

# Mitsui Seiki Machines

## CUT SPIRAL BEVELS

Several customers of Mitsui Seiki USA have reported success cutting 10–14 class ring gears in low- to mid-volume applications, such as for aerospace and power generation, using CNC vertical and horizontal machining centers. The company’s Vertex machine is capable of cutting ring gears up to 16 inches. A gear making model of the machine features a trunnion table for the finish turning operations.

“This machine can turn the gear faces, the final profile of the internal bore and generate the gear teeth,” says Mark Speier, sales engineer at Mitsui Seiki.

On the HU80A-5X, one of Mitsui Seiki’s largest five-axis centers, customers are manufacturing gears up to 35 inches. “One of the benefits of producing gears on that machine is that the relative gearboxes or gear cases, and even reduction gearboxes, can also be processed on this one machine,” Speier says. “The gear housing is a critically precise piece. The accuracy of both parts has a direct correlation to



The Vertex five-axis machine cuts spiral gears up to 16 inches.

the transmission performance over the life of the motor. The end product reliability is a positive factor, too. Further, the gear is mounted flat and then turned up 90 degrees—or another angle—so that the end mills can cut at the optimum attitude to the gear profile. This results in excellent roughing efficiencies. For finishing, the ball nose end mills generate the final profile before heat treating.”

Initially, Mitsui Seiki experimented in gear cutting by cutting the teeth, roughing and semi-finishing operations before heat treating. By adding turning operations to the Vertex machine, all the operations’ accuracies have improved through the single setup. Turning is not yet available on the HU80A-5X, but Mitsui Seiki expects it will be in another six months.

“The traditional gear cutting machines may run faster; however, [with] the tooling economics, improved accuracy through one-setup machining and improved process control, the overall cost may be advantageous, especially in low volume runs,” Speier says.

“Plus, this application may enable our current gear making customers to get more use out of their Mitsui Seiki five-axis machining centers. Our knowledge base is growing exponentially in this area.”

The Mitsui Seiki machines wouldn’t be cutting gears successfully without the software. The company has partnered with *Mastercam* developers CNC Software, Inc. in this venture for generating the tool paths for spiral bevel gear cutting.

### For more information:

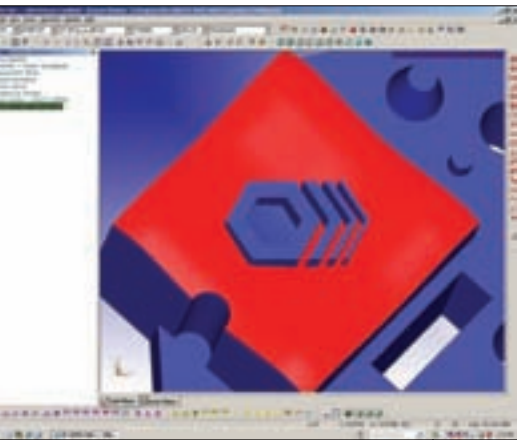
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The HU80A-5X horizontal machining center cuts gears up to 35 inches by mounting the gear flat and then turning it up in an angle, so the end mills can cut at the best attitude to the gear profile.

# Wilcox

## ROLLS OUT ENHANCED CAD METROLOGY SOFTWARE, INTRODUCES STAND-ALONE MODULE



Sold under the banner of Enterprise Metrology Solutions (EMS), the *PC-DMIS 2009* is the latest version of the CAD-based metrology software from Wilcox Associates, a Hexagon Metrology company. The upgrade enhances the pre-existing *PC-DMIS CMM* and *PC-DMIS Vision* software while introducing *PC-DMIS Planner* and *PC-DMIS Reporting* suites. The software suite also includes NC and Portable modules.

“*PC-DMIS 2009* is a very significant release for Wilcox,” says Ken Woodbine, president of Wilcox Associates, Inc. “Far from being simply an incremental release of *PC-DMIS*, *2009* is the culmination of development projects we have been working on for several years, and represents the tightest integration yet of the product suite. It also brings together new hardware categories that have been added to

the Hexagon Metrology group since the last major release of *PC-MIS*. The... machine tool probe integration with *PC-DMIS NC* for CNC machine tools is one of the most significant.”

