CASE STUDY

# Making Next-Gen Satellite Communications a Reality With the Help of 3D Scanning Technology

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*Originally published in Quality Digest on 05/15/2017*

## Leading SATCOM Antenna Manufacturer Eclipse Composites Blazing a Trail in Composites Engineering

Everyone in manufacturing has heard about the fantastic properties of composite materials, but if you're not involved in satellite communications (SATCOM), you've probably never heard of Eclipse Composites, based in Bluffdale, Utah. If you are into SATCOM and particularly SATCOM antennas, you know they're a leading name in the industry. You would also know that Eclipse is doing cutting-edge engineering and manufacturing with composites. Eclipse is a high-volume manufacturer of next-generation products for the defense, aerospace and microwave communications markets. The company has earned a reputation as a leader in the development of advanced composite hardware which is designed to meet the rigorous standards of the U.S. military.

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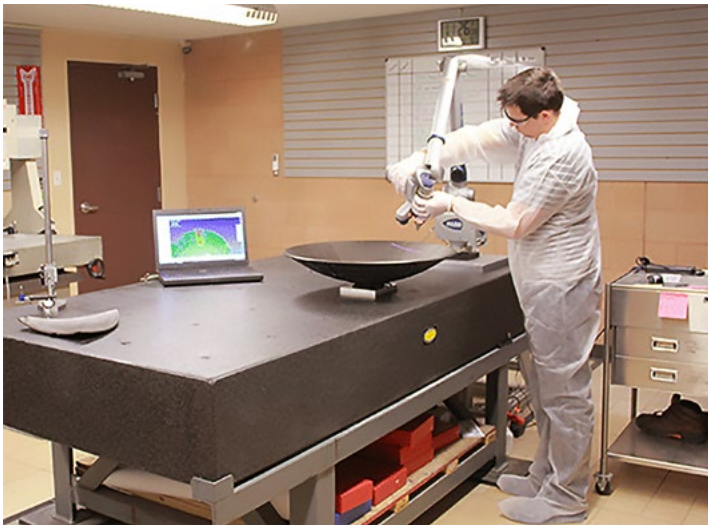
***Andrew Pett***
*Process Engineer*
*Eclipse Composites*



*A FARO® ScanArm® is used for inspecting and verifying the tolerances of an Eclipse antenna.*

"Eclipse is the industry standard in SATCOM antennas," says Jake Leikam, Quality Assurance Engineer, Eclipse. "If you take a walk around the floor of any satellite show, you'll see our products all over the place. We are known world-wide as the best antennas out there."

## Waves of Change

In 2006, Todd McNeill, veteran SATCOM engineer, founded Eclipse Composites in his garage. McNeill's can-do company has been growing steadily ever since. Composite SATCOM antenna manufacturing is a unique and lucrative corner of the market. It's also a very evolutionary business – things change, and change quickly.

"When we started, we were dealing with the X and Ku band and low .020"-.030" Root Mean Square (RMS) tolerances." says Leikam. RMS is a measurement of a surface's deviations versus its nominal or theoretical shape as defined by the CAD model. Leikam continues, "Along comes the KA band, which is a more focused beam on a higher frequency … that's where the tighter tolerances became critical for us to achieve, specifically because surface deviations or undulations affect reflectivity and therefore signal quality."

"KA is a high frequency band that requires a higher precision," says Andrew Pett, Process Engineer, Eclipse. "The whole surface of a KA dish has to be within about a .010" RMS of the CAD model."

## Riding the Waves of Change

To successfully grow in this lucrative field, Eclipse invested in a FARO® Edge ScanArm®. The FARO Edge ScanArm is the perfect contact/noncontact measurement system. Unlike other scanning systems, the ScanArm's hard probe and Laser Line Probe (LLP) can digitize interchangeably without having to remove either component. Users can accurately measure prismatic features with the hard probe, then laser scan sections requiring larger volumes of data – all in one simple tool.

"We were trying to position the individual antenna petal segments in a small, fixed CMM," says Pett. "With the dual curvature of the petals, there's no flat datums to work with. It's hard to properly set up and fixture for the CMM to be able lock the part down and take points off of it. And then there are the size constraints. Our dishes go from twelve to nearly forty inches. The CMM just wasn't a viable option to monitor the dimensional tolerances, so we started looking into other options, including the FaroArm®. That's ultimately what drove us to get a FARO Edge ScanArm."

