

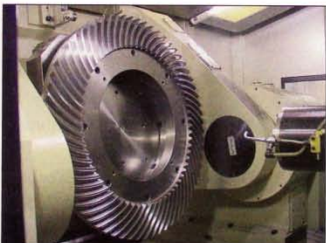
Mitsui Seiki Machines

CUT SPIRAL BEVELS

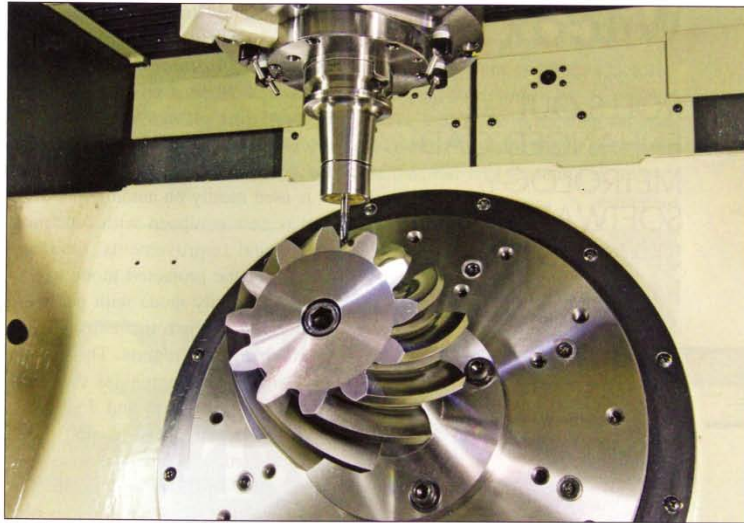
Several customers of Mitsui Seiki USA have reported success cutting 10–14 class ring gears in low- to mid-volume applications, such as for aerospace and power generation, using CNC vertical and horizontal machining centers. The company's Vertex machine is capable of cutting ring gears up to 16 inches. 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 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.



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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