The *PC-DMIS CMM* is considered the core product of the 2009 upgrade. It is used mostly on automated CMMs and is now equipped with functional and visual improvements. One new feature is the protected mode execution, a run-only mode with password protection against any editing, program changes or reports. This feature is designed for companies that have a library of programs and don’t want operators altering them, like those with medical certification requirements.

The *PC-DMIS Vision* upgrade features a MultiCapture technology that automatically locates several features, such as holes, slots and edges within the same view field and measures them simultaneously. It functions as the default setting for the software and can typically improve measurement productivity by 35 percent. *Vision* includes a feature that allows operators to adjust RGB pixels, so for a colored part with edges that are difficult to detect on a grayscale, users can increase the contrast and detect edges more clearly.

The visual programming improvements allow users to see specific move paths before and after a chosen feature; visualize and animate the machine’s working volume within a model view; and observe translucent clearance plane. The grid view was expanded, so points are defined at any cross section automatically.

Support for geometric dimensioning and tolerancing is improved in the 2009 upgrade. It includes support for ASME and ISO and more options. Measurement capabilities for non-contact 3-D laser probes include laser stripe display, measured features and points. Laser hole measurement is also a new feature.

The *PC-DMIS 2009* is available with new machines under the brand banner of Hexagon Metrology, Brown and Sharpe, DEA, Leitz and Sheffield. It can be retrofitted as a software upgrade for most other CMM makes and models. Existing customers who have current software maintenance agreements are eligible for a free upgrade.

Wilcox also recently introduced the *PC-DMIS Reshaper* software module, which is a standalone product and is not included in the 2009 upgrade; however, Wilcox has future plans for it to be available in the core product suite eventually. The *Reshaper* is a program designed for 3-D point-cloud processing. It collects and imports 3-D point data for manipulating and processing in downstream processes, like CAD modeling, CAM or rapid prototyping.

*PC-DMIS Reshaper* collects data live, via direct connection to a digitizing device—a Romer portable measuring arm is one example—or the software collects data offline through file import. It is compatible with more than a dozen 3-D data file formats, including STEP, IGES, ASCII, DXF, DMIS, ISO and RAW.

The *Reshaper* quickly converts cloud to mesh with proprietary polygon organization algorithms that produce lightweight file size models. Point clouds can be imported without file size or point quantity limitations. They are cleaned, merged and edited from the user interface. Hole filling, deformation and smoothing the mesh models are examples of further manipulation the *Reshaper* is capable of.

“*PC-DMIS Reshaper* is an excellent package for the user who wants to do a relatively discrete set of tasks, namely collection and cleanup of point clouds, and quickly getting them into a format that can be taken to the next stage in the development process,” Woodbine says. “It has a short learning curve and

is very intuitive to use. At the moment, *PC-MDIS Reshaper* is a standalone module, but in time, we will be incorporating elements of the technology into the core *PC-DMIS* product suite.”

**For more information:**

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# Grieve Hearth Oven

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The number 815 electric rotary hearth oven, from Grieve Corporation, is currently being used by a customer to preheat various gears, usually steel and sometimes aluminum, before assembly operations.

The dimensions of the unit's inte-

rior measure 76" wide x 76" deep x 24" high. A 72" diameter rotary hearth is made from angle rings with 90 1-3/8" wide x 1-3/8" long x 3-5/8" high slots that hold the workpieces on edge during processing. A 1/4 hp motor drives the hearth through a gear reducer with

a torque limiting device. Each time the loading door is opened and closed, the hearth indexes one position, which signals a long dwell time.

The long cycle preheating suggests the customer is using the oven to stabilize material by preheating it, accord-

**continued**

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ing to Frank Calabrese, vice president for sales and marketing. The hearth oven can also be used, for example, to preheat gears prior to motor assembly, so they shrink fit into a shaft. The 815 could also be used to preheat gears before working them into an assembly,

Calabrese says.

