

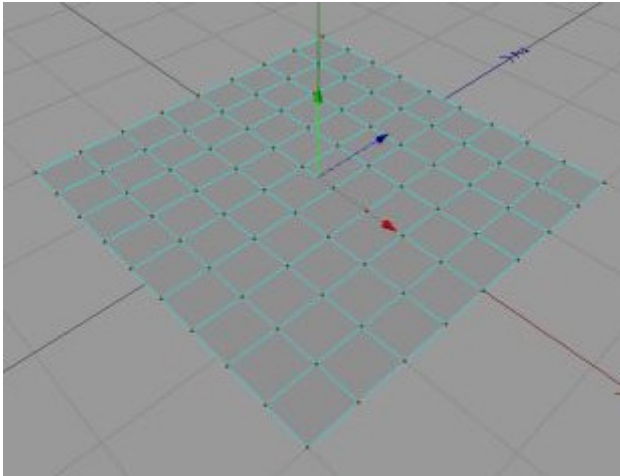
Jamie Knight's 3D Gallery

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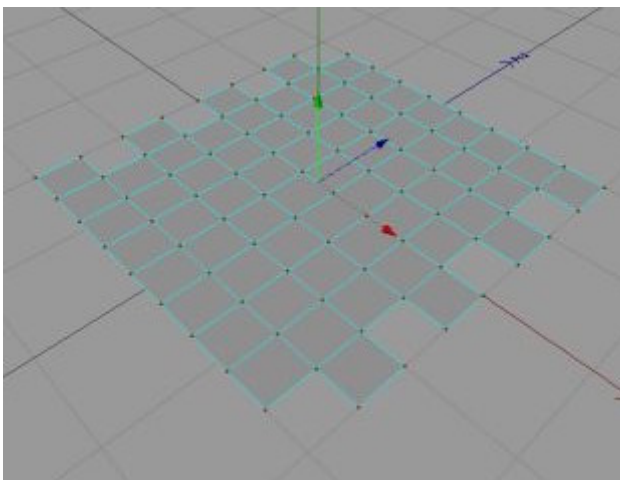
How to Model a Tyre

This tutorial covers the method I use for modelling tyres for all my vehicles.

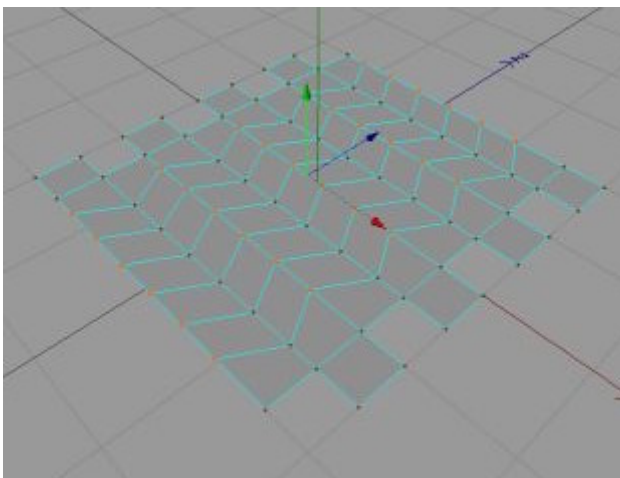
1. Tread Pattern



Start with a plane primitive, with around 9 horizontal subdivisions and 8 vertical, and make it editable. This number of subdivisions should be enough to design the tread pattern.



