

Product Design Process Guide





Increase **Agility**
and Reduce
Risk in **Product**
Development

Accelerate your product design process with 3D solutions, closing the gap between your prototype, replacement part, packaging design or aftermarket development and the computer model.

With FARO® engineering solutions, you'll dramatically reduce the time it takes to turn your ideas into designs that can easily be produced.

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Pain Points In The Process.



If you're working in product development today, you know the need for reducing risk of investment loss, increasing agility and speeding up time to market. The companies that excel in this space are the most agile — the organizations that streamline their product design process and save money wherever possible while ensuring accuracy and quality.

You need a product design process that allows you to test and fail early. Identifying design flaws early speeds up the process and generates revenue faster. Mistakes late in the process cost hundreds of thousands of dollars and hundreds of hours of testing that you can avoid with 3D technology. If you use advanced hardware and software, it can save your organization all the headaches that occur from wasting money on a prototype that you'll only discover later is ineffectual. By implementing some of the most advanced 3D technology available on the market, you can distinguish yourself in your role as engineer by increasing speed to market and keeping ahead of the competition.

Here's what your product design process might look like now — and here's how you can optimize it with 3D technology to save wasted time, money and material, decreasing time to market of the products that will leave your legacy on the world.

Avoid Expensive Design Headaches

Leave it to the late Steve Jobs to describe product design in distinctly human — and poetic — terms. Design, he said, “is the fundamental soul of a man-made creation that ends up expressing itself in successive outer layers of the product or service.” Put another way, product design sits at the intersection of human imagination and creativity, and the technology needed to build, test and iterate on those ideas. It is the process that turns dreams and napkin doodles into reality.

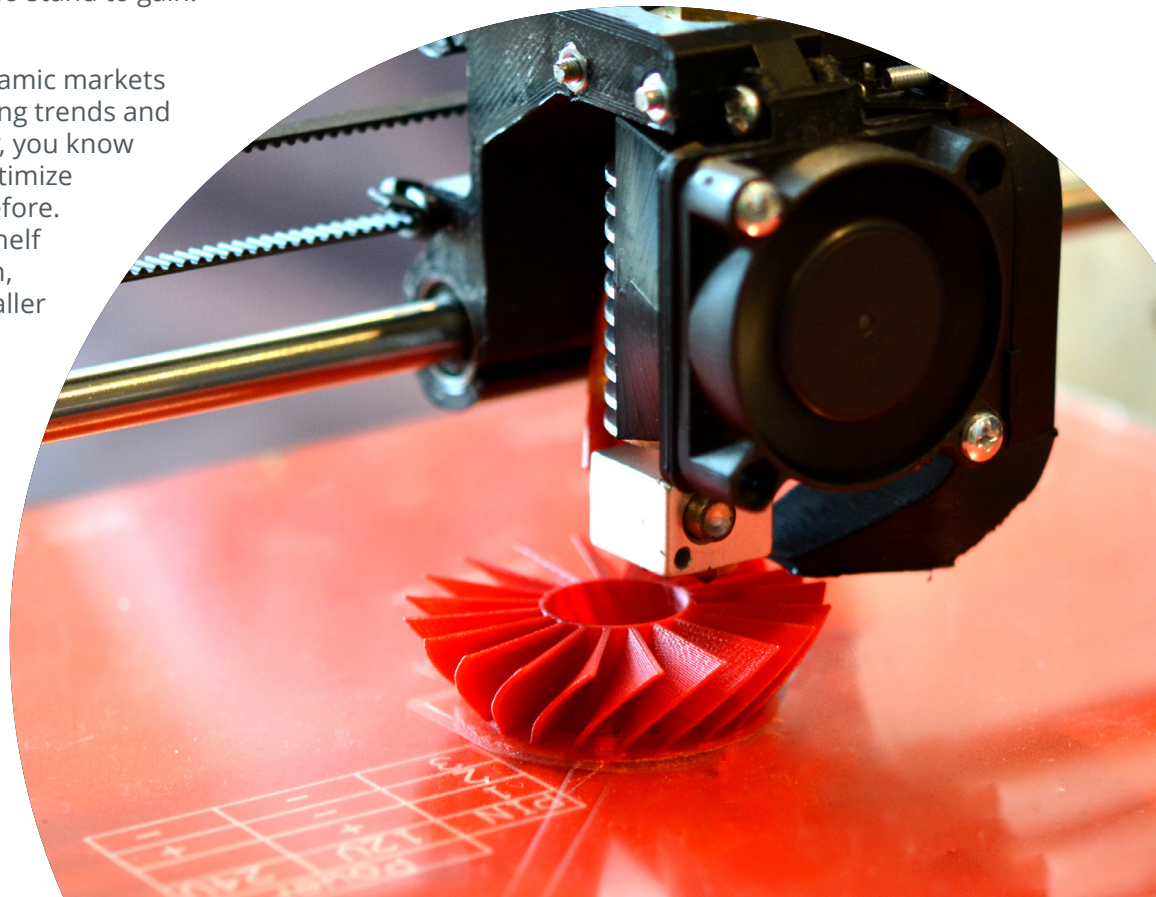
The goal of product design, regardless of market segment, is to solve the end-user’s challenges or address specific needs. Traditionally, much of this work was accomplished through physical product manufacture and testing via manual measurement tools. Today, much has changed as 3D technology is radically accelerating the product design process, reducing costs and driving new efficiencies. Instead of waiting weeks for a machined prototype, you can finish a design today and 3D print it overnight.