A vertical, downward airflow over the workload is achieved by two 2,000 CFM, two-hp recirculating blowers. The 815 features special safety equipment that handles flammable solvents, which includes a manual reset excess

temperature controller, separate heating element control contactors, a 325 CFM powered exhauster and purge timer. The 815 is constructed of aluminum steel and has 4" insulated walls.

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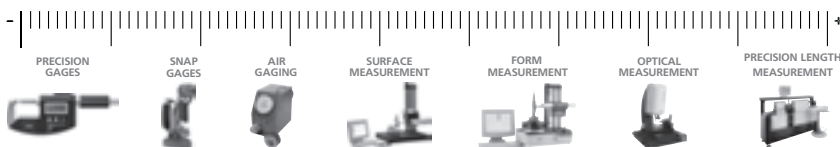
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The Hydro-Grip HD is an extension of the Hydro-Grip tool line designed to perform securely in heavy roughing applications.

The Hydro-Grip HD provides a high clamping force and torque trans-

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Cylindrical shank tools are clamped with a symmetrical force to keep tool runout to a minimum and allow for the high torque transmission. The chucks are balanced to G2.5 for speed. The Hydro-Grip HD is based on hydraulic tool clamping systems and can be adjusted with a torque wrench. There is no external equipment necessary in the clamping. The Hydro-Grip line of toolholders is used in applications ranging from finishing to heavy roughing bores from 0.236" to 1.26".

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## Zeiss Accura CMM

### RAMPS UP SPEED, PROTECTION

In response to customer feedback, Carl Zeiss Industrial Measuring Technology (IMT) developed the Accura, a multi-sensor capable measuring system that allows for quick, economical, precise and flexible measuring.

The Accura features a thin, rigid measuring machine bridge constructed from steel and aluminum components, which are coated by CARAT (coated

aging resistant aluminum technology). The moving parts are lightweight, so the CMM achieves a maximum vectorial travel speed of 800 mm/s, contained in the Performance Package.

Due to the increase in speed, Carl Zeiss has equipped the Accura

with added protection features. The Performance Package also contains a special safety system with laser scanners that supervise the protection zone around the machine when it's in high-speed mode. Speed is automatically reduced within a second if the safety

**continued**

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system detects movement in this zone, and it automatically picks back up once the area is clear.

The active performance of the bridge is enhanced by air bearings with a thinner air gap, so they are more rigid and need less compressed air than other bearings. The bridge is also pro-

tected by foam insulating technology that allows the housing covers to resist temperature. The Accura maintains the same level of precision when operated between 20 and 26 degrees Celsius.

The standard CAD-based measuring software Carl Zeiss offers is integrated with *Gear Pro* and *NT* for freeform



surface measurements. The Accura is available in four sizes, the smallest of which measures 900 x 1,400 x 800 mm with a linear measuring tolerance of 1.6  $\mu\text{m} + L/333$

### For more information:

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The hot zone dimensions of the model HFL-5748-2EQ are 36 inches wide x 36 inches high x 48 inches deep. Since the customer required such a high temperature with uniformity, the hot zone is insulated with eight layers of 0.5 inch-thick, high purity graphite felt, which makes it more energy efficient. A hot face of 0.040 inch-thick Flex Shield, a flexible carbon fiber reinforced graphite foil, protects the insulation pack. The hot zone has thin graphite heating elements mounted cylindrically inside and divided into several trim zones. The hearth has a weight capacity of 2,000 pounds.

Other features include the SolarVac 3000 control system, a high-capacity copper heat exchanger, 150 hp drive motor and a radial blade fan for high velocity gas quenching through "forward tapered" graphite nozzles. The front door uses a pneumatically operated, locking ring closure for positive pressure quenching to 15 psig (2 bar). High vacuum performance of  $1 \times 10^{-5}$  Torr is possible because of a 20 inch Varian diffusion pump.



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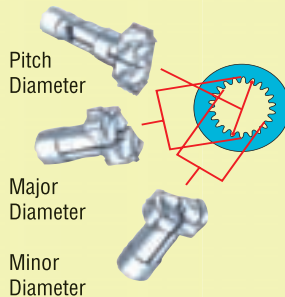


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