

## Dearborn Precision

PUTS DUAL PURPOSE ZEISS CMM TO THE TASK



Gear measurements verified using Gear Pro software (courtesy of Carl Zeiss).



A 4.2 meter Accura with Vast XT gold sensor measures a turbine shaft with gears (courtesy of Carl Zeiss).

When the parts you manufacture pass through numerous processes such as deep hole drilling, machining, hobbing and grinding, a CMM (coordinate measuring machine) is essential when your customers require 100 percent in-process and final inspection.

Dearborn Precision Tubular Products, Inc., located in Fryeburg, Maine, has been involved in deep hole drilling, machining tubular components and precision tubing since 1947. Their work experience has led to the development of machinery and processes that are now applied to commercial nuclear, aircraft, land-based turbine parts, and tubular parts in the oil and gas exploration and nuclear industries. With a production facility featuring more than 100,000 square feet of climate controlled manufacturing space, Dearborn can easily produce either single prototypes or large production orders with a variety of parts.

In 2003, Dearborn purchased their first CMM, a Zeiss Spectrum, because of new turbine engine shaft work that required tighter tolerances. Today, this machine is handling the inspection of a large family of standard production parts. Prior to the Spectrum, they were using more traditional instruments such as hard and composite gages, and hand tools.

In 2007, Dearborn was approached to do a large aviation project involving the measurement of multiple parts including long turbine shafts with lengths of up to four meters and multiple gears on these shafts. The goal was to efficiently measure them in one run. This required a CMM large enough to measure the shaft lengths and one that would also allow them to easily change and use multiple sensors to measure the different part characteristics.

After comparing different systems, Dearborn decided to purchase a 4.2 meter Accura as the measurement solution for these long turbine shafts

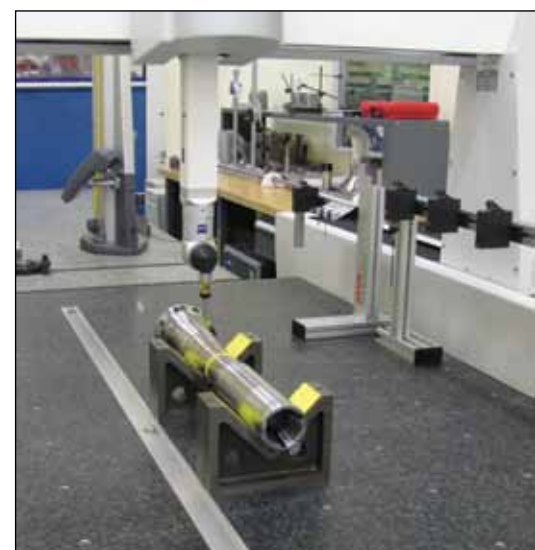
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configured with the Vast XT gold sensor needed to measure deep into the long shafts. The Vast XT can be used with styli up to 800 millimeters long and up to 600 grams in weight. For software, the easy choice was Gear Pro, including involute, bevel, and worm,

which allows them to do a full analytical inspection of the gears. Gear Pro will calculate the tolerances to multiple standards such as ISO 1328, AGMA 2000-A88, and DIN 2962. "This CMM is serving a dual purpose for us," says Andrew March, quality control engineer at Dearborn. "It can

be used for traditional production run inspections and it also allows us to offer a gear checking service to our aviation customers. Most gear checkers are million dollar machines and they can't handle the length of these gear shafts." Dearborn can now measure about 10 of these long shaft parts in a day instead of what typically took a week without the Accura. They are verifying runouts of splines and gears that cannot be done with a gear checker. Typically, a gear checker is limited to about 1.5 meters of measuring height. With the Accura, they can measure gear shafts horizontally with 4.2 meters of measuring length, so runouts with data that distance apart can be measured in one run. This Accura is designed to handle long, horizontally measured gears versus the heavier 3,000-pound gears that are typically measured on three-axis rotary tables.

Dearborn specializes in deep hole drilling, so a typical part would start with drilling long parts followed by cylindrical grinding to hold the tight tolerances of + one ten-thousandth of an inch. There could be precision milling for added features, and gearing and splining would follow grinding. Roundness and runout tolerances are



Standard tubular products inspected on the Spectrum and Accura (courtesy of Carl Zeiss).

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in the ten-thousandths of an inch. All parts go through in-process and final inspection before being shipped to the customer.

The Zeiss CMMs have helped Dearborn add customers, especially those requiring specific certifications. Their ISO 9001:2008 and AS9100B certifications depend on the process and measurement documentation that these measurement systems provide. It shows customers that Dearborn has control of their production processes.

*Calypso* has definitely helped Dearborn with their measurement requirements. They use the latest version, *Calypso 5.0*, especially for features like the enhanced graphical reports and have an SMA (the annual software maintenance agreement) to stay current with any new features and developments. "I've always been impressed with the improvements of *Calypso*," March says. "It allows us to provide more for our customers each year."

Overall, application support and scanning technology have been the most valuable aspects of owning a Carl Zeiss system for Dearborn. They are able to get answers to their questions quickly when working with Carl Zeiss applications engineers. And the scanning technology has allowed them to take a closer look at form measurement, which has made the CMM even more valuable. Without it they wouldn't be able to do analytical inspection of gears. The Vast XT provides them with sound raw data as well as proven algorithms for filtering data.

The two most beneficial results Dearborn has realized since purchasing the CMMs are reduced inspection time and reduced downtime for production machines. Inspection times have been reduced from four hours to half an hour per part with the Accura, while also eliminating operator influence. There is also significantly less downtime for production machines that are waiting for parts in inspection.

Looking into the future, Dearborn desires to further increase its business in the aerospace industry. Currently, they are at a point of expansion, adding square footage and employees. "Our customers demand 100 percent part inspection," March says. "Without these CMMs, we couldn't ship quality parts

and be as successful as we are today."

**For more information:**

Carl Zeiss Industrial Metrology  
6250 Sycamore Lane North  
Maple Grove, MN 55447  
Phone: (763) 559-0402  
[www.zeiss.com](http://www.zeiss.com)

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