How 3D Measurement Tools Improve Your Additive Manufacturing Process

FARO®

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What is **Additive Manufacturing?**

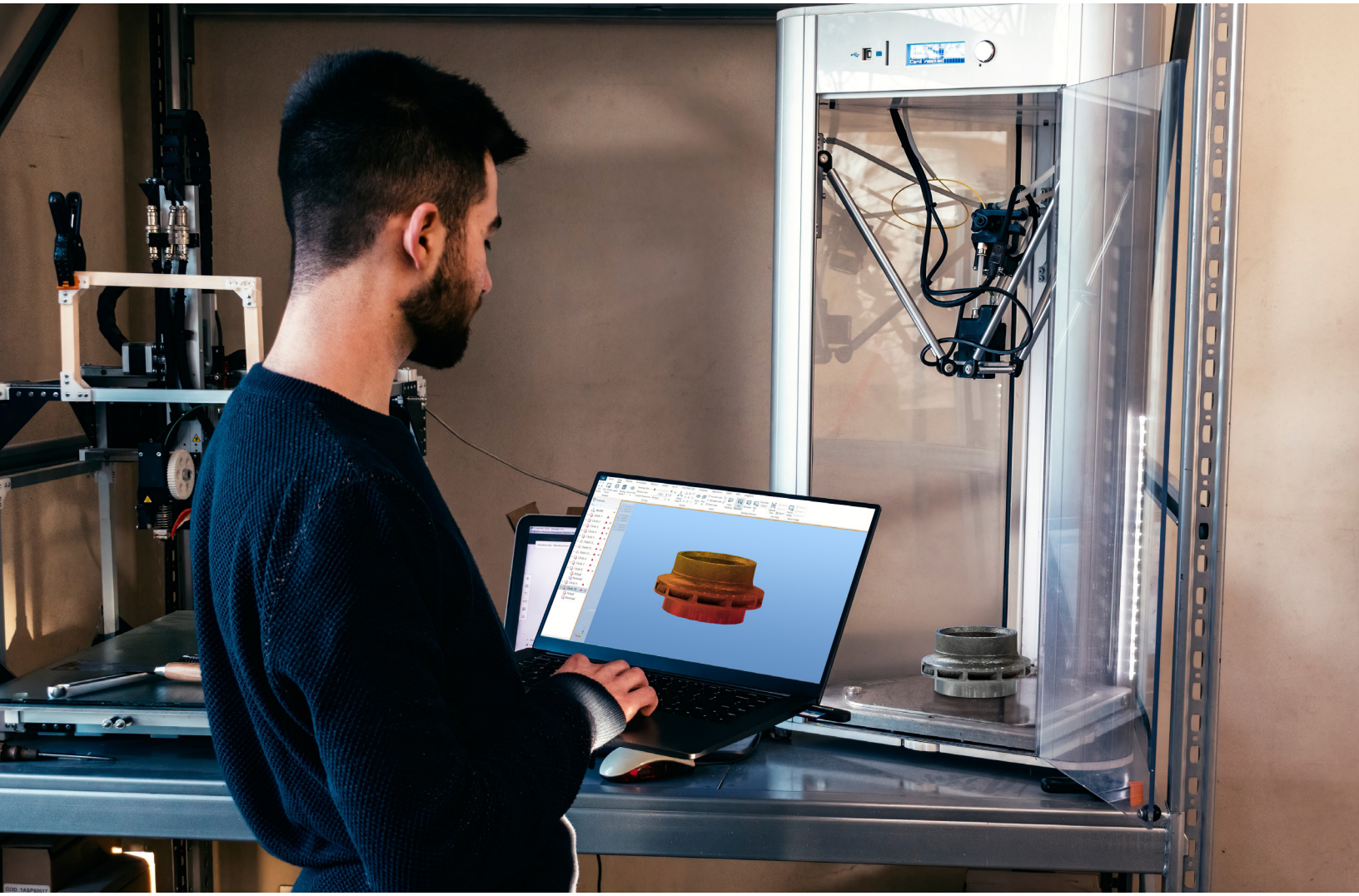
Closely related to 3D printing, additive manufacturing is a process of making a three-dimensional physical object from a digital file. It involves building up an object one layer at a time, which is why it is also sometimes called additive layer manufacturing (ALM).

