



**ADDere** ADDITIVE MANUFACTURING

# Laser Wire Additive as a Replacement for Short Run Casting



# An approachable alternative to casting

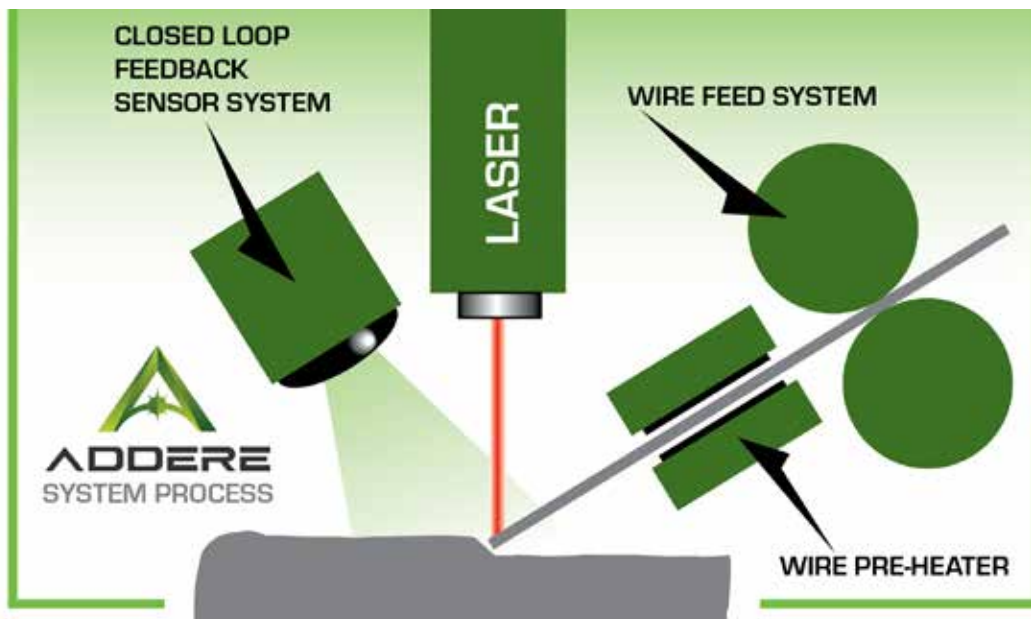
Casting is a reliable and time-proven process to build parts, but technology marches on. Laser Wire Additive Manufacturing (LWAM) is now competitive with casting and offers a number of benefits, provided it's the right scenario.

Metal additive manufacturing is a relatively nascent field. The market is filled with selective laser sintering (SLS) processes that, while making a highly detailed and strong component, is prohibitively price constrained from making larger components. What happens when a larger part is needed, like a suspension component or rocket assembly? Until ADDere, you're only option was casting.

Like all 3D metal printing process, ADDere's LWAM process directly deposits material to build a part. It does not require intermediary steps to arrive at the final part, while casting requires a pattern to be made, then a mold to be built before metal can be brought in to create the part. Casting can build parts at a much faster speed than 3D printing but these parts have to be checked and tested to

make sure the pour quality meets the needs of the application. Issues like cold shutting cracking or porosity can develop if molds are made incorrectly or if the metal is poured without a skilled hand behind the ladle.

With ADDere's Laser Wire Additive Manufacturing process, there's another option for getting prototype or small run parts made – and one with far less steps to production ready parts.

