ZEISS

Seeing beyond

Productivity Enablement for the Aerospace Shop Floor

ZEISS AEROSPACE SOLUTIONS

Quality assurance in the aerospace industry presents unique challenges to maintain high standards for safety-critical parts without impeding the speed of manufacturing and overall productivity. These challenges are amplified by stringent authorizations — including more specs to follow, strict paperwork traceability, and compliance and certification standards.

At the same time, the aerospace industry's OEMs have been increasingly consolidating their supplier bases. There are many reasons for this, including the high cost to enter the aerospace market, exceptionally long product lifecycles of as much as 30 years, and long-term service agreements that limit new supplier opportunities. But if OEMs are limiting their supply chain, how can aerospace component manufacturers keep their customers and stay competitive while producing safe and trustworthy parts?

How Can Aerospace Suppliers Stay Competitive?

"Today's manufacturing entails a higher level of precision than ever before," says David Wick, Director, Product Management for ZEISS. "This is particularly true in areas where performance is critical and where failures can be costly or dangerous. Examples include automotive, aerospace, orthopedic devices, and a variety of industrial manufacturers, for which a single out-of-spec part can cause catastrophic failure of entire systems."

Delivering quality components under increasing OEM pressure

Due to these pressures, the supply chain has benefited from the steadfastness of aerospace OEMs in the past. Stability was guaranteed by relationships based around commitments to large order backlogs and assurance that suppliers could handle increasing aircraft production rates. In this new world of aerospace competitive dynamics, however, OEMS are aggressively reducing costs by squeezing the supply base for price reductions.

Suppliers are being increasingly pressured to deliver increased production, enhanced service, faster turns, and lower prices, all while maintaining the highest of quality standards. Inspection of these products is vital, and quality cannot be sacrificed.

These quality standards are maintained by inspecting raw materials, parts in process and finished products before they are sent to an OEM. Manufacturers are delivering products that will be part of avionics, aerostructure and propulsion systems, and include such components as:

- Fans
- Wings
- Combination parts and chamber
- Turbine blades
- Blisks
- IBR-IBS (Integrated Blades on Rotor — Integrated Blades on Stator)
- Rotors
- Engine parts
- Gears
- Gearbox components

Each component has its own challenges. During the inspection process, for instance, a vendor might encounter an unexpectedly complex task in a machined component, such as a turbine blade.

"One of the most time-consuming measurement applications in aerospace is measuring the characteristics of turbine engine blades," says David Wick. "This is because the blades contain multiple characteristics that must be measured in different ways and with different sensors — both contact and noncontact."

The interconnectivity and interdependence of aerospace parts require high precision. Beyond imperfections, inspections can also be used to find particulates and debris that need to be caught before any required post-processing, such as coating or heat treatment.

Strict Aerospace Quality Standards

Quality inspection can also ensure a part is up to the aerospace industry's high-quality systems and performance standards, such as AS9100. As explained by the Performance Review Institute: "AS9100 takes the ISO 9001 requirements and supplements them with additional quality system requirements, which are established by the aerospace industry in order to satisfy DOD, NASA and FAA quality requirements. The intent of the standard is to establish a single quality management system for use within the aerospace industry."

Attaining this certification is not easy, so any company that has attained it has proven they've put in the time and effort to maximize quality. A typical certification process involves months of training, followed by an audit process that is repeated at regular intervals. From filing paperwork to producing a plane engine, AS9100 certification shows a supplier can conform to strict quality, safety and reliability standards.

