

# USER CASE STUDY

## Kreisler Industries



### Bringing final inspection into the manufacturing cell

Kreisler Industries, founded in 1914, manufactures tube and manifold assemblies for aircraft engines. Kreisler products show up in aircraft like the Boeing 787 engine and the latest F-35 Joint Strike Fighter. A speciality of the company's products is manual and orbital-welded joints.

For Kreisler, flight safety is the bottom line and the company's ambitious goal is zero customer returns. According to Kreisler President Michael Stern, "We call a customer return an 'escape,' and no level of escapes is acceptable. The passengers, pilots and crew are all counting on us to perform our inspection correctly in order to eliminate any risk to the safety and well being of the flying public." For Kreisler, escapes are very expensive, both in monetary terms and in customer satisfaction.

Kreisler aims to identify visual defects as early as possible in the manufacturing process, to reduce the cost of rework and decrease the likelihood of a nonconforming part ever reaching the customer. It has implemented tools like six sigma and lean manufacturing, and all welders go through a visual training program, with a practical component of visually inspecting actual parts and a technical component of reading specifications and understanding what is acceptable to their customers. And the visual inspection includes what Stern terms "very aggressive borescope inspection". Kreisler uses Hawkeye Precision Borescopes to inspect weld joints to ensure the quality of the weld is acceptable and that the part is flight worthy, with all welders and weld operators trained in visual inspection requirements and performing borescopic inspections. This gives the welder or weld operator immediate feedback on whether the penetration is acceptable without waiting for x-ray results. This allows the operator to change welding parameters as necessary to ensure a conforming part.

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*Michael Stern, President,  
Kreisler Industries*

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Kreisler used to have just one borescope, but the increased complexity of its assurance program demanded additional instruments. As well, Stern highlights that the affordability of the Hawkeye borescopes allows each cell and welder to have one. Kreisler has effectively brought final inspection into the manufacturing cell.

Kreisler is adding another capability to the inspection process with its addition of video systems attached to borescopes. Explains Stern, "The video systems provide blown-up views, so they give inspectors an enhanced picture of welded joints. Welders can just lay down a tube and twirl the scope around to easily and quickly inspect their work. Also, the video system has become a great tool for welder training on visual requirements."

Kreisler also inspects all welds with x-ray equipment, and an x-ray Level III inspector often uses a borescope to confirm something seen on the x-ray image. Kreisler then sends each part for a final inspection where the inspector may use the borescope to verify the weld meets specification.

Before introducing borescope inspection, Kreisler's options for inspecting parts were a magnifier with a light source or end of line x-ray, which, says Stern, "gets a lot more expensive if we wait to inspect and correct a part at x-ray stage."

Ultimately, adds Stern, "Achieving the highest level of quality is a continuous effort, and whatever we can do to increase efficiency to the manufacturing cell we will do."

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