By employing such 3D measurement solutions, initial product design is only the first functional area that stands to benefit. Rapid prototyping, the study of Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA) simulation/analysis, aftermarket customization and manufacturing to a new design (i.e. golden part inspection) also stand to gain.

Companies serving highly dynamic markets have to keep pace with changing trends and developments. As an engineer, you know you have to iterate, design, optimize and build quicker than ever before. Reduced lead times, shorter shelf lives, greater product variation, tighter differentiation and smaller batches mean that research and development disciplines have to be flexible, fast and accurate in order to deliver crucial design data.

Once your products are in the market, improvements and additions can enhance a product or assembly as products head towards lifecycle maturity. New accessories and redesigned components can deliver a new lease of life, while new parts may require variations in the original design data that may not exist, may be confidential, or might not be in an easy-to-use format.

Especially for companies looking to reduce material waste to meet organizational sustainability goals, refurbishment instead of replacement can provide an excellent starting point. Machines will reach the point where worn, non-serviceable and underperforming parts can have a hugely detrimental effect on its optimum capabilities. A “make” decision can often make more sense financially and ethically than a “buy” decision, but it does rely on the accuracy of design data for replacement parts. But a lack of accurate design data is not a hurdle if you have access to 3D scanning technology. You can use comprehensive and accurate design data generated from point clouds to improve replacement parts or fabricate them more economically using modern production processes and materials — such as 3D printing, which can help reduce overall weight.





Fast, Flexible and Accurate Research and Development

One automotive company used FARO tools to reduce their time-to-data by 70%, thus avoiding expensive headaches in the design process

Whether you're working in aerospace, railway, automotive or marine industries, retrofit projects can be some of the most unique, bespoke and rewarding projects. With 3D technologies, you can customize standard products to make them more suitable for demanding applications, increasing their performance or making them more aesthetically pleasing. Using handheld, arm-based or tripod mounted scanning solutions, you can measure single products all the way up to an entire vehicle chassis, with multiple point clouds being stitched to create single homogeneous CAD files. Then, you can work with the resulting CAD data in subsequent software solutions to perform additional modeling and design analysis of retrofit components to help ensure optimum performance and end-customer satisfaction.

First Impressions Are Everything

It does matter how incredible your product is if the final delivery doesn't provide that spark to the end-customer. With this in mind, today's leading companies are ultra-focused on their packaging, as it speaks volumes about the

brand and determines whether you'll get a repeat customer or not. If a product is damaged because of its packaging, well, the customer experience is even worse off. Consequently, accuracy and fit for purpose are prerequisites for designing packaging that's both elegant and pragmatic. CAD data may exist for a product about which a packaging concept can be created, but one-offs and special designs often require unique capabilities to match product geometries. Advanced 3D scanning can help you and other engineers create customized packaging solutions and deliver greater protection to high-value components. Collections of products can also be grouped, analyzed and packaged far more quickly and effectively. Agility is key to modern industry as customer and consumer demands dictate ever greater customization and individualization, smaller batch sizes and greatly reduced lead times. Key to this agility is accurate design and manufacturing data. FARO develops portable 3D digitization solutions that accurately capture complex geometries in a huge variety of engineering and design scenarios, including prototypes, products, sub-assemblies, structures and entire working environments.

But 3D data is only the beginning. When you combine the latest software and data capture hardware, it allows you to easily, quickly and accurately digitize a part, an object or an environment and create a fully surfaced CAD model, which can then be deployed in a wide variety of subsequent design and testing procedures.

By bridging the physical and virtual world with a full 3D representation, everything you need is at your fingertips. Your work can be completed correctly with the least amount of waste or re-designing as possible, using digital references to verify that models are both accurate and complete.