Adding Industrial Metrology to the Shop Floor

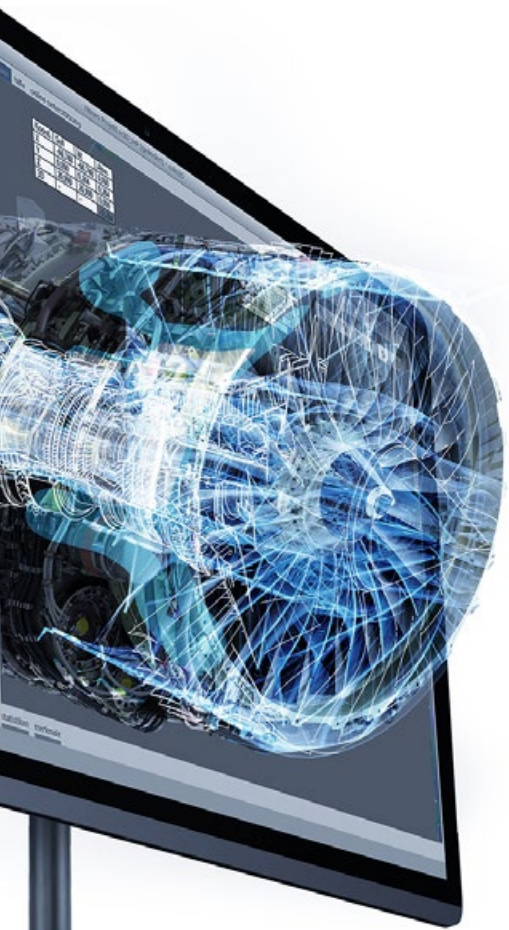
For suppliers, floorspace is at a premium. You need to deliver a combination of speed and quality on the shop floor to stay competitive in the crowded field competing for OEM business. Despite the need for both speed and quality, many manufacturers have not yet implemented metrology on their shop floors.

A manufacturing manager's instinct may be to assume that this will slow down the production process, but reviewing the lessons provided by the automotive industry over the last few decades proves companies cannot afford to wait on improving their quality performance.

According to Joseph M. Geraghty of Aerospace Manufacturing and Design: "The automotive industry's transformation was at times bumpy, but those efforts have become a way of doing business and have led to failures in the supply base. The push to improve supplier performance, eliminate waste, and improve quality has resulted in billions of dollars of savings to automotive manufacturers."

Once shop floor metrology is implemented — with CMMs operating alongside CNCs — it becomes integral to the production process. With ZEISS solutions for the aerospace industry, a supplier has access to the latest technologies that can deliver precision and speed on the shop floor.

This is a must for an industry in which not every supplier works on the same supplier chain structure. While some vendors adopt tier 1 and others utilize vertical integration, ZEISS is ready to fit to any specific supply chain structure.



ZEISS Shop Floor Solutions You Can Trust

With the right tools, methods and experience, ZEISS has the best practices to assure total process control on the shop floor. Applying these best practices to increase aerospace component safety, ZEISS measuring systems deliver precise geometries and material parameters. ZEISS CMMs are used for inspecting complex geometries, such as engine components or for assembling large airframes. The material property data generated from the inspections is also used for finite element simulation, flow analysis and reverse engineering.

ZEISS shop floor CMMs can be trusted to quickly check an aerospace part's dimensional condition across the entire production process. Tactile measuring machines allow consistent measurement across many surface finish conditions and metrology of deeper holes and cavities, assuring quality in even modern manufacturing processes such as additive manufacturing. This provides valuable information regardless of part density or finish and guarantees the safety of the parts.

Product Selection

When considering the right metrology systems for your shop floor, look for CMMs that are optimized for integration directly into a production line. The ideal machine will have a robust design, be unaffected by extreme temperature fluctuations and have pneumatic insulation that dampens vibrations from processing centers.

Loading and unloading must also be considered with a CMM's incorporation into a production line. Loading can be automated with a CMM with a variable workpiece base, and the ability to be moved with a lifting truck or forklift allows incorporation without increasing floorspace requirements.