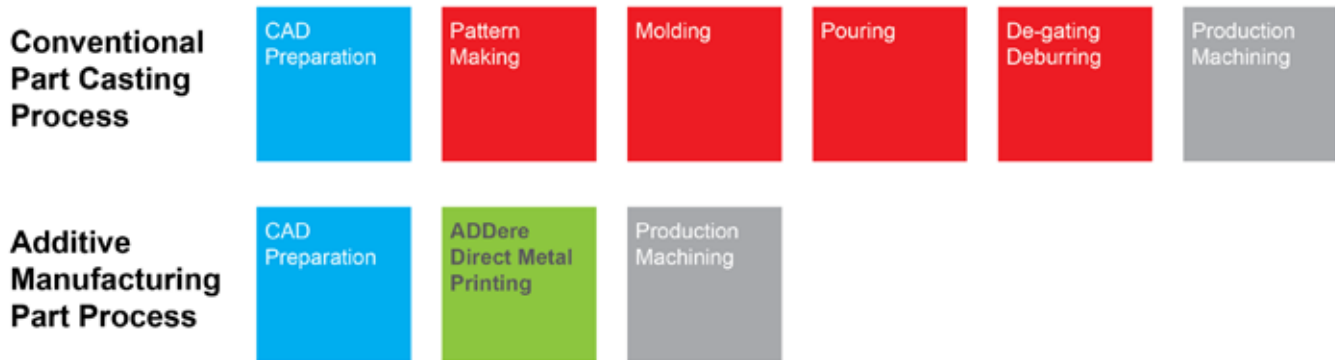


### How the metal printing process works

Laser Wire Additive Manufacturing is a 3D printing process that uses a high-powered laser to melt pre-heated wire to form shapes, layer by layer. With the fine-grain control of the laser and positioning system, the ADDere system is able to create parts with tight control over the metal's qualities. LWAM also allows for much larger deposition rates than SLS printing can achieve. This makes the technology increasingly cost effective for very large scale components. The LWAM 3D printed metal parts resemble what's available from sand casting processes, offering a near-net shape ready for finishing operations.

### Benefits over casting

While there is certainly a place for conventional sand-based casting, ADDere offers a number of benefits for product development and low volume production settings. Getting parts made faster in the development phase could mean the difference between a six month development cycle and over a year to get to market.



### Faster turnaround

One of the biggest areas where LWAM and casting are different is in production time. In the time it takes to make a pattern for the casting process, LWAM creates a just-out-of-the-mold-quality part – only one that does not suffer from the possible metallurgical issues found in casting like micro- or macro-porosity, cold shuts or laps, and scabbing.

The production speed difference comes from reducing the number of steps necessary to get to the final part. In a casting setting, there's the need for the construction of a mold pattern. This step includes not only making the shape but integrating all of the details necessary to make a successful metal pour, including details like designing and adding channels for the pouring of the metal as well as vents for the release of the gases involved. Shape constraints are factored in to properly flow the metal in the mold and make for easier release from the mold. All of this happens before the mold is actually built. In sand casting, this requires a skilled operator to make sure the mold is made properly for pouring.

After pouring, there is the added step of removing extra cast material from the part. Such details as the gating necessary for the metal to move through the mold properly, as well as the unintended material like flash and parting lines have to be taken care of before a cast part is ready for production.

With ADDere 3d printing, all of the above steps are unnecessary. The process can go directly to depositing material to build the actual part shape. When finished, a LWAM part does not need to go through the process of removing the extraneous features that show up in casting, like removing the gates necessary for pouring the part or the features that show up as part of the process like flash. The LWAM part is ready for production finishing.

## **High Quality**

The ADDere LWAM system has far better control over the prospective part quality than can be achieved through conventional sand casting. This quality control ability comes from several aspects of the ADDere system.

While there are competing additive technologies using a variety of printing methods, using high-powered lasers to heat the deposition material allows for much finer control of metal temperatures during the deposition process. Laser systems also offer opportunities to modify the structure of the material as the part is being printed. This ability introduces the opportunity to alter the tensile strength, yield strength, and elongation characteristics of the material throughout the part as it's being printed.

ADDere's proprietary closed loop feedback control system virtually guarantees the best quality interlayer consolidation and freedom from impurities. It also ensures consistency of part dimension as the system prints. The feedback system takes into account several sensors and makes adjustments several times a second.

With an available data map of the temperatures for every aspect of the print build, you can see for yourself the consistency and quality of part from the ADDere systems. Further, if material quality is of highest priority, ADDere can make available example test prints of materials for independent analysis or certification before printing entire products.

