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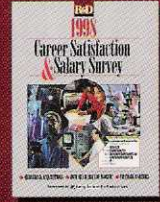
# R&D

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■ SEPTEMBER 1998 ■ Vol. 40 No. 10

## 36th Annual R&D 100 AWARDS



## Machine Chatter Silenced with Q-Tool

**T**he **Q-Tool**, a simple fluid damper fitted over a standard machining tool, doubles material removal rates while maintaining surface finish for manufactured metal parts.

The device acts as a shock absorber to eliminate chatter—an unstable tool vibration that causes large variations in the surface quality of manufactured goods. To do this, a thin sleeve is fitted over the shank of the cutting tool. Then the gap between the sleeve and tool is filled with fluid that dampens machining-induced vibration, allowing more aggressive cuts. Machining spindles equipped with the tool can now run at a full speed of 8,000 rpm, four times faster than before.

Developed by Kevin Wasson of Aesop Inc., Bedford, N.H., and Alexander Slocum of Massachusetts Institute of Technology (MIT), Cambridge, the tool provides an order of magnitude greater damping than other methods.

Wasson says he and Slocum were so confident in the Q-Tool's potential that they didn't even finish early-stage testing before building a prototype. "We did a simple software analysis that gave us a rough approximation, and then we just went ahead and built without even waiting for the final results," he says. The tool is so simple that development only took three or four months.

Circle 220

## Digging up Land Mines Safely

**W**ith more than 100 million land mines buried in 62 countries around the world, safe excavation is critical. The **AIR-SPADE** model CGP 1.5/30 allows users to clear mines with a non-contact hand tool.

The AIR-SPADE was designed by Richard Nathenson and his research team at Concept Engineering Group Inc., Verona, Pa., with the U.S. Army's Humanitarian Demining Program, Ft. Belvoir, Va. The portable



system uses a Mach 1.5 supersonic air jet to dislodge most types of soil. The device exposes buried land mines without triggering explosions and uncovers plastic mines overlooked by electronic detectors. **Circle 222**

## Measures Pulp Consistency

**T**he **ISO-torq Rotating Consistency Transmitter** precisely measures the consistency of fiber-in-pulp streams used to make paper. This critical measurement allows operators to tighten their process controls, thereby optimizing product quality and yield.

The first sensor to measure torque in the pulp stream on an absolute basis, the ISO-torq enables single-point calibration. The new sensing blade does not create turbulence, so it can detect fiber consistency down to 0.0%.

Developed by Ekhard Preikschat and Mike Stern of APPA Systems Inc., Redmond, Wash., the ISO-torq offers the broadest measurement range and the highest torque resolution of commercial devices. It can be extracted under full pressure without shutting down the process, thus minimizing maintenance requirements. **Circle 223**

background noise. Manufacturers use this feedback to know when to decelerate the grinding tool without crashing into the lens.

The OptiPro-AED reduces wasted "air-grinding" time by at least an order of magnitude. The instrument was designed by Mark Piscotty and John Taylor of DOE's Lawrence Livermore (Calif.) National Laboratory and Mike Bechtold of OptiPro Systems Inc., Ontario, N.Y.

Circle 221



## Computerized System Speeds Optics Grinding

**P**recision optics manufacturers use a tedious, advance-and-retreat fine grinding method to prevent damage to lenses. To speed the process, the **OptiPro Acoustic Emissions Detector (AED)** tracks the distance between tools and lenses to produce smooth finishes and minimize sub-

surface cracks.

A piezoelectric sensor records variations in acoustic emission levels generated by the grinding tool, fluid, and glass optic. These tiny sounds correlate with the tool-to-lens separation but are more than an order of magnitude quieter than

