

Aircraft components manufacturer adds another leg to lean journey

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As part of its journey down the path of lean manufacturing, Globe Engineering Co. Inc. reviewed how it verified the dimensions of the tube it bends. Its investigation led it to abandon its conventional mechanical measurement methods and adopt a camera-based optical system.

For much of the 20th century, Wichita, Kan., was an aircraft mecca. Clyde Cessna, Emil Matthew “Matty” Laird, Lloyd Stearman, Walter Beech, Al Mooney, and Bill Lear formed aircraft manufacturing operations in and around Wichita and would contribute to its reputation as the Air Capital of the World. It was in this environment that a former Boeing engineer, Albert Nelson, Jr., launched a line of children’s furniture. Using a self-designed tube bender and aircraft-grade tubing, he made products that were nearly indestructible. He later changed the direction of the company, and since then, the biggest names in the aircraft and aerospace industries have come to rely on Globe Engineering Co. Inc. for components and assemblies. Globe has a reputation for taking on difficult projects.

Currently, Globe’s 221 employees fabricate more than 100,000 aircraft tubes a year. In addition to bending tube, Globe’s core competencies include hydroforming, machining, welding, complex assemblies, spinning, and heat treating. Its customer base goes far beyond the Wichita city limits, encompassing 150 customers throughout the world. One of the ways Globe has achieved such growth is by analyzing its production methods and searching for improvements, a process that was started many years ago.

Nelson always invested in the latest machines and technology to keep ahead of his competitors. Although he sold the company to his employees in 1994 through an ESOP plan, Globe has continued to thrive, in large part because of its ongoing commitment to investing in technology and its commitment to lean manufacturing.

Running Fast, Running Lean

Globe committed to lean manufacturing in 1997. Its employees interpret lean manufacturing as increasing the productivity and efficiency of each employee while reducing waste. This has the desired effect of bringing down manufacturing costs while increasing quality and capacity.

Globe Manufacturing has taken advantage of lean manufacturing programs offered by its customers. Bend Shop Supervisor Shaun Knuth was one of the first Globe employees to take Boeing’s Introduction to Lean manufacturing course. Knuth followed up with an additional week of lean trainer instruction in Seattle. For years, he has led a two-day course—Introduction to FOD, 5S & Lean Manufacturing—for new Globe employees. Employees also participate in lean workshops and kaizen events in their own and other Globe shops.

Globe Engineering believes that achieving lean manufacturing requires cross-training, capital investments, and synchronizing activities through proper management. The core of lean manufacturing is the implementation of 5S method: Sort, simplify, sweep (physical & visual), standardize, and self-discipline.

Globe adds one more key item: Invest. Globe Management considers it important to invest not just in capital equipment, but also in employees. Trusting employees to directly manage the quality of parts they produce is just as important as investing in equipment to achieve efficiency and deliver a quality product. Because Globe is employee owned, every employee has a personal stake in fabricating the highest quality parts in the aircraft industry.

Lean Bending

While looking for opportunities to increase efficiency, Globe discovered a need in their first-piece setup of tube bending machines. Globe had been using a conventional mechanical system that was found to be slow and lacking in measurement consistency. Results varied between measurements and among operators. It was not unusual for the first-piece setup to take longer than the production run.

In 2007 Globe Quality Manager Jeff Teague—now Globe president—recognized the opportunity to take a step forward by evaluating a TubeInspect system from Accurex Dimensional Measurement. The TubeInspect is an optical measuring system that uses an array of high-resolution digital cameras to render accurate images of tubes or wires in seconds. After the user places a tube on the measurement bed, the system creates a series of images that the software combines to create a 3-D model of the target object. The software then compares the model to the print. Because the process is automated, the result is a measurement that is fast and repeatable.

One Inspection System Serves Nine Benders. The new system measures any tube, no matter what type of machine was used to bend it, and it sends feedback directly to the bending machines, of which Globe has nine. Nine benders feeding a single inspection system sounds like a bottleneck, but it's not. This capability improves productivity and allows the machine operators to take direct measurements, saving time and reducing errors.

In a clear example of lean efficiency, Globe's bender operators now have immediate access to detailed information that previously was available only to management. This allows quality and manufacturing decisions to be made quickly by the operators themselves, based on objective standards.

Every operator receives the same results, whether they have been running the machine for five years or five minutes. This is an excellent example of the fourth lean S: standardization.

More than Speed and Accuracy. After the new machine was integrated into the work flow, it changed almost every aspect of the company's operations, from quoting to shipping.

In addition to decreasing setup time, improving quality, reducing fixture use, and reducing scrap, the optical system presented some unpredicted benefits. Providing immediate, accurate dimensional information to everyone on the shop floor may have had an even bigger effect on employee involvement and overall productivity.

Knuth summed it up: "As soon as we installed the TubeInspect, we saw everything move faster and better in the tube area. It gives everyone fast, accurate results and is incredibly reliable."

It went so well that Globe changed its operations somewhat, creating two separate bending shops: one bends tubes up to 1 inch in diameter, and the other bends all the rest. Globe invested in a second, larger inspection system for the second shop. Overall, the company has experienced a 70 percent decrease for first-piece setup time, scrap reduction, and elimination of other measurement methods—all are important steps on Globe's lean journey.



Globe Engineering Co. Inc. invested in two optical measurement systems, TubeInspect models P8 and P16. The smaller unit measures tube up to 39 in. long in diameters from 0.040 to 5 in. The tolerance is ± 0.001 in. The larger unit handles tube up to 102 in. long in diameters from 0.12 to 8 in. long. The tolerance is ± 0.003 in.