## **Broad material availability**

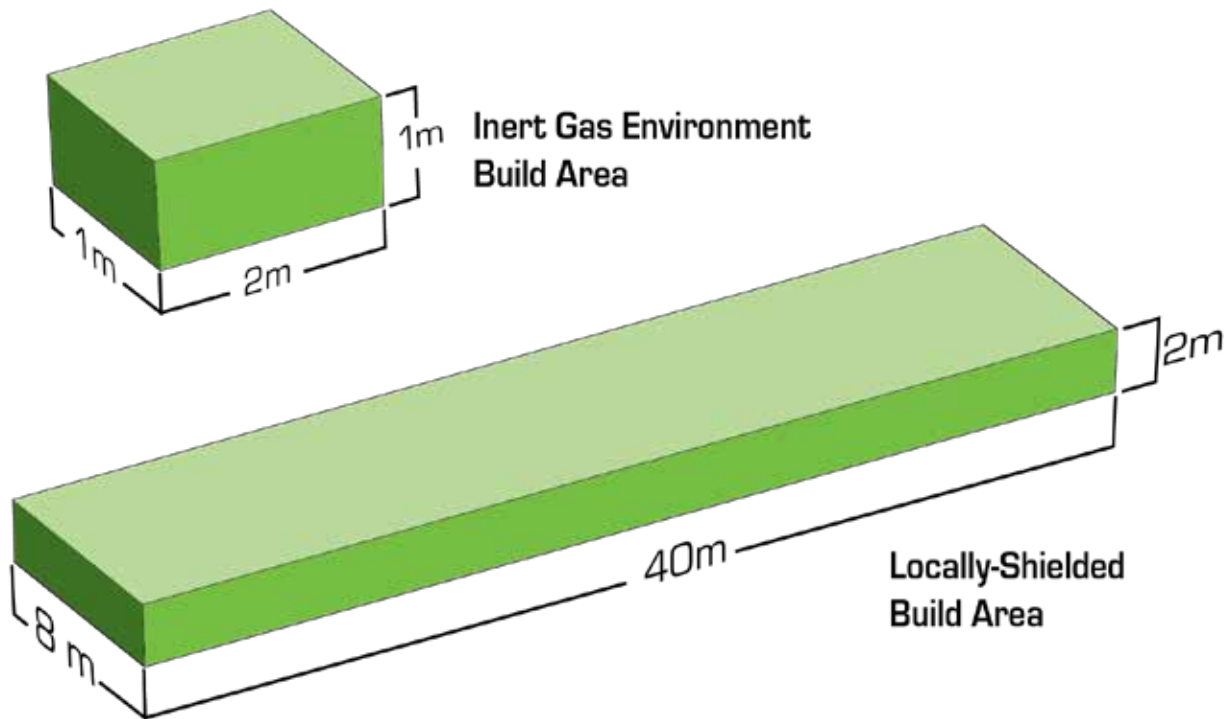
LWAM can build parts out of hard to source materials like titanium, stainless and nickel-based steels like Inconel and Invar variants often used in the aerospace, defense and power generation industries. The system is also able to build parts out of more common materials like aluminum and most steels including stainless steels.

ADDere is adding more and more metals to the list of process proven materials all the time. Contact us if you're looking for a specific material, we would be more than happy to test for process compatibility.