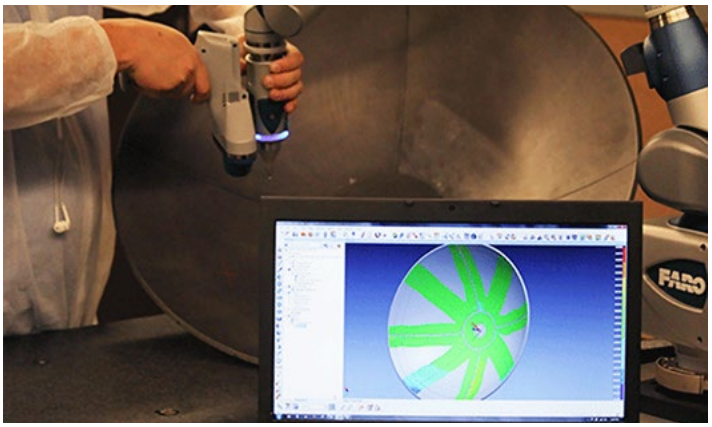
*"The FARO ScanArm is a huge part of our ability to produce the things that we do. It is, in my opinion, an outstanding piece of equipment. It's extremely fast; we can inspect parts in minutes versus hours or sometimes even days. Older techniques just can't compare.*

*"… It's difficult to pinpoint when we saw a return on investment, but certainly it paid for itself the first year of use. We've certainly seen ROI several times over since we purchased it."*

***Jake Leikam***
*Quality Assurance Engineer*
*Eclipse Composites*

The FARO® Edge ScanArm® is the ideal tool for inspection, point cloud-to-CAD comparison, rapid prototyping, reverse engineering, and 3D modeling, and has become an indispensable part of Eclipse Composite's processes.

"The FARO ScanArm is a huge part of our ability to produce the things that we do," asserts Leikam. "The ScanArm is, in my opinion, an outstanding piece of equipment. It's extremely fast; we can inspect parts in minutes versus hours or sometimes even days. Older techniques just can't compare."



## Making Sense of the Data

In any business endeavor, quality data requires quality interpretation. Inspecting and analyzing a measured part is only possible if the digitized data is properly positioned and oriented in 3D.

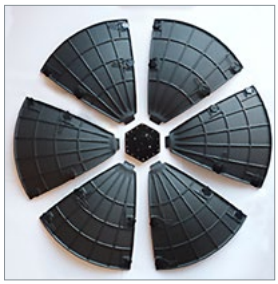
"We've married-up our FARO ScanArm with Polyworks® software. It works great and it's very user-friendly," says Leikam. "Our inspection criteria is completely customer driven. Some customers want a full-spectrum comparison point for their systems while other companies just want a color-map and a feel-good inspection."

At the core of the PolyWorks workflow is the extraction of measured part dimensions and computing the deviations to their corresponding nominal dimensions. Thanks to the remarkable flexibility integrated into PolyWorks, dimensions can be extracted from measured point clouds, polygonal models built from point clouds, or probed points. Nominal dimensions can also be extracted from a CAD model or a reference measured part.

"The FARO ScanArm allows us to collect a lot of data, and PolyWorks is a great tool to analyze that data in different shapes and forms," explains Pett. "We've used it to create basic color maps. We've also used it to gather point cloud data from different parts and combine them together into an average to help us modify a tool to yield a better part."

Does the Eclipse team feel that the 3D scanning technology has the legs to grow with them?

"It only takes about 4 weeks to learn all the controls," adds Leikam. "And then a lifetime to discover all the additional things you can do with it."



## Portable Tools to Create Portable Products

"The portability of the ScanArm is outstanding," claims Leikam. "If we need to do an on-site inspection, that happens quickly. We've had instances where we had to go out and check molds that we've outsourced. We were able to just pack up the ScanArm, grab a laptop and go. In ten minutes, we were up and running and inspecting the part."

## Return on Investment

"It's difficult to pinpoint when we saw a return on investment, but certainly it paid for itself the first year of use," says Leikam. "We get contracts that require this level of technology and quality-inspection reporting, so we wouldn't even be able to function at this level as a company without it. Especially working into the KA field, we would not be able to meet customer expectations for tight tolerances. There would be such a huge lag time, people would just go elsewhere. We've certainly seen ROI several times over since we purchased it."

## Takeaways

SATCOM antenna manufacturing is, of course, not the only industry affected by rapid changes in materials and manufacturing methods. The fact is, having the proper tools for modern manufacturing can be a deciding factor in whether your organization is profitable or whether it can even compete in a given field at all.

"Without the FARO® ScanArm®, we wouldn't have the capability to do the things that we do now," admits Pett. "The biggest thing for us is that investing in the ScanArm was critical to our growth. We would have had to outsource. The cost, turn-around time, and vagaries of quality inspection just wouldn't be viable."