Your Ideal Product Design Process

If you want to save time, save money, save material waste and win downstream business for your company, you need to be considering 3D measurement technologies for your product design needs. When incorporated into your process, these technologies alleviate the pain points that come from working with the old tools and techniques. Adding them to your workflow also allows you to take advantage of newer technologies like 3D printing that can dramatically reduce prototype costs.

Although the benefits are numerous and often have beneficial knock-on effects, the four main reasons to improve your process with 3D tools are as follows:



**Save Time
on the
Job Site**

You can save an incredible amount of time and improve the quality output of your product design process when you use 3D measurement technologies. You'll close the gap between testing and the computer model faster, with 3D data that's accurate down to a few tenths of a millimeter, and on software that's accessible 24/7. No more wasted time transferring knowledge from the physical prototype back to the digital design — and using a portable measurement arm like the FARO ScanArm you'll be able to scan shiny black parts without the time-consuming task of placing stickers or spraying the parts prior to scanning.



**Save
Money**

Whether you're working in aerospace, machining, assembly, automotive or any other number of fields, 3D measurement tools can help you produce the exact design data that you need. This technology can shave weeks off your working time, allowing your organization to complete your projects ahead of schedule.



**Save
Material
Waste**

The peace of mind and confidence you get during design, after having taken measurements with 3D tools, is incredible. There are no surprises, which means you'll avoid costly rework and also reduce material waste. If your company has a sustainability goal, adopting 3D measurement technology is an excellent way to tangibly reduce the physical waste created on the job.

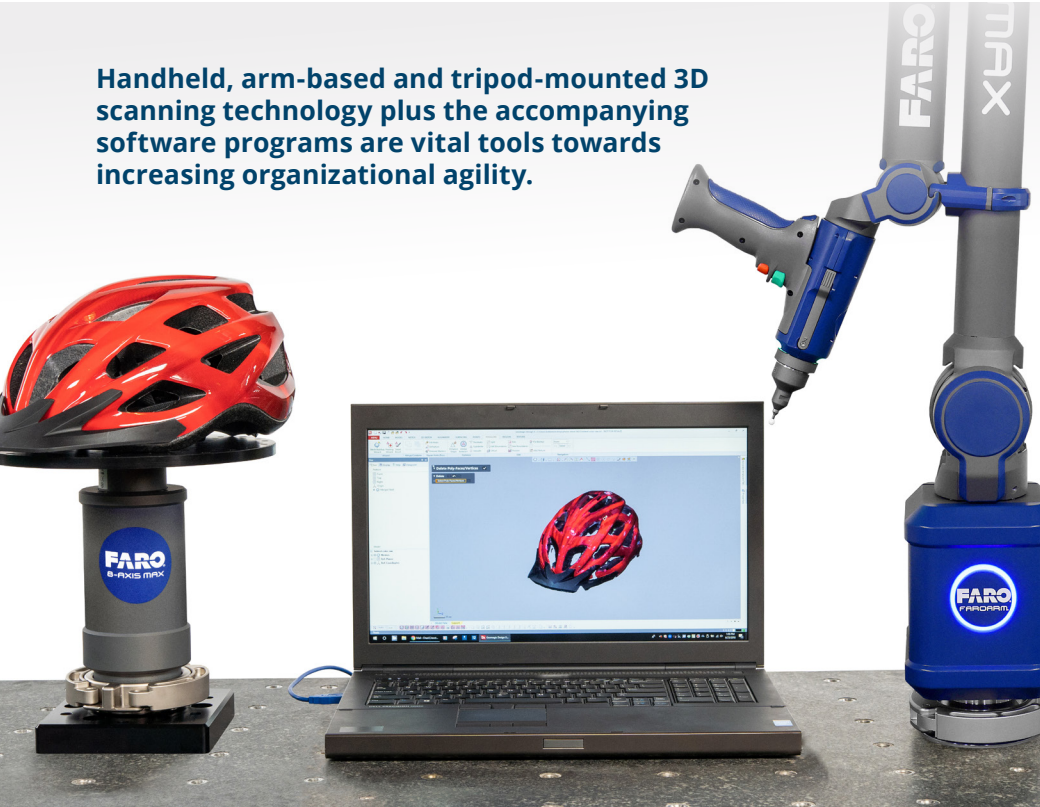


**Win
Business
Downstream**

Simply having the capability that this advanced technology provides can be the difference between winning a business deal and losing a lucrative project. While this technology is increasingly a tool that companies can't do without to keep up with the competition, lower-tier suppliers can find an incredible competitive edge over their peers that might not have adopted 3D solutions.

The 3D Tools That Can Make Your Product Design Process Easier

Handheld, arm-based and tripod-mounted 3D scanning technology plus the accompanying software programs are vital tools towards increasing organizational agility.



