

Pedal to the 3D Printed Metal: How Laser Measurement is Transforming the Automotive Industry



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"If you can dream it, you can do it."

Enzo Ferrari
Founder of the Ferrari automotive brand

While few industry leaders would quibble over the wisdom of the late [Enzo Ferrari](#), Dave Kindig, President and CEO of [Kindig-it Design](#), a Salt Lake City-based custom vehicle restoration and remodeling company and star of his own hit [reality TV show, Bitchin' Rides](#), would probably expand on that sagely advice.

That's because since 2017 his 24-year-old company has started to adopt 3D laser scanning technologies as a

way to streamline workflows, drive new business, cut down on cost, speed project completion, and make it easier for their customers' automotive dreams to be brought to life. Working with [FARO Technologies, Inc.](#), a global leader of 3D measurement, imaging and realization solutions for the 3D Metrology market, Dave calls the hardware and software solutions the company develops his "magic wand."

"This is what gives Superman his ability to look through walls," Dave said in a recent interview. "FARO 3D laser scanners and contact and non-contact portable coordinate measuring machines are my X-ray vision. With tools like this I'm able to acquire real-world data very, very quickly and very precisely with perfect measurements, put that data into a computer and design custom vehicles off of that, all of the custom elements that we want to do."



Chevrolet Camaro

Through Dave's perspective no vehicle body part is off limits. From entire engine bays to the inside of vehicles, 3D laser scanners can capture irregular geometries with ease and do so quickly, creating a digital replica of the as-built physical object, used as the basis to construct a CAD model that can further be adjusted and shared with a variety of project stakeholders. The newest FARO Quantum Max ScanArm, for example, features three purpose-built hot-swappable Laser Line Probes (LLPs) and is designed to meet a variety of small and medium-sized measurement needs, eliminating the guesswork commonly associated with more traditional hand-measuring techniques.

Putting 3D Tech through its Paces

Like many in the automotive industry, Dave, who is 52, came of age in a different time. He may have grown up with Star Wars and futuristic hyperdrive spaceships, (an on-screen inspiration he recalls from his youth after he saw the film in theaters for the first time) but



1967 Chevrolet C10 Convertible Hardtop, named the "Game Changer"

it's important to recall just how analog George Lucas' cinematic creation was. In 1977 there was no CGI, there were no computers on set, no digital recordings, and no motion capture. Models were hand drawn, hand crafted, and hand painted. Measuring tape, paper, and pencils were the tools of the trade.

And to people like Dave, there was (and still is) a perceived authenticity in that kind of work. But with 3D technology — laser scanners, scan arms, trackers, and 3D printing, a type of additive manufacturing — those perceptions are beginning to change.

In fact, the top 5 automotive uses for 3D laser scanning [include](#):

- **Reverse Engineering** — Most useful when a part is not available and a replica can only be made from scanning the original article and reassembling that part within a digital model as part of a 3D scanning software package.
- **Vehicle Customization** — This is what the team at Kindig-It Design does most and it's where the art and science of vehicle restoration intersect. Parts from other vehicles are mixed and matched with an existing vehicle to create something entirely unique.
- **Accessory Manufacture** — Speaks to items like floor mats. Here, too, laser scanning determines the exact dimensions of the inside of a vehicle so an accessories manufacturer can create an exact match.
- **Prototyping** — As noted above, 3D printing or additive manufacturing, builds actual vehicle parts layer by layer (additive versus subtractive) combining a 3D scan with a 3D printer. This allows the reproduction of actual objects without the need for casting and molds.
- **Creative Thinking Catalyst** — Sometimes a 3D laser scan is used not to replace a traditional method of design iteration, but rather as a way to augment the creative process. Clay is often used to create scaled-down models of actual vehicles. 3D scanners can scan the clay model and use that model to build the CAD design. It's a way for engineers to double check their work and think outside of the box.

Broadening use cases like these underscore why 3D tech in the automotive industry continues to gain ground. [Spherical Insights](#), a global research and consulting firm, finds in its May 2023 report that the world's 3D laser scanning market size is expected to grow significantly in the next 10 years, with a compounded annual growth rate (CAGR) of 13%. According to the report, "the widespread use of 3D scanners in reverse engineering, quality control and inspection, virtual simulation, and other applications in industries such as manufacturing, automotive, medical, aerospace & defense, electronics, retail, architecture & construction, energy & power, mining, artifact & heritage preservation, and others is expected to drive the 3D scanning market during the forecast period."

For Dave and The Kindig-It Design Team, market growth stats like these aren't surprising, especially considering how well his staff has taken to FARO technology and how much it's transformed their production efficiency.

"I'm very excited to see what the newest products will be in the future," Dave said. "I mean, we have a FARO scanner, but this isn't our first one. This is actually our second model. We've actually gone up to the next model and we're very happy with the results — how quickly the data comes out on screen; the overlap is nothing like the first years of any kind of scanners. The job has literally become easier in the last two years than it was even four years ago."



Greg Hebard scanning a 1953 Kindig CF1 for reverse engineering purposes

At present, Dave's team uses the Quantum Max on a weekly basis, sometimes multiple days per week. Other times all the week's scanning is condensed into one day and performed in a designated "clean area." Greg Hebard, Kindig-It's Digital Fabrication Specialist, scans the most and has become highly proficient in it. All it takes is minutes to capture the data he requires. Once the data is acquired a 3D model is generated via imaging software. Next, the part or piece of sheet metal is created right from the company's on-site 3D printer.

A perfect example of how the technology is used would be on a recent 1967 Chevrolet C10 remodeling, which included the addition of a convertible hardtop, along with a dashboard inspired from a 1959 Chevy Impala and gauges that belonged to a 1941 Chevy. Dave and his crew adapted it by scanning the dash, scanning the gauges, and then adding the material, which was 3D printed between them, creating an entirely different dash that doesn't belong in any previously designed vehicle.

Robots, AI, and Tomorrow's Automotive Assembly Today

In the immediate future, Dave envisions several developments. The most obvious, of course, is continued adoption of laser scanning technology — not only in his Salt Lake City shop, but across the automotive industry.

And as a key promoter of its benefits, to help others learn to recognize the time and efficiency savings such technology achieves, while at the same time, helping shift the traditional narrative that such work can only be done by hand, or that the investment into the technology is best saved for stronger economies.

Then there's the advent of ever-smarter machines and artificial intelligence — both of which Dave sees as inevitable outgrowths of current trends. From the assembly floor, where smart robots can perform first article inspection, and where robots can spot-check other machines to ensure they are producing parts within tolerance upstream in the assembly process, to driverless vehicles and vehicle handling emergency mitigation technology, it is not surprising that it is estimated that by 2030, up to [98%](#) of all new vehicles will have some measure of integrated AI.



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From a classic vehicle design and remodeling perspective, Dave anticipates learning from the younger generation and never being afraid to embrace new ideas or purchasing the latest equipment from third party 3D measurement providers like FARO.

"FARO has been awesome to work with," Dave said. "I can't thank them enough. With FARO's help, we're going to continue to grow our technology portfolio and increase our productivity. When you're building technical parts for hot rods the right kind of equipment like a 3D scanner is essential. It really is the best way to gain real-world information, fast. And use that data to speed production time and take on new business."



1953 Kindig CF1 #2