

DMM TUTORIAL 6: Using Splinters

The default fracture geometry follows the Tet Mesh's tetrahedrons. This means that the object will break along its tetrahedrons' edges. This is fine for crystalline materials but not for wood or bricks for instance. By attaching Splinter Cages to a DMM object, you can control its fracture geometry.

A library of Splinter Cages is provided with the DMM plug-in. You can also create your own Splinter Cage from a 2D texture map.

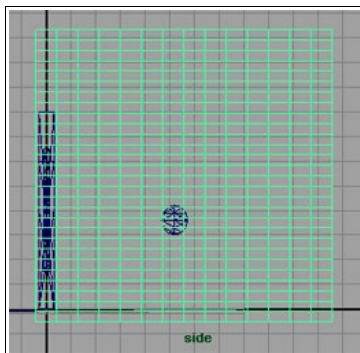
In this tutorial you will

- transform the concrete wall constructed in tutorial 5 into a brick wall and attach to it the brick wall Splinters Cage provided in the library
- create a new Splinter Cage from the 2D texture map which you will also use on the brick wall's Maya material and apply it to the brick wall

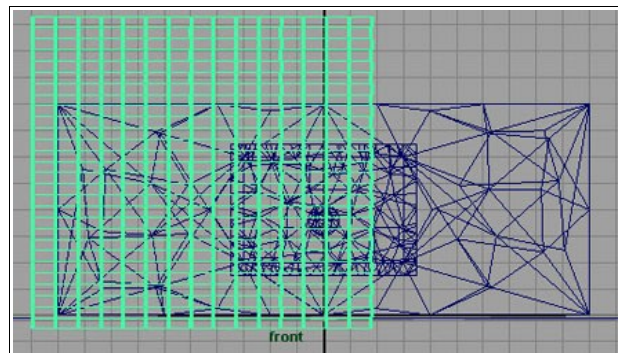
Adding a Splinter Cage from the library

A library of Splinter Cages is provided as a set of .obj files. Before we start, make sure that the .obj export plug-in is loaded.

1. Open the scene you created in tutorial 5 (the one with the animation of the sphere). If you don't have this scene anymore you can use the *tutorial6_start.ma* file which is provided here.
2. Import the *brickWall.obj* file from the *splinters/mesh* folder.
3. Place it around your wall and expand it to have bigger bricks (about x6).

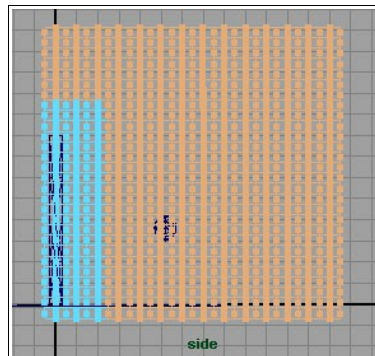


Side view




Front view

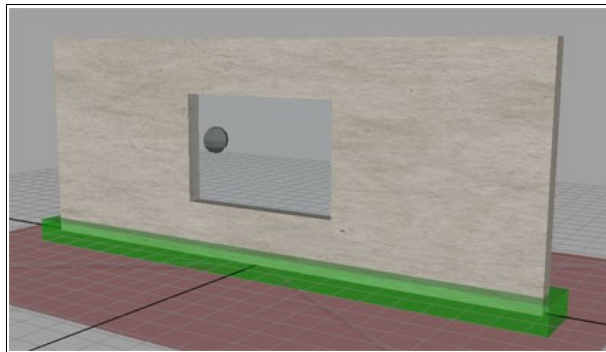
4. You can also delete the faces that will not be needed (orange). This is not necessary, but makes your scene less clustered and easier to work with.



5. Duplicate the Splinter Cage to add splinters to the whole wall.
6. Position the duplicated Splinter Cage appropriately. (Use the snap tools).
7. Combine it with the original Splinter Cage.

Note: You have to combine all duplicated Splinter Cages because a DMM Object can only have a single polymesh as a Splinter Cage.

8. Add the Splinter Cage to the wall
 - Select the Splinter Cage and the wall
 - Select *DMM Asset / Add Splinters to DMM Object* or 
9. Modify the walls DMM Material to Weak_Bricks for it to break more easily.
 - Select the wall
 - Select *DMM Material / Assign New DMM Material / Weak_Bricks*
 - Adjust the following parameters: Youngs:30000000 (one more 0) / Density:2500
10. Add a Passive Region at the base of the wall. This will prevent it from falling to the ground.



11. Modify the animation of the sphere to break the wall instead of the window.
 - Move it to: frame 0 (X:-3 / Y:1.8 / Z:-2.6) frame 40 (X:-3 / Y:1.8 / Z:5.3)
12. Duplicate the sphere to create more damage

- Select *DMM Asset/ Duplicate DMM Object* or 

Note: You cannot duplicate a DMM Object with the Maya Duplicate function. It will not simulate properly. You have to use the specific DMM utility.

- Move it to: frame 0 (X:3.3 / Y:3 / Z:-2.6) frame 40: (X:3.3 / Y:3 / Z:5.3)
13. Play the simulation. The wall breaks into big pieces which is not very realistic. This is because it has very few polygons. (tutorial6_video1.mov)
 14. Adjust the Triangulation Density Area to 0.2800

Note: The maximum recommended size for a tetrahedron when using splinters, is about one tetrahedron for three splinters.




15. Play the simulation again and see the difference. (tutorial6_video2.mov)

Additional notes about Splinter Cages:

- 1) Requirements for a Splinter Cage:
 - Each cell needs to be water tight
 - Components can overlap and can have gaps between them
 - Components can share faces
 - Each face has to be convex and planar
- 2) Splinters are seen in the output simulated surface mesh when fracture occurs and only in the area of fracture. You can show splinters even before fracture occurs
 - Select the *DMM Object node* (In the *DMM Asset Manager* click the *DMM Object Node* Select Button in the *General Section*) This will open the *DMM object Node's* attributes in the Attribute Editor.
 - Select the *Start Splintered* attribute.

Creating a Splinter Cage from a 2D texture

You can also create a Splinter Cage from a 2D texture map (currently only .bmp format). The Splinter Cage will be an extrusion of the 2D pattern. A library of 2D patterns is provided with the plug-in but you can also create your own.

1. Remove the Splinter Cage you just applied to the wall
 - Select *Edit DMM / Detach Component / Splinters Cage* or 
 - Delete the splinter cage polymesh
2. Select *DMM Asset / Create Splinters from Image* or 
3. Choose the brickwall.bmp file from the library . This will add a Splinter Cage polymesh to the scene.
4. Edit the Splinter Cage so as to cover the wall
 - You can also duplicate it just as we did with the previous Splinter Cage. Be careful to check the tiling and don't forget to combine the duplicated Splinter Cages.
5. Add the Splinter Cage to the wall
 - Select the Splinter Cage and the wall
 - Select *DMM Asset / Add Splinters to DMM Object* or 
6. Play the animation. You should get about the same result as with the previous Splinter Cage.

Additional note: Creating your own 2D textures:

You can create your own 2D textures to make custom splinters. This can be useful if you want the splinters to match your Maya texture for instance. There are several things you have to keep in mind:

- 3) The pattern has to be strictly black and white.
- 4) You have to be able to tile it.
- 5) A single layer Splinter Cage made from a single 2D texture map is good for brick walls and glass. For materials that tend to have more depth, like wood, several 2D texture maps can be used to produce multiple layers. These layers are then combined into a single mesh.