Strategic 3D Solutions

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10 Criteria for Selecting a Professional 3D Printer

Are you thinking about buying a 3D printer? Wondering which one to purchase? With multiple 3D printing processes, a growing number of manufacturers, an incredible list of models, and a wide assortment of materials, what are the key factors to consider in making that important decision? We believe the most important criteria to consider are provided below (not in any particular order). Click on any item of the 10 items to jump to that topic or simply continue reading.

1. Application
2. Accuracy; Resolution; Surface Finish
3. Build size
4. Material
5. Monochrome or Color
6. Build Speed
7. Maintenance
8. Post-processing Requirements
9. Initial Investment
10. Recurring Cost of Ownership

A more detailed discussion for each is provided below.

1. Application

How do you plan to use the 3D printer? What do you want to build? The list could include concept models, prototypes, master patterns for castings, mold inserts, tooling and fixtures, low-volume production parts, end use production parts, and perhaps others.

2. Accuracy; Resolution; Surface Finish

What level of accuracy, resolution, and surface finish is required to fabricate the parts you need? In general, higher levels of performance require more expensive 3D printers and may impact the build time.

3. Build size

What size parts do you expect to build? A good rule of thumb to consider is to purchase a 3D printer that is capable of building 95% of the parts you think you will need. Then, outsource the rest to service bureaus. In doing so, you will limit your investment to a more reasonable level and avoid the costs associated with owning capacity that is unused 95% of the time.

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4. Material

What physical properties are needed in the fabricated parts to achieve your objectives? How stiff? How flexible? How durable? What color? Does it need to be resistant to moisture penetration? What about chemical resistance (e.g. alcohol, acetones, hydrocarbons)? Secondarily, if you identify the need for more than one material, what is involved to change from one material to another? The relevant parameters to consider when changing material include recalibrations (if applicable), time, labor cost, material cost (including purging), and disposal cost.

5. Monochrome or Color

This may be an easy criterion for most buyers. Color parts are almost always more interesting, but they are simply not required for many situations. If your application needs color parts, you will want to take a close look at the available choices. At one end of the spectrum, you will find many 3D printers that will handle only 1 color at a time, requiring you to change materials between builds. At the other end of the spectrum, you will discover 3D printers that provide full color capability.

6. Build Speed

The simple metric for build speed is usually expressed in inches per hour or millimeters per hour for the vertical build direction. Build time may depend on the size and geometry of the part for some 3D printers, and it may also depend on the chosen material. Build time is also a function of the layer thickness of the build process. Layer thickness is driven by the capabilities of each 3D printer, may be related to specific material properties for that 3D printer, and/or may be selected by the user for some 3D printers. Related to this is whether adding parts to the build platform will increase the build time or not. The answer to that question ranges from a simple “no” to an absolute “yes”, depending on the 3D printing technology.

7. Maintenance

As with many electronic systems, some level of maintenance is also required for 3D printers. To some extent the term “3D Printer” can be somewhat misleading with respect to perceptions of ease-of-use. Some less-informed buyers may think that operating and maintaining a 3D printer is similar to what is required for 2D printers. A simple suggestion would be to read the operators manual and learn what is required for operating the system and performing preventive maintenance.

8. Post-processing Requirements

In general, parts fabricated on a 3D printer require some level of post-processing to finish a part after the 3D printer has “completed” the build. Manufacturers usually don’t spend much time discussing what is required to finish the part and may down-play the extent of what is required. The requirements

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for floor space, solvents, special tools and/or work stations, technician time, disposal fees, and safety equipment can vary significantly depending on the 3D printer. Be sure to ask. Again, we suggest you read the operators manual. We suggest you ask for a demo or a video from the manufacturer. You should consider searching on-line for videos that may provide more realistic examples of what to expect.

9. Initial Investment

The initial investment is an obvious criterion, and it is included here for completeness. Of course, the quoted price is key, and to the extent that the following items are relevant to your situation, you will want to be sure the terms are clear regarding: handling and shipping charges, sales tax, installation, training, technical support, warranty, and extended warranty. Some 3D printers may have requirements that are not included in the price but will represent an additional investment on your part. For example, is a dedicated computer required to operate the 3D printer? Some 3D printers may have unique power requirements, need ventilation systems, and/or operate within specific environmental conditions (temperature; humidity; dust-free).

10. Recurring Cost of Ownership

Perhaps equally or even more important than the initial investment, is the recurring cost of ownership. You are making an investment that you hope to use for many years. The cost to own and use the 3D printer over multiple years may very well exceed the initial price. The recurring cost of ownership may include build material, support material, other consumables, solvents for clean-up and post-processing, labor, maintenance, repair, re-calibration (if applicable), and the cost of capital.

Additional Thoughts for Consideration

As you research the market and narrow the list, you should know that it is a common practice in this industry for buyers to request a benchmark part from the supplier. For this step, you will need to provide a file in the appropriate format (generally a .stl file, but it may be a .obj file or a .wrl file for a color part) that reflects the kind of parts you would build if you were to purchase a 3D printer. Generally, 3D printing suppliers will build a benchmark part at no cost to you if you are a serious, prospective customer who has been qualified by the supplier.

We hope you find this information helpful. If you have questions or suggestions, please feel free to contact us. We welcome the opportunity to be of further assistance and to learn from your experience.