FARO 3D measurement technologies help you enhance your engineering processes in a range of applications, such as:

- Reverse engineering
- Rapid prototyping
- Replacement parts production
- Additive manufacturing
- Aftermarket design and parts production
- Industrial design
- Casting
- Forging
- Injection molding inspection



Quantum Max FaroArm® Series

The global standard in contact and non-contact, portable measurement arm technology — an all-in-one solution comes with Laser Line Probes and 8-Axis. Faster, more accurate product design and engineering allows you to expedite your reverse-engineering and rapid prototyping operations for shorter time to market.

FARO Quantum Max ScanArms

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, which can both scan and probe the specimen, 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.



“Thankfully, with the FARO ScanArm, we can now scan black parts quickly and accurately. We used to take up to two full days to completely scan one car, but we can now finish the same task in one day.”

Yutaka Kikuchi

Development Division Manager, Mooncraft Co.

FARO RevEng™ Software

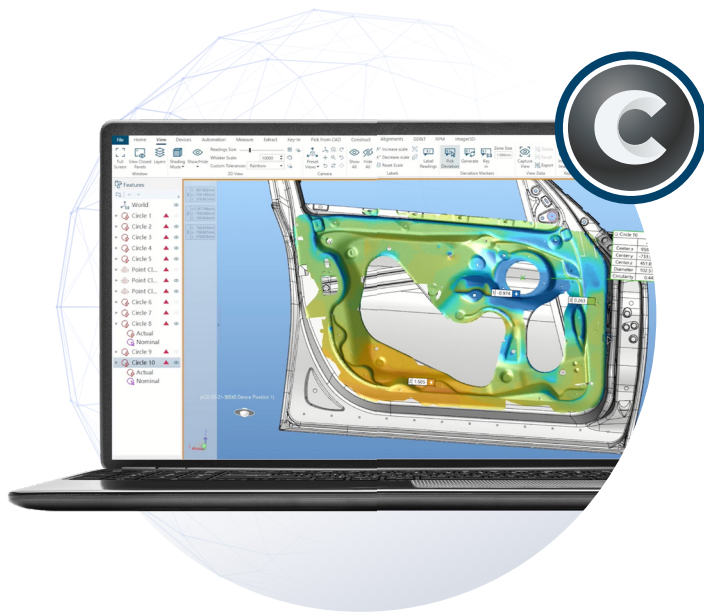
Create high quality, ready-to-print meshes from 3D point clouds. Enhance your product design process with comprehensive mesh editing tools, which are extremely useful when dealing with incomplete data from broken or incomplete parts. Additionally, you can create high quality CAD surfaces quickly — with the automatic NURBS (Non-Uniform Rational B-Spline) Sketch Tool — ready to be exported to your favorite CAD packages for reverse engineering. Whether your work requires aftermarket design, replacement parts or new design iterations for the auto industry and other segments, RevEng streamlines the entire process.



FARO CAM2® Software

CAM2 is designed to easily and intuitively manage quality assurance and inspection tasks, featuring guided workflows and extensive reporting capabilities. With the information at your team's fingertips, they'll be equipped to make smarter decisions faster and stay ahead of any problems. Furthermore, faster troubleshooting and root-cause analysis help increase your company's overall yield.

And with CAM2® Premium — which is a combination of CAM2 and RevEng — you have the ability to reverse engineer, create high-quality meshes and CAD surfaces ready to be imported into any CAD software, plus create golden parts and perform quality inspection, all in one software package.



“As for a single, portable and practicable CMM, FARO just can't be compared to. Its features and ease of use makes it one of the most sought-after pieces of hardware for inspection and design purposes.”

Bryan Hook
Hubner Manufacturing Co.



FARO Focus Laser Scanners

For fast, complete and accurate measurements of large and complex objects, Focus Premium Laser Scanners enhance the accuracy and speed of your design and engineering processes. When a product has no CAD data, simply scan it to get all the measurements you need for reverse engineering. And when manufacturing fixtures and fittings for ships, cars or aircraft, scan the complex interiors as your basis for planning conversions.

How to Make Your Job Easier and Win More Business

If you want to improve accuracy, speed and increased yield during your entire product design process, FARO tools will help you overcome your challenges in a variety of ways. These tools will help you:



- Save time while keeping or improving the quality of your projects.
- Scan shiny black parts and objects, plus gain measurement access to locations that are out of line-of-sight.
- Interpret manufacturing data easily to make fast, informed decisions.
- Keep your company away from expensive design headaches and reduce material waste throughout the product design process.
- 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 increasing time to market and end-user satisfaction.
- Gain repeat customers through providing higher quality products and goods.

Engineers across the world are adopting 3D measurement solutions to improve their work, closing the process loop between prototype and computer model. 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](#)

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