**Multi-Angle Test Tower for Calibrating Jerk**

### Description

This test tower can be used to calibrate Jerk/Junction Deviation settings for 3D Printers. The Jerk setting causes the printer will slow down more when printing tighter angles.

This tower has 10 steps - every 3 mm in height there is a slight bump in or out of.08mm. It has angles: 20, 30, 40, 50, 60, 70, 80, 90, 100, and 140 degrees.

Use the following in order to customize this model for calibrating your printer (requires editing of the gcode file - but I will tell you how!). This example is for Marlin firmware, but you can check which gcode to use on Reprap.org. Link below.

* First slice the STL with 1 perimeter, no infill, and no top layers - in other words: as a single walled object, and do not use z lift.
* Decide what your starting Jerk value will be, and how much you want to increment it for each section. You could start with a value lower than the current value in your firmware. (Once again: the lower the value, the slower the printer will move at the corners.)
* Edit the gcode file with Notepad, look for the layer changes (G0 Z... or G1 Z.... commands), and insert a M205 command to change the Jerk value before the first layer, and every 3 mm. Another easy way to identify layer changes is to turn on the output of comments in your slicer, and the layer number will be included.  
  If you sliced at 0.2mm layers then you will insert a line of gcode every 15 layers.
* Example Jerk Gcode for Marlin: M205 X10 Z5 ; Sets X/Y Jerk to 10mms, Z jerk to 5mms
* (The text after the semicolon is a comment.)
* At each Z height increment, insert the M205 with an increased X value. For instance the next command could be: M205 X15 Z5
* Save and Print.
* Observe the changes at the corners (blobbing or over extrusion), and changes in any ringing artifacts (these look like waves that happen just after a corner).
* Count the steps from the bottom for best looking area you observe to determine which Jerk value you used.
* Either add a M205 command with that Jerk value to your start gcode, or update your firmware with it.
* You may want to test again with a different default acceleration.

You can use the same method for testing Acceleration, temperature etc. Just switch out the gcode you have added at each height.

The gcode setting for Jerk varies by firmware type. See here: <http://reprap.org/wiki/G-code#M205:_Advanced_settings>

"Jerk" is called "Junction Deviation" in other firmware and is calculated differently, and so has different setting/values.

### Materials and methods

A 3D printer's Jerk/Junction Deviation setting affects the printing of corners. A low Jerk setting makes the printer move slowly through the corners - but too low and you could have blobbing and slow printing.

Tighter corners cause more slowdown.

A high Jerk setting causes the printer to move quicker through the corners - increasing print speed - but too high and the printer will vibrate more, causing waves in the outer perimeter (ringing) and other issues - possible including missed steps.