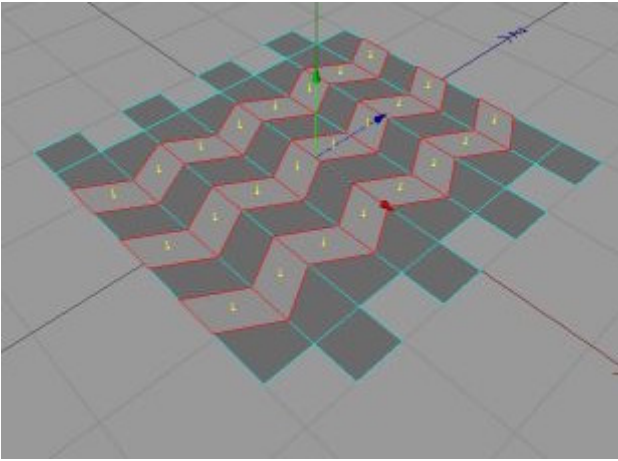
Some edges and vertices along the sides need to be deleted to give the blocks around the edge of the tyre.



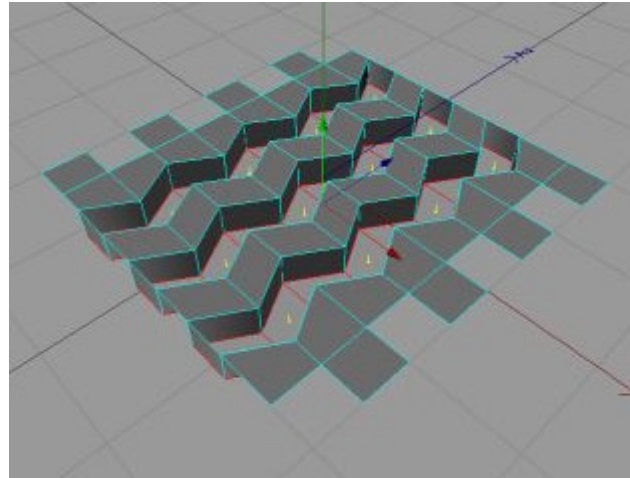
For the tread pattern, alternate rows of points need to be moved sideways to produce a zigzag pattern.

2. Extrude the Tread

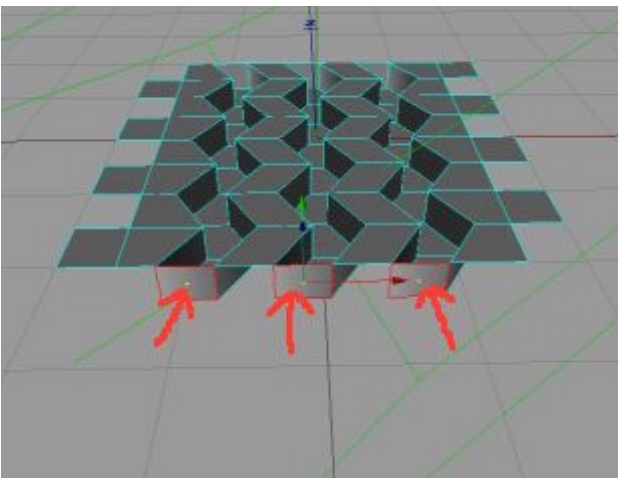




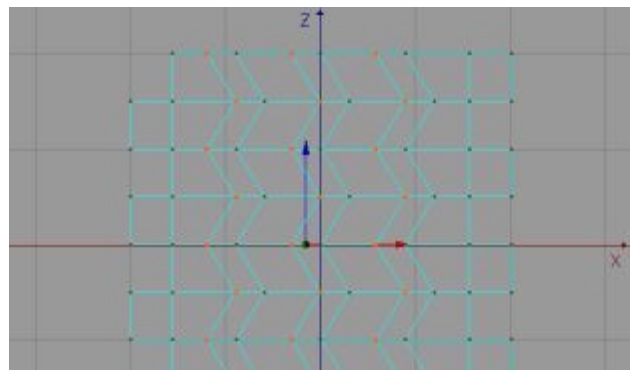
Select alternate columns of faces ready to be extruded downwards to form the tread.



Extrude them downwards to form grooves in the surface.



