear:</b> <b>3D View:</b> - select the “backLandingGear” object - [R][Z]-20[Enter] to rotate the backLandingGear in the leftmost position - [I][R]otation to insert the 1 <sup>st</sup> keyframe for the backLandingGear
19:30	<b>Animating the Tailrudder – animation constraints Empties</b> <b>3D View:</b> - select the “TailWheelLowerLFTConstraint” object - [I][L]ocation to insert the 1 <sup>st</sup> keyframe for this empty - select the “TailWheelLowerRTConstraint” object - [I][L]ocation to insert the 1 <sup>st</sup> keyframe for this empty

19:45	<b>Animating the Tailrudder – lower rudder cable sections:</b> <b>3D View:</b> <ul style="list-style-type: none"> <li>- select the “rdLftCntrlRod1” object (lower left rudder cable)</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> <li>- select the “rdLftCntrlRod1.001” object (lower right rudder cable)</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> </ul>
20:00	<b>Animating the Tailrudder – animation constraints Empties</b> <b>3D View:</b> <ul style="list-style-type: none"> <li>- select the “TailWheelUpperLFTConstraint” object</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> <li>- select the “TailWheelUpperRTConstraint” object</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> </ul>
	<b>Animating the Tailrudder – upper rudder cable sections:</b> <b>3D View:</b> <ul style="list-style-type: none"> <li>- select the “??” object (upper left rudder cable)</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> <li>- select the “??” object (upper right rudder cable)</li> <li>- [I][L]ocation to insert 1<sup>st</sup> keyframe for this empty</li> </ul>
20:20	<b>Explanation to check if every object has the proper keyframe attached to it</b>
21:30	<b>Animation Window:</b> <ul style="list-style-type: none"> <li>- Set framecounter to:50</li> </ul> <b>3D View:</b> <ul style="list-style-type: none"> <li>- repeat the above steps for all animated parts and empties in the rudder center position</li> <li>- rotate or move all the animated parts in the rudder center position and apply the 50% keyframes to them.</li> </ul>
23:20	<b>Animation Window:</b> <ul style="list-style-type: none"> <li>- Set framecounter to:100</li> </ul> <b>3D View:</b> <ul style="list-style-type: none"> <li>- repeat the above steps for all animated parts and empties in the rudder right-most position</li> <li>- rotate or move all the animated parts in the rudder center position and apply the 100% keyframes to them.</li> </ul>
24:40	<b>Testing the tail rudder wheel animation</b>
	<b>Animation Window:</b> <ul style="list-style-type: none"> <li>- reset framecounter to:0</li> <li>- [&gt;] to play the animation</li> <li>- set framecounter to:0</li> </ul>
26:00	<b>Save the Jodel model file again</b> <ul style="list-style-type: none"> <li>- you can export to FSX if you want from this point</li> </ul>
26:20	<b>End of this video</b>

**Congratulations:**

You now have completed the entire Blender 2 FSX tutorials and know “the basics” about everything one needs to know to get their own created aircraft model from Blender (via XtoMDL) into Microsoft Flightsimulator X.