Additive manufacturing is different from traditional manufacturing techniques, which involve subtracting material or molding it into shape. Additive manufacturing can be used to create objects with highly complicated geometries or internal structures that would be difficult to manufacture using other methods.

The aerospace industry has been one of the early adopters of additive manufacturing, using it to create fuel nozzles and other engine components. Additive manufacturing is also being used in the medical field to create orthopedic implants and prosthetics. As the technology continues to develop, it is likely that additive manufacturing will have an increasing impact across many different industries.

All manufacturing processes have their strengths and weaknesses. The key is for professionals to understand their process and stay up to date with the latest technologies that can help their organization beat the competition. That's where this guide comes in — so, read on to learn about the challenges you might be facing in your process, and how FARO 3D measurement software and hardware solutions can help alleviate them.

Your Challenges in the Additive Manufacturing Process



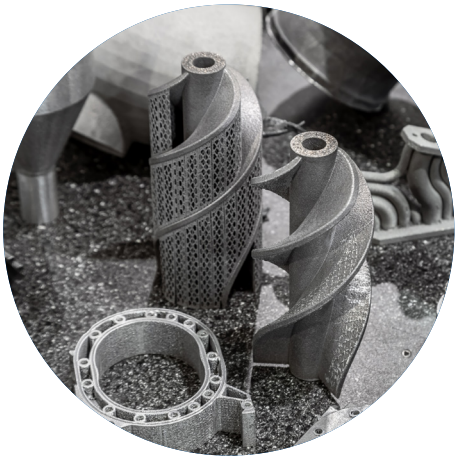
Additive manufacturing is a fast-growing technology with many potential applications. However, it also comes with some challenges, particularly for companies that are looking to use it on a large scale.

One of the biggest issues is wasted time. Additive manufacturing can be very slow, particularly when compared to traditional subtractive manufacturing methods. This can lead to significant delays and higher costs. In addition, additive manufacturing often results in material waste. Because 3D printers build objects layer by layer, it is often necessary to start with more material than is actually needed. This can lead to substantial waste if not managed properly.

Finally, additive manufacturing can be challenging from a quality control standpoint, as the additive process makes it more challenging than subtractive manufacturing to ensure that all parts are identical and meet the required tolerances. As a result, companies must carefully consider all of these factors before deciding whether or not the technology is right for them, and if so, on a small or large scale.

Common Applications for Implementing an Additive Manufacturing Process in Your Organization

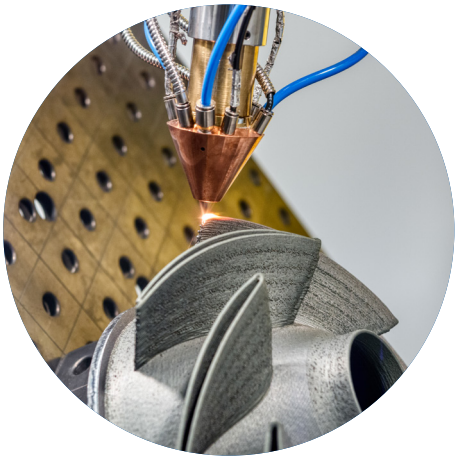
Rapid Prototyping



3D measurement tools, such as 3D laser scanning, have revolutionized the prototyping process because of how they save time and make for faster analysis and troubleshooting.

In the past, prototyping could be a time-consuming and expensive endeavor, requiring the creation of multiple physical prototypes. 3D measurement tools allow engineers to quickly and accurately capture the dimensions of an existing object, saving both time and money. Furthermore, 3D measurement data can be used to create a virtual prototype, which can be explored and modified without the need for costly and laborious physical prototypes. As a result, 3D measurement tools have made rapid prototyping a reality for many companies.

Low Volume Manufacturing



Additive manufacturing offers many advantages over traditional subtractive manufacturing methods, such as milling and lathe turning, for low volume production runs. Additive manufacturing technology is particularly well suited to small companies who need to produce parts in low volumes but cannot justify the cost of setting up and running a traditional machining operation.

