

Construction of Asperity Model

Materials*

Wood: 4" x 6" x 3/4"

Aluminum: 4" x 6" x 1/32"

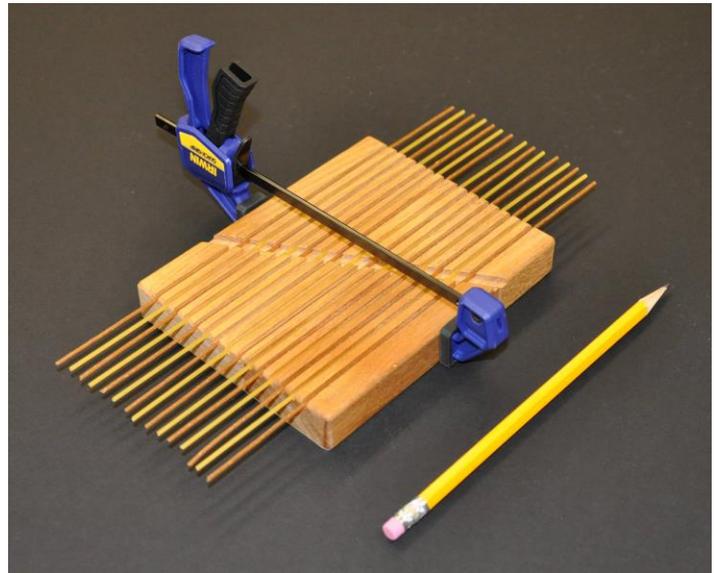
Small Nails: Shorter than 3/4"

Clamp: 6" Irwin Quick-Grip Mini Bar Clamp

Spaghetti: Thin Spaghetti, Whole Grain Spaghetti

Tools Required for Construction**

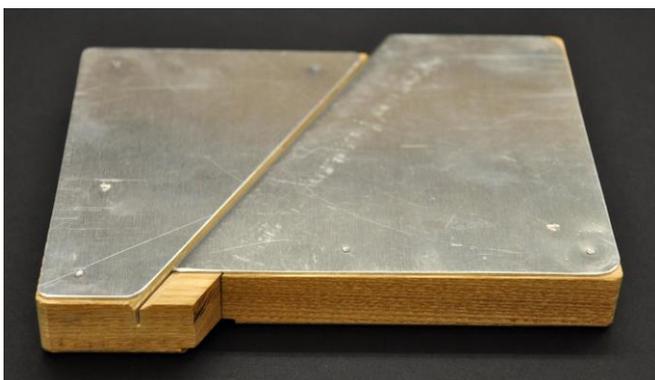
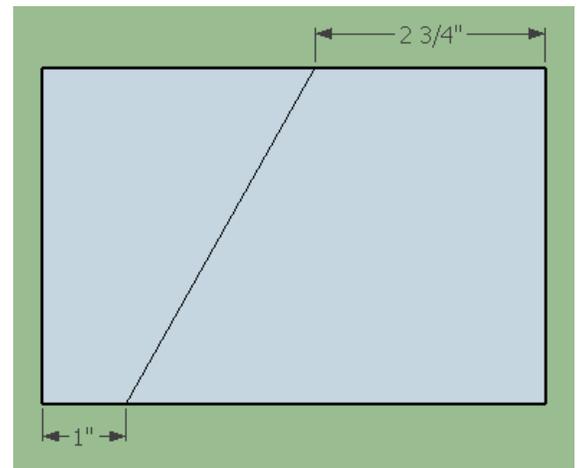
Table Saw	Metal Shear
Miter Saw	Metal Brake
Hand Miter Saw	Drill
Table Router	Sandpaper 220 Grit



Construction

Use a 1/8" round over bit in table router to round over the top sides, ends and the vertical corners of the wood block. On the table saw set the saw depth to 1/8" and the fence to 0.5". With the rounded over top of the block facing down and the side against the fence, cut a groove through the block. Move the fence in increments of 1/4", cutting a groove each time, until you have 15 grooves and you should have about 0.5" left on the block. With a chop saw cut the block in half at a 60° angle, the cut should start about 1 5/8" to make equal pieces. Set the table saw fence on the left side of the blade, move the fence so it almost touches the blade and blade height is set at 1/8". With the block face down and the 60° cut against the fence, cut another groove. Do this for both halves to create a space on both sides of the fault. Use the sandpaper to smooth all of the edges.

Cut the aluminum in two with a 60° angle to match the wood. The cut should start at 1", this will leave about 2 3/4" on the opposite short side. Place the smaller piece on the underside of one of the wooden halves. Align the straight edges, the angled edges will be parallel but about 0.5" offset from each other. Drill and secure the metal in place with a few small nails. Saw a groove 3/8" deep along the edge of the metal into the wood. On the other piece of metal, bend over the angled edge. The bend should be 90°, 1/4" deep, on the brake the longer straight side will be on the right. Place the two wood pieces together, face down. Insert the bent metal edge into the wood groove, drill and nail the bent piece into the half of wood it is resting on. The groove in the wood might need to be rounded over if the metal bend is not sharp. To finish, spray with some shellac.



Modification from IRIS Model

To adapt the model for our classroom activity, we:

- Added a groove along the fault for visible elastic deformation.
- Added tongue and groove plates prevent spreading of the wood as stress is applied.
- Used two types of spaghetti that break at different stresses and help to differentiate between foreshocks, aftershocks and mainshock.

Construction Suggestions

*Alternate Materials

We used oak because we had some old shelves to use up. Pine is less expensive but it is a softer wood and might deform or break when stress is applied to the model.

The metal plate is not required. A piece of leather or hard plastic sheeting may hold the sides together.

The specific brand of spaghetti is not important, but they should be two types to provide heterogeneous asperity. We recommend regular and a whole wheat variety.



**Alternate Design Options

We made a class set of models and have access to a wood and machine shop. Page 1 describes how we modified the model, as it was the quickest, cheapest method for us. If you do not have access to the same resources, the following alternatives might help:

Table Router: The router is not required. It improves the aesthetic of the model and reduces splinter problems. Sanding or filing all the edges by hand would have the same effect.

Electric Miter Saw: If you don't have one, you can do the same thing with a hand saw. The model performs best when the cut is smooth, so if you do it by hand be sure to sand the fault plane. Also, the hand saw blade will be a different thickness so the dimensions of the metal plate will need to be adjusted.

Metal Shear: A hand shear or tin snips could be used but this will curl the metal as you cut. Make sure to flatten the metal after cutting.

Metal Break: This could be accomplished in a vise. Clamp the metal plate with 1/4" in the vise and bend over the plate to make the 90°

Alternatives to metal: The same effect could be made with an all wood tongue and groove by making some interlocking groove in both sides of the wood like the picture below. Another option was using some felt or rubber to attach both sides but we did not try these.

