Liquid and powder

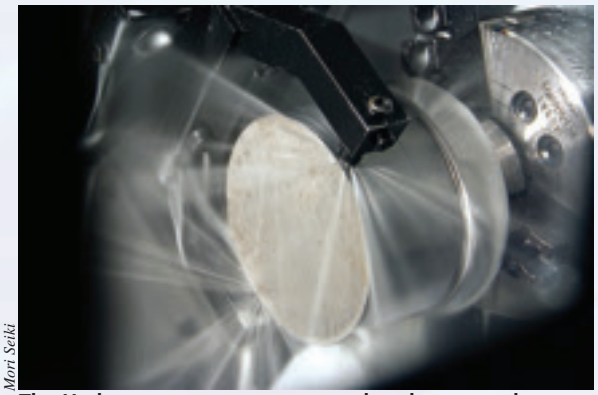
By Alan Richter, Editor

This month, CUTTING TOOL ENGINEERING *covers a liquid-based gage and a cost-effective method for reducing titanium to a metal powder.*

Fluid measurement

Numerous methods exist for measuring precision metal parts, and Mori Seiki USA Inc. introduced another one at the recent EMO trade show in Germany. Called Hydrogage, the closed-loop metrology system passes coolant between the gage, or plug, and the workpiece, measuring the resistance to flow, or pressure build up, as the fluid exits the plug.

In principle, the Hydrogage operates like air gages, according to Mori Seiki. However, the machine tool builder didn't simply convert an air gage to run on a liquid instead of a gas, said Greg Hyatt, vice president and chief technology officer for the company's Machining Technology Laboratory (MTL). "The fundamental logic of metering and sensing is completely different," he said.



Mori Seiki

The Hydrogage system passes coolant between the gage and the workpiece to measure parts by measuring the coolant's resistance to flow.

The Hydrogage is able to measure IDs and ODs to a 0.5-micron resolution with high repeatability using a dedicated plug for specific diameters. Hyatt noted that IDs and ODs are the easiest surfaces to measure with the system, but gages can be configured to measure an array of surfaces, including flat, conical and tapered.

Because the back pressure in the coolant line is inversely proportional to the size of restriction, a part's actual dimension can be calculated with a high degree of accuracy. That accuracy, however, depends on the accuracy of the set master used for calibrating a plug.

Calibration frequency depends on the application environment. In a thermally stable environment, calibration might be needed once a shift, whereas calibration might take place every hour in a thermally unstable environment.

The system automatically adjusts for coolant temperature and viscosity with calibration. Hyatt noted that maintaining coolant temperature can be a challenge, whereas viscosity is only an issue for oil-based coolants, not water-based ones. To achieve the highest level of accuracy, a coolant chiller might be required for an application where a lot of heat is generated. "That can influence the size of the part, the size of the set master if it's splashed with coolant and the size of the plug when it's splashed with coolant," he said. "If the coolant temperature is out of control, it could have an influence on total system capability just as it would with any metrology system." Hyatt added that the Hydrogage is insensitive to the type of coolant as long as the system is properly calibrated.

All Hydrogage electronics are placed in a machine's electrical cabinet and out of harm's way in the event of a crash. The measuring cycle is typically a few seconds, so in manned applications, the Hydrogage can measure parts and allow production to resume quicker than an operator, Hyatt said. For automated operations, Hydrogage can be programmed to adjust tool offsets, recut the part or set off a machine alarm based on the measured dimensions, thus achieving "true unmanned operation," according to the company.

Hyatt noted that a special interface to control the coolant supply and measure the pressure drop is required, and Mori Seiki offers interfaces for high-pressure coolant delivery systems from ChipBlaster, Meadville, Pa., and CoolJet Systems Inc., Brea, Calif. Mori Seiki can field install the Hydrogage system on its various machines.

For more information, contact Rolling Meadows, Ill.-based Mori Seiki's MTL at (847) 472-9107 or visit www.moriseikius.com/mtl.

Upping titanium supply

Being a common element doesn't necessarily mean its supply is plentiful and cost is low. Titanium, for example, is the ninth most abundant element in the Earth's crust, but its price is rising as more applications are deemed appropriate for titanium, which has a high strength-to-weight ratio as a metal.

"The demand for titanium is there; the supply is not," said Stan Borys, chairman of the board and CEO

(continued on page 104)