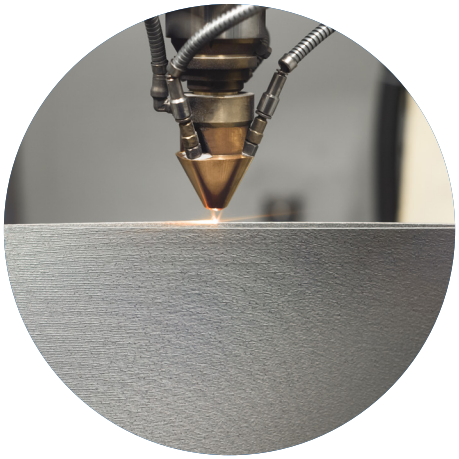
It also allows small companies to produce parts quickly and cheaply, without the need for expensive tooling or fixturing. Plus, additively manufactured parts can often be made with lower set-up costs than traditionally manufactured parts. This is because additive manufacturing technology does not require the use of expensive tools or dies, which must be purchased and maintained regardless of how often they are used.

The Benefits for Product Designers

Product designers, especially, have a number of advantages when they use an additive manufacturing process. Perhaps the most significant is the ability to create complex shapes that would be difficult or impossible to produce using traditional manufacturing methods. Additive manufacturing also allows for the creation of prototypes quickly and cheaply, which can be invaluable for testing purposes.

Small batches of products can also be produced on demand, without the need for large-scale production facilities. As a result, additive manufacturing is a powerful tool that can be used to create innovative and customized products.

Product Quality Benefits



There are a number of advantages for manufacturing operations that employ additive manufacturing, especially when it comes to quality control. The process can be used to produce high-quality parts with increased accuracy and repeatability, and it can also be used to create prototypes and test new designs before they are put into production. In addition, additive manufacturing can significantly increase throughput by reducing the need for rework and scrap. As a result, many manufacturers are finding that additive manufacturing is a valuable tool for ensuring the quality of their products — and thus, long-term user satisfaction and repeat customers.

Measuring Organic Shapes and Complex Geometries

Unlike traditional manufacturing methods, the 3D measurement tools used in additive manufacturing can produce high-quality data points without compromising the integrity of the measurement. As a result, additive manufacturing is an increasingly popular choice for designers and engineers who require accurate prototyping of organic shapes and complex geometries. In addition to increased data quality, additive manufacturing offers a number of other benefits, such as shortened lead times and reduced costs.

As additive manufacturing technology continues to evolve, it is likely that even more applications will be found for this versatile process. But for this to happen, the tools that engineers use must be up to the task. If measuring a 2D object, this is simple to do with a measuring tape and calipers. But for 3D objects, this is not the case.

Simply put, additive manufacturing would not be possible without 3D measurement tools like laser scanners, portable coordinate measuring machines (portable CMMs) and the software to work with the data that these tools collect.

3D Measurement Tools Are Essential to the Additive Manufacturing Process

3D measurement tools like portable CMMs are integral when it comes to an additive manufacturing process. For one, 3D laser scanning can help to quickly and accurately capture the dimensions of an existing part. The quality of the data one receives from 3D laser scanning is exceptional — and these data can then be used to create a 3D model that can be used for reverse engineering, rapid prototyping or simply for reference.

In addition, 3D measurement tools help save both time and money by eliminating the need for costly and time-consuming trial-and-error methods with older technologies. By taking precise measurements throughout the additive manufacturing process, any potential issues can be quickly identified and corrected, leading to more efficient and effective work for the team and organization. Ultimately, 3D measurement tools offer a number of advantages that can improve the additive manufacturing process.

The FARO 3D Measurement Solutions to Optimize Your Additive Manufacturing Process

Handheld, arm-based and tripod-mounted 3D scanning technology plus the accompanying software programs are vital tools for increasing organizational agility. FARO 3D measurement tools help you enhance your additive manufacturing processes in a range of applications, such as:

- Quality Control
- Reverse Engineering
- Aftermarket Design & Parts Production
- Replacement Parts Production
- Rapid Prototyping
- Industrial Design

"After 15 years of using FaroArm portable CMMs at Pratt Miller, the latest generation offers a further improvement in time savings. The resulting productivity gains help support the needs of projects where fast development cycles are required across the motorsports, defense, and mobility industries that we support. Our 4.0m Quantum Max ScanArm with the FAROBlu xS LLP has already reduced the inspection time of molds for manufacturing carbon fiber body panels by 15-25% depending on the complexity and size of the mold versus the previous ScanArm. With the tight timelines we specialize in at Pratt Miller these types of consistent improvements in equipment capabilities from a metrology partner are crucial to retaining a competitive advantage for our customers."