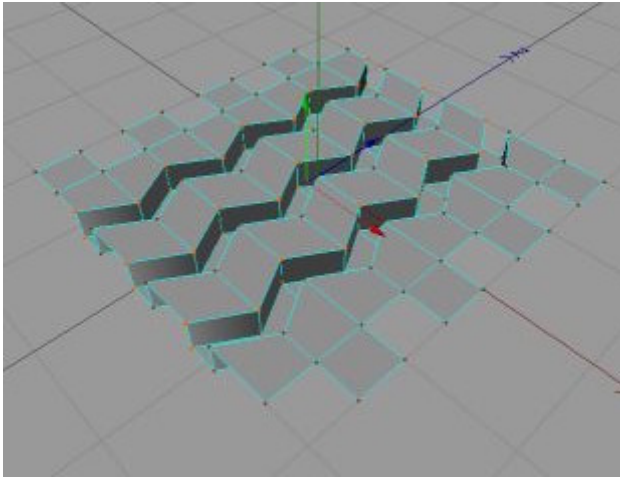
Some extra faces at the ends of the tread grooves need to be deleted - do this at both ends.





The tread grooves are too wide, so the columns of points need to be moved sideways - this is best done on Top view. The points could be adjusted before the tread was extruded, but I

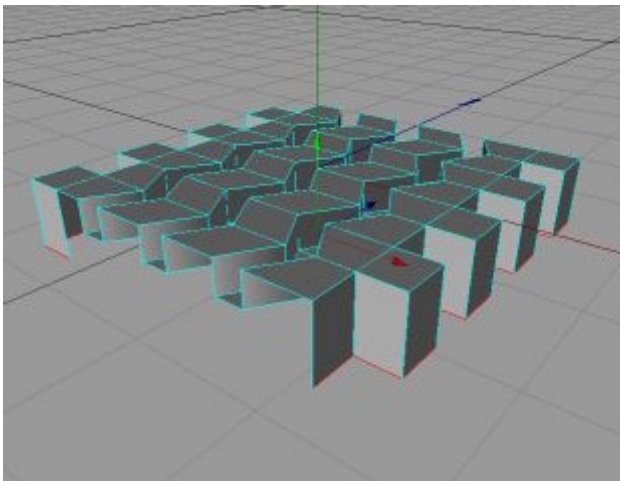
found it easier to judge when I could see the actual extruded tread pattern. Make sure you turn off **Only select visible elements** in Cinema's **Active Tool** page so that all vertices are selected.



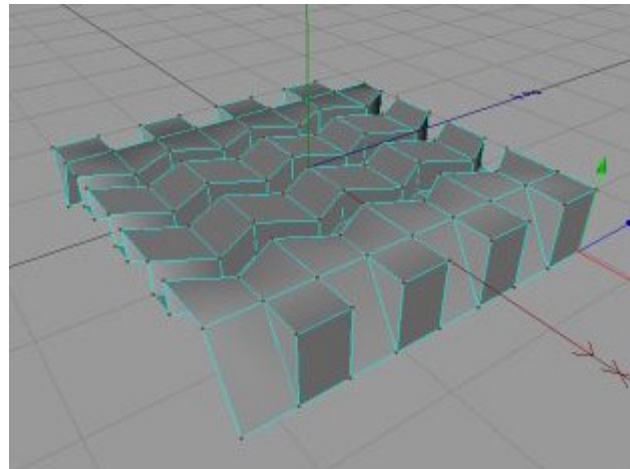
This gives a better tread pattern with narrower grooves.