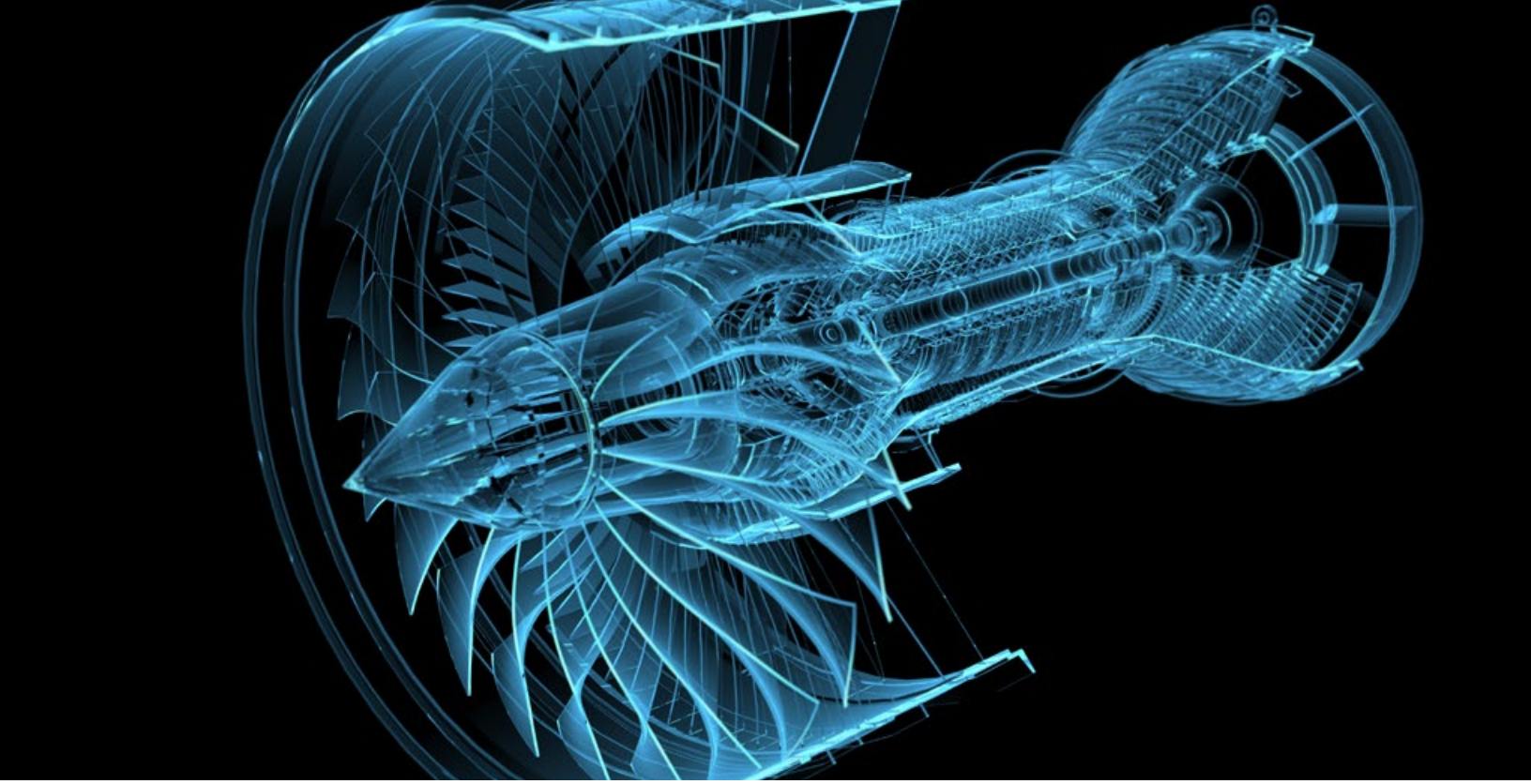
For CMMs that measure directly in a rough production environment with enormous speed and precision, ZEISS Industrial Quality Solutions offers unparalleled stability.

Metrology Software — The Right Tools for Specific Applications

ZEISS CMMs utilize software that drives results with data-oriented business models and improves the production process. ZEISS CMMs all use CALYPSO, a universal metrology software that measures standard geometries and generates measurement plans easily, quickly and reliably.

For a manufacturer of aerospace components, CALYPSO offers a large number of options and the right tools for specific applications:

- ZEISS BLADE PRO determines an enormous range of parameters for the analysis of turbine blades.
- ZEISS PiWeb is included with ZEISS CALYPSO on delivery. The reporting software can combine multiple parts and data from different measurement systems into one customizable report. With this IT solution for quality data management, you can use templates to organize the information flow as it travels through the supply chain, enhancing the quality of your products and process efficiency.



Conclusion

Quality measurement standards are important in every industry, but they are especially vital within the aerospace industry. For suppliers of safety-critical parts to OEMS, every single component and function can affect the lives of countless numbers of people.

With ZEISS Industrial Quality Solutions as your metrology partner, you can increase the robustness of your process and stay competitive by bringing CMMs to the production line. Through a combination of speed and quality on the shop floor, ZEISS delivers safety to the aerospace world.

Contact us for a demo of ZEISS measuring solutions for aerospace component manufacturing.

Request A Demo

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