Francis Wilson
Quality Manager, Pratt Miller

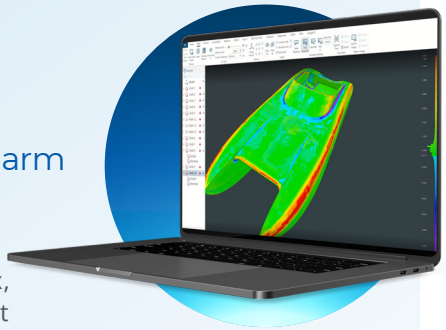
FARO Quantum Max ScanArms

The global standard in non-contact measurement arm technology

Sometimes a part or tool is so complex, you can't use contact probes to capture all of its measurements. But lasers do the job with exceptional speed and accuracy. In these cases, leading manufacturers rely on FARO Quantum Max ScanArms — which combine the measurement capabilities of a Quantum Max FaroArm® portable coordinate measuring machine (CMM) with the non-contact functionality of a laser line probe.

The Quantum Max also offers three LLPs that optimize accuracy, speed or a blend of both, depending on project need. Whichever LLP you choose, 3D ScanArms capture precise measurements in nearly any environment, from the factory floor to the field.

FARO CAM2® Software



The global standard in non-contact measurement arm technology

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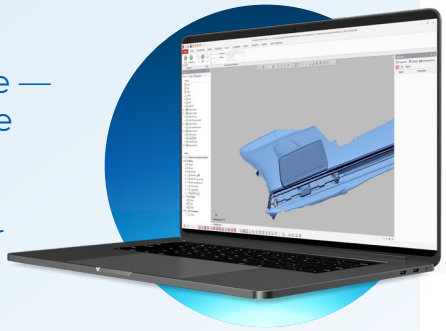
FARO RevEng™ Software

3D point-cloud capture and mesh generation for reverse engineering

The advanced FARO RevEng Software platform empowers you with a comprehensive digital design experience. The reverse-engineering software helps create and edit high-quality meshes and CAD surfaces from 3D point clouds for additive manufacturing processes, and industrial designers can then use these mesh models for further design or 3D printing.

Geomagic® Design X™



From scan to CAD in no time — processes large scan data sets with millions of points faster than any other reverse engineering software.

Geomagic® Design X™ lets you reverse-engineer physical parts into digital parametric CAD models with a reverse-engineering software that combines history-based CAD with 3D scan data processing for the most optimal results. Create CAD models from 3D scans quickly, accurately and reliably, generating new business value out of existing products.

How to Make Your Job Easier and Win More Business

Interpret manufacturing data easily to make fast, informed decisions.

Scan shiny black parts and objects, plus gain measurement access to locations that are out of line-of-sight.

Reverse engineer both legacy and prototype parts to keep your operations running at full capacity.

Speed up the project's schedules and timelines, allowing your company to win more business downstream by **speeding up time-to-market and end-user satisfaction.**

Keep your company away from expensive headaches and **reduce material waste** throughout the additive manufacturing process.

Gain repeat customers through providing **higher quality products and goods.**

Save time while keeping or **improving the quality of your 3D printing projects**.

Engineers across the world are adopting 3D measurement software and hardware solutions to improve their work. Get in touch with a FARO expert today and we'll bring an equipment demo to your site so you can test it out in action

Consult With Our Experts

Local operations around the world. Go to **FARO.com** to learn more.

FARO Global Headquarters
250 Technology Park, Lake Mary, FL 32746, USA
US: 800 736 0234 MX: +52 81 4170 3542
BR: 11 3500 4600 / 0800 892 1192

FARO Europe Regional Headquarters
Lingwiesenstr. 11/2
70825 Korntal-Münchingen, Germany
00 800 3276 7253

FARO Asia Regional Headquarters
No. 3 Changi South Street 2, #01-01 Xilin Districentre Building B Singapore, 486548
+65 65111350

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