262 3D Printing: 4.1 Designing a Tolerance Test

# **15 Points**

By now, students should have printed a part they designed, or one they downloaded from a reliable online source. Class discussions should already be revolving around the quality and reliability of those prints. Now students are to come up with their own experiments to test the quality, reliability, and tolerance of the printer. Direct the class discussion through the various limitations of the printer, and how these limitations relate to the tolerance of its prints. Students should write a ~2 paragraph essay explaining the steps they would take. Next, the class should design their test and get them ready for printing. In the end we are looking for a smooth press fit tolerance of a cylinder for both XY and Z axis.

# Discussion Topics:

1. Settings on the Printer  
2. XY resolution vs Z resolution

3. Filament size

4. Value range to test

5. Secondary print, tighter tolerance print

6. Clear labeling

Here is an example of a tolerance test. I made a cylinder 5mm diameter by ~10mm tall. The block has holes of 5.02, 5.04, 5.06, 5.08 etc… Also duplicated those holes to print on the Z axis as well. This is a good test to get in the ballpark of tolerance, but you may need to revise and reprint as necessary. You could go one more step and put a 1 degree draft on the printed cylinder to give more of a gradient while testing.

