Customizing machines to compete in a down market

FROM 1989, MACHINE TOOL Technology-21 Inc., Schaumburg, Ill., has sold Kitamura stand-alone machine tools. During the past 5 to 10 years, MTT-21 has seen a trend toward providing customers with not only the machines but also optional accessories, fixturing and tooling to reduce cycle times and increase productivity. This enables end users to machine new parts more efficiently with less or no labor.

A case in point is the Kitamura Mycenter-HX400iF horizontal machining center with a two-position automatic pallet changer that MTT-21 customized for Klein Tools Inc., Skokie, Ill. The manufacturer of industrial hand tools found the machining process to be time consuming and labor intensive and turned to MTT-21 to find a way to reduce cycle times, minimize labor, improve equipment efficiency and extend tool life. To enable that, MTT-21 equipped the machine with:

- Special hydraulically operated multiple-station fixtures;
- A hydraulic power unit to activate the fixtures;
- A spindle probe for registering the locations of the carbon steel forgings to be machined;
- A laser-based tool breakage detection system for tool setting and monitoring;
- A high-pressure coolant-through-the-spindle system; and
- A Royal programmable mist collector to prevent the mist generated when drilling from obstructing the laser detector.

According to Mike Baker of Klein Tools Inc., there were two main aspects to the project. "We were looking for a machine that was very robust and could handle severe cuts and would make a lot parts really fast," he said. "The other aspect was fixturing that allows us to put more parts on the machine than our older fixtures."

The new fixtures enabled Klein to machine six matched sets of parts vs. four matched sets previously. The parts are for wire pulling tools called Chicago Grips.

The hydraulic fixtures also provided an ergonomic advantage for the operators who previously used an impact-type screw gun that vibrated to clamp parts onto a fixture. The new fixtures are also more efficient. "The hydraulic fixtures free up operator time to manage the other machines in the cell where before there were issues with machines waiting for the operator because he got behind in his loading," Baker said. "Now it's just one flip of the valve and he's ready to go."

All images: A. Richter

Klein Tools' Manufacturing Manager Mike Baker (left) and Production Engineer Christopher R. Babel in front of the industrial hand tool manufacturer's Kitamura Mycenter-HX400iF HMC that features special hydraulically operated multistation fixtures (inset).

In addition to speeding up the workholding process, cycle times are quicker on the new machine. Christopher R. Babel, production engineer for Klein Tools, noted that, compared to the previous machine, the Kitamura increased the average cutting speed from 5 ipm to 30 ipm when drilling and from 8 ipm to 30 ipm when milling, with milling being the primary operation.

Machining the parts requires many specialty cutting tools and the tools are lasting significantly longer on the new machine, which is faster and more rigid than the machining technology from the late '80s that Klein was using. Because Klein has only been operating the Kitamura for about six weeks, the manufacturer hasn't been able to quantify any tool life increase, but knows it's significant. "There are drills in the machine we haven't even changed yet," Baker said. "On our old machine, we would have changed them multiple times by now."

The total length of the project from receipt of the purchase order until the equipment was accepted at Klein's facility was 7 months. "MTT-21 met the delivery requirements," Baker said. "It was really a smooth project."

Delivering a customized machine

to Schultes Precision Manufacturing presented a different challenge. The job shop needed a machining process where twice as many 6061 aluminum hydraulic manifolds could be loaded onto a pallet than previously without going to a large machine—and it was needed fast. "We needed the machine in 8 weeks because we had to deliver parts to a customer," said Alex Patent of Schultes Precision Manufacturing, Buffalo Grove, Ill.

MTT-21 provided a quote in about a week for a Kitamura Mycenter-HX400iF HMC rather than a bigger machine, such as a Mycenter-HX630i, which costs more and has a CAT 50 spindle taper instead, whereas the smaller machine accepts CAT 40 toolholders. That meant Schultes wouldn't have to purchase new toolholders. "When MTT-21 said they can do it on an HX400iF, I was like OK, I don't know how they're going to do it but I'll be happy to see it," Patent said.

"We designed and manufactured special fixturing to accommodate more parts on the pallet without creating any interferences and preserving the ability to machine three sides on every part on the pallet," said Mark T. Ulanov of MTT-21. The workpieces are held with vises on a pallet-mounted tombstone, and Schultes is able to complete four workpieces per pallet, or eight pieces per cycle.

MTT-21 designed special fixtures for Schultes' Kitamura Mycenter-HX400iF HMC to provide appropriate spacing between the manually operated vises and enable adequate clearances for the array of tools applied (inset).

In addition, MTT-21 equipped the machine with a Renishaw spindle probe for registering workpiece location, a Renishaw laser-based tool breakage detection system for tool monitoring and a 1,000-psi coolant-through-the-spindle system to provide adequate chip evacuation, especially when applying long port tools. Because parts are loaded by hand and their locations can vary, for example by 0.050", the machine probes each part and sends offsets to the control. "The machine now knows exactly where the part is located," Patent said.

When the machine was scheduled for delivery, Patent said it arrived already setup and joined the shop's 14 other Kitamura machines.

—A. Richter