

► BY RICH DZIERWA, EDITOR

Calm Before the Storm?



There are signs that the U.S. manufacturing sector is on the verge of recovery. No doubt when that happens, machine tool builders will let loose with a flurry of research and development that could result in leaps forward in production technology. In the meantime, however, caution dominates, and machine tool suppliers' R&D investment remains conservative.

This will be evident on the floor of IMTS 2002. Advancements will, in general, be limited—but helpful nonetheless—contributing particularly to improving users' productivity. "Faster," "more accurate" and "more flexible" are surely words that will be heard over and over again.

"The overall trend at this year's IMTS will include higher accuracy and greater speeds and feeds," said Paul Warndorf, director of technology, AMT-The Association for Manufacturing Technology, the organizer of IMTS. In an exclusive interview, Warndorf told CUTTING TOOL ENGINEERING that the demands of various manufacturing sectors, in combination with advancements in cutting tools, fixtures and coatings, are driving the acceleration of these trends. "This is especially true when it comes to (satisfying the demands of) aerospace, where the concept now is to put down a hunk of metal and machine the part right then and there. With the speeds, feeds and acceleration rates we have nowadays, you can cut a part in less time, more accurately and with thinner walls than if you assembled several metal pieces to produce the finished component."

Allied Forces

In Warndorf's view, most, if not all, IMTS machine tool exhibitors will demonstrate their ideas for improving machining productivity.

"This is especially the case in terms of serving the automotive industry," Warndorf said. "More and more, automakers are buying machines based solely on the number of parts they produce and the low cost of producing those parts."

For example, there is a growing number of builders that have developed multitasking machines and other equipment that combine processes. A case in point is Oxnard, Calif.-based Haas Automation Inc. It will introduce two systems that combine vertical machining and laser cutting. The ZM-100 and Z3-500 employ sealed CO₂, pulsed-laser technology from Coherent Inc., Santa Clara, Calif.

Multitask machines sure to pique IMTS attendees' interest include Cincinnati (Ohio) Machine's Hawk TC-200M CNC turning center. Its live-tooling capability allows mixing and matching of static and powered tools for milling, drilling, tapping and boring.

Mazak Corp. will showcase the Integrex e-650H. It performs turning, milling, drilling, deep-hole boring and gear hobbing. The machine's five axes incorporate linear guides for high-speed machining.

"We are continuing to move toward greater accuracy," AMT's Warndorf said.

Obviously, there's a limit to the cycle times and accuracies attainable, but Warndorf doesn't feel the metalcutting industry is nearing those limits yet, particularly in regards to certain applications. "A number of years back, ± 0.005 " was the general specification for the aerospace sector. Now, that's moving lower. Meanwhile, the automotive industry and others are really starting to learn that components that are better put together last longer."

The manufacture of better diesel engine parts has been the recent focus of engineers that design grinding machines at UVA International AB, Bromma, Sweden, a division of KMT-



Toyoda Machinery USA

There will be no shortage of 5-axis technology on display at IMTS. For example, Toyoda Machinery USA will mill a steel drill for rock boring on its FA630 HMC. A Tsudakoma table with a C- over B-axis configuration will be used to place the part in a horizontal position—with rotary capability—over the machine's 4th axis (perpendicular to the table). This improves access to the part's raised surfaces, indentations and angles and allows complete machining in one clamping.

Karolin Machine Tool AB.

According to Henrik Alveskog, an analyst that covers KMT for investment firm JP Nordiska, Stockholm, UVA's efforts have been constant. "Fuel efficiency standards all over the world are getting tougher and tougher," Alveskog said. "You have a number of different components working together to let only the exact amount of fuel into the engine. UVA uses a process it calls 'match grinding' to simultaneously produce pins and corresponding holes. If the pins don't match the holes precisely, fuel efficiency suffers."

Meanwhile, grinding of cutting tools has been improved with the development by Rollomatic Inc., Mundelein, Ill., of the GrindSmart 6000XL, which will make its U.S. debut at IMTS. It is touted as the only fully hydrostatic grinding machine. Hydrostatic functions allow friction-free linear and rotary movements for the machine's six axes.

"The 6000XL's movements are very smooth," company spokeswoman

Christina Brasda said. "It's not stop and jerk, like with ballscrews being pulled in and out."

Brasda said the tool grinder provides so-called perpetual repeatability. "The machine doesn't require slight adjustments," she explained, "as is necessary with equipment incorporating ballscrews as they wear out."

The Axis Powers

In evidence at IMTS 2002 will be a growing number—and growing affordability—of 5-axis machines and the minimized setup they provide.

Five-axis machine manufacture is spreading around the world. For example, Czech OEMs have joined the Germans and other Europeans in the market. The Japanese, which have clearly established themselves in the category, are watching their stronghold in Asia start to be challenged by the emergence of a Chinese 5-axis movement. The Taiwanese, too, have begun building 5-axis machines, but Warndorf's assessment is that they are primarily sticking with their niches of 3- and 4-axis units.

Warndorf warned not to expect very much expansion of so-called parallel-link machines. These include units that incorporate multiple slides connected to the spindle, to allow a setup where the point of the spindle is tilted to allow six degrees of freedom.

One builder that will demonstrate this type of technology is Lamb Technicon Machining Systems, Warren, Mich. Its Bobcat HMS employs a "hybrid kinematic" design that allows the unit's Y-axis to pivot in an arc in combination with the X and Z linear axes.

"We'll see some of this at the show," Warndorf said, "but the technology is still in an infant stage and has yet to develop into the show-stopper people thought it would be years ago."

As for likely marquee technologies when IMTS 2004 rolls around, Warndorf has a "linear" view.

"I think the gradual move toward linear motors will continue, especially in conjunction with achieving higher accuracies. But they won't take over until the cost of design and implementation starts to come down."