3. The Tyre Walls

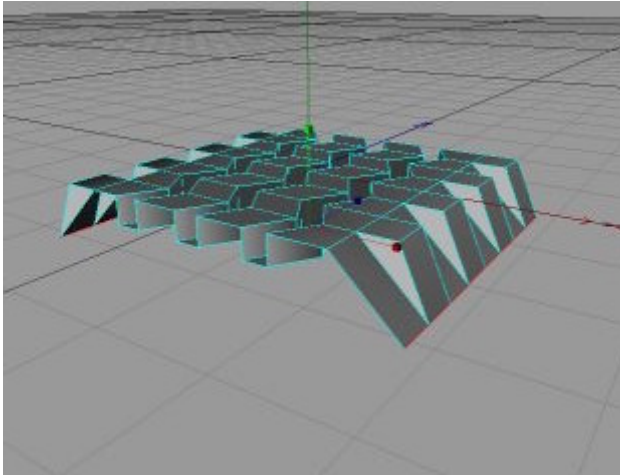
To produce the tyre walls the outside edges of the object are extruded. Cinema Release 8+ has Edge Extrude built-in, but a plugin is needed for earlier versions.



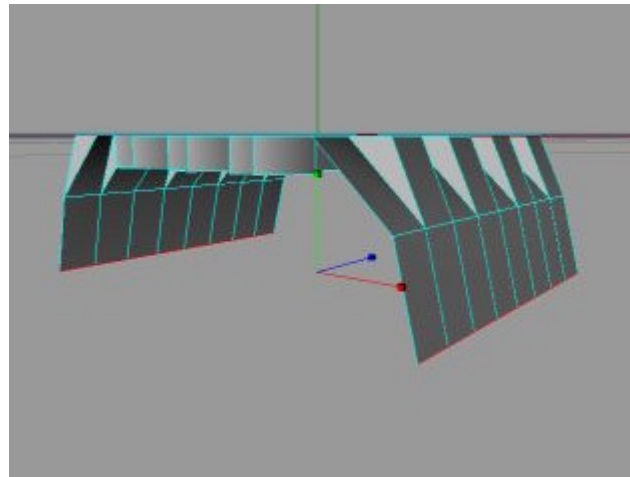
Select the side edges and extrude them straight down.



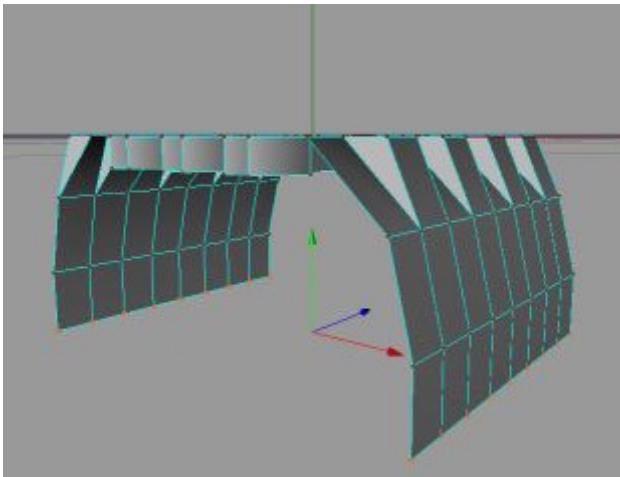
This first extrude forms the section of tyre wall where the outer chunky bits fade into the wall, so the indented edges need to be moved out and overlapping vertices welded together. Cinema's Structure|Optimise menu command doesn't seem to weld these overlapping vertices, so it needs to be done manually.



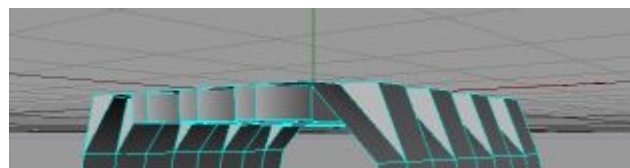
The lower edges need to be widened as the tyre wall is formed.

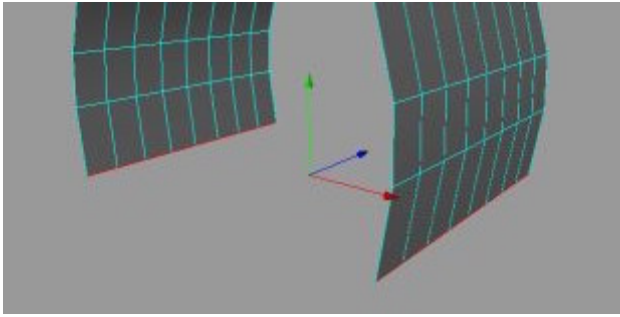


The same edges are then extruded down and widened once again.



