

Top 5 Considerations for Choosing a Metal 3D Printing Supplier

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When jumping into the world of additive manufacturing for critical applications, it's important to ensure material quality and integrity, along with a conforming geometric output.

Choosing a supplier who understands all the key process characteristics, and has developed a systematic and effective approach to controlling quality, can be challenging. To help you with this task, we put together the **Top 5 Considerations for Choosing a Metal 3D Printing Supplier**.



1. Consider your metal print as a raw material.

When purchasing your metal 3D printed part, think about what your expectations are on a forging or a casting house. Are you putting as much thought and consideration into those expectations on your metal 3D printing supplier? While of course in powder bed metal machines there is a raw material supplier for the powder, there is a lot that happens to that powder between the time that it's shipped from the atomizer to being melted in the powder bed machine. Make sure your supplier has process controls and checks in place at every step to ensure the material in your part meets all of your requirements.

2. Require your suppliers to meet industry standards.

Industry standards exist for a reason, so there is a baseline of quality and ensure compliance across the board. While the material and process specs from SAE, ASTM, AWS, and NIST continue to roll in, update, and grow, consider using as many of them as possible. In addition, if your industry normally requires accreditations such as ISO9001, ISO13485, or AS9100 you should continue to enforce those when choosing a metal 3D Printing supplier. In addition to those, start looking for a NADCAP AC7110/14 accredited facility which is specific to additive manufacturing. The checklist is new this year, however the list of accredited suppliers will continue to grow and give a baseline confidence that a controlled process is being utilized in the facility.

3. Give them requirements.

As an AM Supplier ourselves at LAI International, we all too often receive requests to print a part with “best effort” attached to the request. Unfortunately, as the supplier we do not know the part’s fit, form, and function as designed and “best effort” for us may not line up with “best effort” for you. Instead, treat your metal printing supplier as any other entity that you purchase parts from.

It is understandable that this is more easily said than done, especially when the purchasing company is new to AM. In this case, it’s important to provide requirements and expectations to your metal printing supplier which would guarantee your part meets your requirements, and have the discussion with the printing experts at the supplier about how they plan to achieve that goal.

For example, if your part already exists as a casting or forging a good place to start is to utilize a red-lined drawing in order to alter the part into an additive manufactured candidate. By providing a blue-print of a legacy part, or similar part, it gets the conversation started. Suppliers that are digging into this level of detail will automatically bring up difficulties and deal-breakers when reviewing the prints and comparing them to their processes. Details you can expect a conversation around include material specs, tolerances, surface finish callouts, and inspection specs. Since it can be difficult to completely red-line a print to meet the additive manufactured version, you can consider a clean statement of work type of contract which will spell out in detail the expectations of both parties.

Once you fully outline the expectations, the price of your once “best effort” parts will most likely increase. This shouldn’t come as a surprise since good quality comes at a price, and it’s important for the metal printing supplier to consider all of your true requirements when delivering a conforming part.

4. Require quality analysis.

Initiate a relationship with your metal printing supplier’s quality engineer(s). Do they have a quality department for other manufactured components? Are they flowing their AM parts through the same rigorous quality analysis as machined components? Additive manufactured component quality analysis can look different than a dimensional first article report, but the idea behind it is the same. Consider these elements of metal printing quality analysis when in your discussions:

Digital: The benefit to additive manufacturing and today’s state of information, is how much data can be extracted during the process. Although the amount of data can be overwhelming, it’s important that the data be reviewed and analyzed during and after a build is complete. Significant process variables should be monitored, measured, controlled, and constrained. A good quality metal printing supplier will be very open to how they measure their process statistics, and should be able to provide you a report on your part and how it fits their process control requirements.

Visual: There are VIS specs which exist on machined parts, and as-built additive parts should not be treated any differently. Inconsistencies in surface finish, color, layering, etc. can signify more than just visual artifacts, and may be a hint to underlying material concerns. Your metal printing supplier should have a VIS spec check in their process standards to fully analyze all of your parts. Some indications may turn out to not be a concern, however some indications may require further investigation such as a deeper look into the digital data, or advanced NDT technologies to rule out material non-conformances.

Physical: For physical quality analysis this includes items such as measuring surface finish, dimensions, powder removal, and internal material characteristics ranging from NDT techniques to material cut-ups, chemistry, density, and material property evaluations. Many of the go-to NDT techniques can become difficult with the geometries and surface finishes of additively manufactured parts, so some different technologies may be required to ensure you are getting the results you need.

In addition, remember that if you are calling out a material specification to the supplier that lists some of these physical requirements (chemical composition, density, strength, etc.), the supplier is responsible to perform the necessary testing to prove conformance to that spec.

5. Ask for Certificates of Conformance

After all the post processing steps are completed, and your parts are being delivered, ensure that all of your requirements have been met by asking for certificates of conformance from the quality department. This should require them to make the extra step to check off all the boxes that were laid out between the prints and perhaps the statement of work. Include requirements for them to provide all of the quality analysis reports, build reports, thermal cycling reports, and final dimension reports if there is post machining or processing.

Ensuring and documenting additive manufactured quality can be complex and intimidating for those new to metal printing. The best way to approach the task is to lean on the experts, and set expectations for your suppliers. Use every order and delivery as an opportunity and a learning experience, and apply those lessons learned for the next component. Establishing consistent and comprehensive requirements will build the baseline knowledge of the technology, and unveil the limits of what it can and can't produce.

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