

ADDITIVE MANUFACTURING LAB

Guide to Selecting 3D printing Resolution and Internal Structure

Resolution:

Additive Manufacturing Lab printers have four different z-layer resolutions, .005", .007", .010", and .013". As the resolution gets coarser, from .005" to .013", the time required to print drops significantly, making the print job much faster and much cheaper. The four resolutions are not available for all materials or all machines. Refer to the [FDM Materials](#) information sheet to determine which resolutions will work with each material.

Inversely, as the resolution gets coarser, features of the part may become harder to see or may not appear at all. See the images below showing how geometry changes with resolution.

The examples below will help to determine which resolution is suitable for your project. The .005" resolution is not pictured below, it will have a better resolution and show features more refined than .007". .005" will have the longest build time thus increase the cost of the print.



Figure 1: .007" Layer: .007" layer height allows for the best possible part resolution and will show most features. The print time for this height is very high and subsequently cost more than all the other layer heights.



Figure 2: .010" Layer: This Layer height is the middle resolution and allows for a good-deal of features to show through and also prints faster than the .007" layer height. This is more cost effective than the .007" layer height option.



Figure 3: .013" Layer: This layer height is the courses height and misses the most of the part features. This is also significantly faster and most cost effective to print. The image shows that this resolution is still fairly good and will suffice for most prints.

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Internal Structure:

Additive Manufacturing Lab printers also have the ability to print different internal structure or infill. The three options are Sparse Low Density, Sparse High Density, and Solid. As the material infill gets denser, from Sparse Low Density to Solid, the time required to print goes up as does the cost. See the images below for more detail on the type of fill.



Figure 4: Sparse Low Density: Sparse Low Density uses the least amount of material and takes the least amount of time to print. It creates a grid-like pattern in the part that is mostly air. The outside several layers are still solid to help with part rigidity.



Figure 5: Sparse High Density: Sparse High Density uses the next amount of material and takes a "medium" amount of time to print. The internal pattern is a grid-like pattern that is almost equal parts air and material. The outside several layers are still solid to help with rigidity.

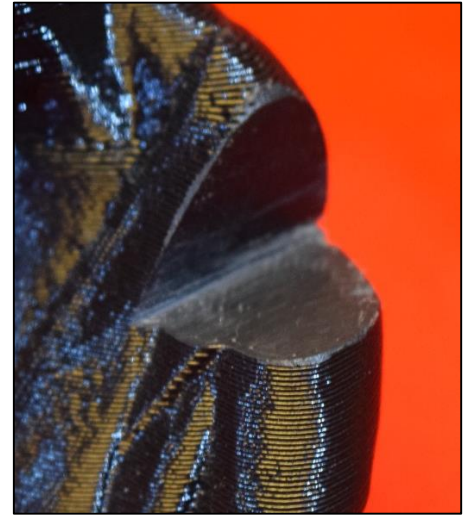


Figure 6: Solid: Solid internal structure takes the longest to print and uses the most amount of material. Since it is solid, the entire print is 100% print material. This will be the most durable and heaviest of all the print types.