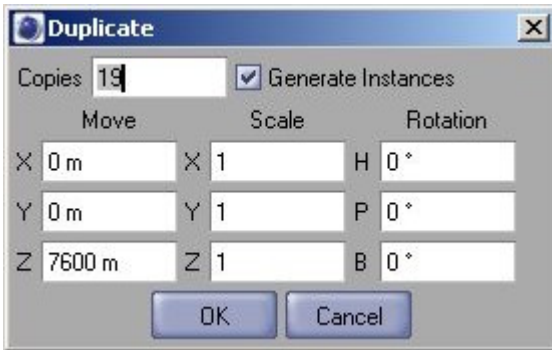
Another extrude, this one straight downwards.





And one more extrude, narrower than the others to finish the wall. You could do one more smaller extrude here to create the curve of the tyre as it disappears behind the wheel, but this is normally hidden by the wheel.

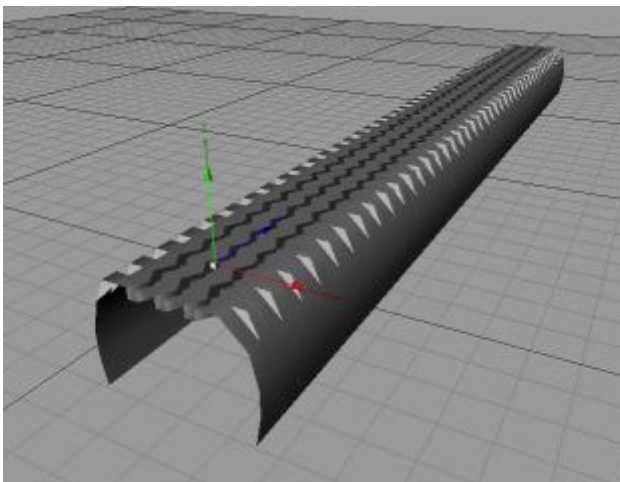
4. Duplicating the Section



Now we have a section of the tyre complete, it needs to be duplicated into a longer section. Use the **Functions|Duplicate** menu command to do this (if you're using Release 9 then you use the Tool Manager instead of a dialog box). The tyre section is 400 units square and we want 19 copies (to give us 20 sections), so the **Move.Z** needs to be 400×19 (you can type this into the edit field), or 7600 - make sure **Generate instances** is turned on.

The Duplicate command creates a Null Object with the instances in it as child objects. In the Object Manager drag the original tyre section into this null object so the section and all it's instances are grouped together.

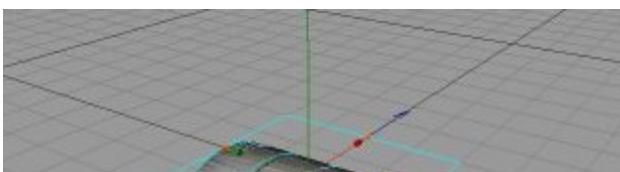
By using instances we can adjust the shape of the tyre or the tread by editing the original section and have the changes applied to all 20 sections.



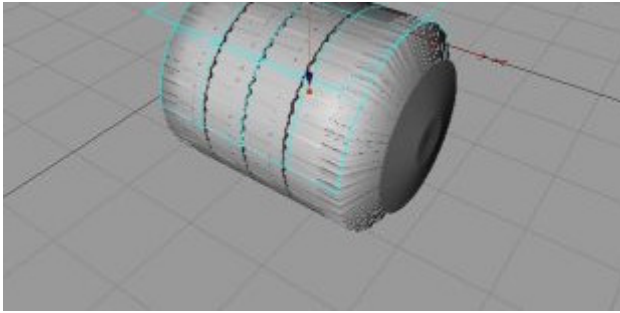
We now have a long straight tyre made using instances which now needs to be bent into a circle.