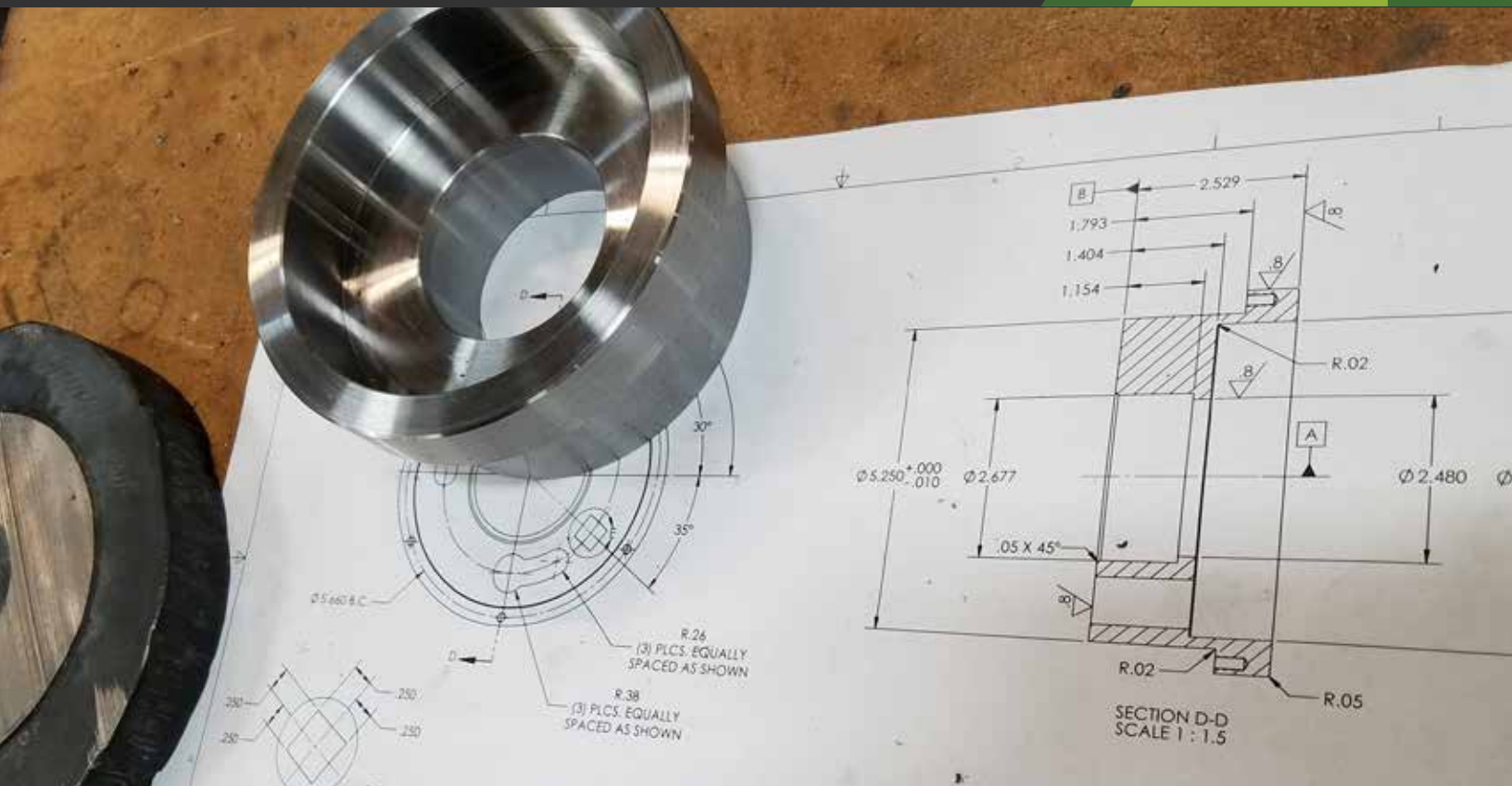
## Large Scale Printing

ADDere can build parts at sizes most casting firms provide and much larger than most commercial powder-based 3D printers. With a build area of 2m x 1m x 1m, ADDere can build all but the largest of components.

The LWAM process is adept at putting down enough material to make large components as strong as they need to be. This means even the largest of component groups can see the benefit of 3D printing where assemblies can be printed as one component, reducing assembly times and part counts.



The ADDere LWAM system deposits material at a rate that can create casting sized parts in almost a tenth of the time powder based systems can offer. These rates mean ADDere can build a part that would take a powder system 30 days but in less than 30 hours. Couple this with material loss rates as low as 3%, you can all but guarantee that the metal consumed in the process goes into the parts being made, not into the recycle bin.



## Getting Parts Made

Customers should not be intimidated by LWAM. We take pride in guiding customers through the printing process. This takes the need for an in-depth understanding of the process off the table. ADDere has engineers on hand and versed in the minutiae of the laser wire additive process. They work to ensure success for our customers throughout the printing process including determining if changes will need to be made to ensure a successful print. Using their knowledge from years of LWAM printing, our engineers partner with customers to ensure a quality part will be achieved.

Ordering 3D printed metal components from ADDere is just as easy as from conventional small run casting firms, if not faster. Putting together a standard quote package is the same for either process. A package would contain a solid model of the part to be printed, a dimensioned set of drawings that notes critical surfaces and areas to make sure the part conforms to dimension and information about materials and part quantity. These items are all that is minimally necessary for the engineers at ADDere to begin assessing the build process and determining the cost and scheduling of a part's printing.

## Bringing it all together

While 3D printing is relatively new to large scale components, the benefits cannot be ignored. From an end-user perspective, ordering 3D printed metal parts can be just as easy as the process for ordering short run castings. ADDere is here to make sure customers get the most out of the metal additive process.

Contact us today to learn how ADDere can speed up your development time or short run, large scale part manufacturing today or to schedule a live demonstration of the ADDere system.

## Contact Us

Call or email ADDere today to discuss your application with our process engineers and see if the process is right for your operations.



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