5. Bending the Tyre

Choose **Objects|Deformation|Wrap** to create a wrap deformer. By default the deformer is facing the wrong way, so in the Coordinate Manager change the H rotation to 90 and the P rotation to -90 and click **Apply**.



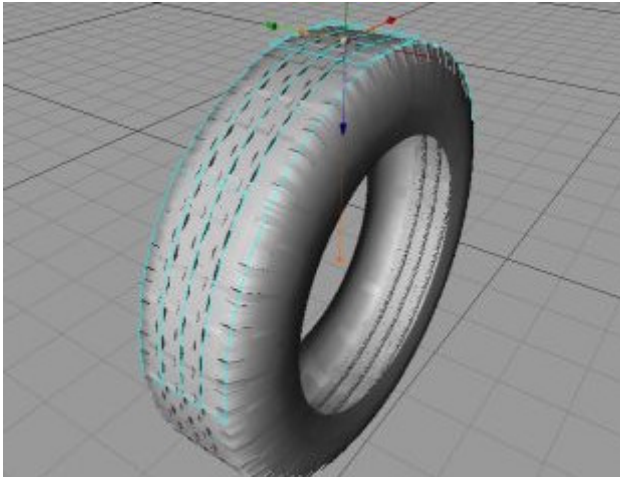
Now in the Object Manager drag the wrap deformer into the Null Object containing the tyre sections - the deformer affects it's parent and the parent child objects, in this case all the tyre



sections, just as if they were one object.

the Radius value of the deformer to 1000. The radius and dimensions of the wrap deformer also need to be changed.

Hmm. Interesting, but not really correct. Change

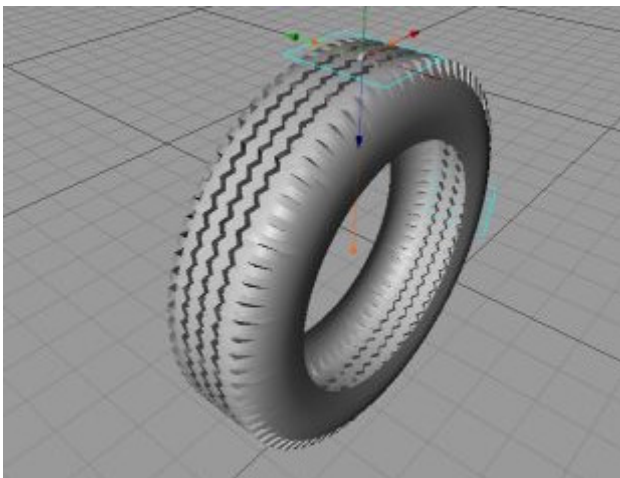


Looking better, but the tyre sections overlap, destroying the tread pattern. To get around this adjust the Wrap deformer as follows:

Set the **Longitude Start** to 0 and **Longitude End** to 360/20, or 18. 20 is the number of tyre sections we have.

Set the **Width** and **Height** to the X and Y dimensions of the original tyre section - in my case X=518 and Z=400.

This sets up the deformer to the correct dimensions for our tyre sections:



Looking good. If you view this in Wireframe mode, you'll see that the tyre sections line up to each other nicely.

All that remains is to apply a good rubber texture to the Null Object containing the tyre sections and deformer - doing this applies the texture to all the sections as a whole, but it will only work if the individual sections have no texture tags of their own. I used a photograph of a real Land Rover tyre flat mapped from the side - the Object Managers **Texture|Fit to Object** menu command comes in useful here to get the texture map

the correct size.



One final trick is to place the tyre in a HyperNURBS object. This rounds off the edges of the tread, but you will need to increase the edge and vertex weights to reduce the rounding. Also increase the edge weights in the tyre wall to maximum to close any gaps that may appear there.

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