

Shop Reduces Setup Time With Multi-Pallet Machines

When George McNab, president of MAC Machine Company, says his shop has “always been a proponent of automation,” he’s

not exaggerating. The Baltimore, Maryland-based company first began running multi-pallet, horizontal milling machines unattended 22 years ago, a time when few manufacturers had implemented “lights-out” production. For MAC, it was the beginning of a specialization in short-run, high-mix production in which setup time is often a make-or-break factor in meeting deliveries and making profits.

MAC MACHINE COMPANY

PROBLEM Needed automation to reduce setup time on multiple short-run jobs

SOLUTION Multi-pallet, five-axis Matsuura machines from Methods Machine Tools

RESULTS Easier setups, reduced cycle time, increased competitiveness

Supplied by Methods Machine Tools, the MAM series machines feature 12,000- to 20,000-rpm spindles and Matsuura servodrive systems.



To minimize setup time, the company relies on Matsuura four- and five-axis, multi-pallet VMCs and HMCs supplied by Methods Machine Tools of Sudbury, Massachusetts, the exclusive North American Matsuura importer. These machines have increased the shop's competitiveness to the point where it can successfully participate in all markets to which it is exposed, Mr. McNab says.

Those markets include aerospace, defense and medical, which account for approximately 60, 20 and 15 percent of the company's work, respectively. The remainder of the work is for high-technology, commercial customers. Among the components produced at the shop are mechanical parts used in space suits and components for the Joint Strike Fighter, as well as items for submarines, missiles, rocket motors and ejector seats. Other work includes surgical implants and components for diagnostic medicine, commercial satellites and aircraft. While most production is for the domestic market, the company also attracts business from Europe, the Middle East and other regions.

The production floor is a busy place, with more than 200 active projects at any given time, Mr. McNab says. And high-quality machines aren't the only important factor in meeting the demands of a lights-out production process—this also requires a skilled workforce, he adds. The company depends on specialized "setup machinists" who work the first shift to prepare new work for the multi-pallet production line. The second shift is much smaller, consisting of only seven or eight of the shop's 60 total employees. These workers are charged with monitoring the automated systems and ensuring everything is in order for the unattended third shift.

The shop runs unattended 90 hours per week out of an available 168 production hours. Prior to its switch to multi-pallet systems, the shop used single- and twin-spindle vertical machines that required lengthy setup times and were not suitable for unattended operation. The transition to multi-pallet machining centers eliminated more than 50 percent of previously required operations by enabling complete machining of a part in a single cycle, Mr. McNab says. He credits Methods, which supplied the company's first Matsuuras nearly

25 years ago, for continually providing the equipment, expertise, programming assistance and support needed to make unattended production work.

Using multi-pallet machines to reduce setup times on small production lots has since become a core competency for MAC Machine, and the company has earned a reputation for taking on difficult jobs that other shops might decline. While that has created strong customer relationships, it has also consistently led to a demand for smaller lots, lower pricing and zero tolerance for error. "We must anticipate problems in advance and take corrective action before the green button is pushed," Mr. McNab says. "We have to make good parts right the first time."

Thanks in part to its skilled workforce and a climate-controlled quality lab, the company manages to achieve a percent parts-per-million (ppm) rate of less than 1,000. That is, on a job consisting of 1,000 parts, only one will be rejected. However, Mr. McNab emphasizes that achieving near-perfect production runs and addressing cost and delivery concerns make up only part of the equation—productivity is the most challenging aspect of meeting stringent customer expectations. And with throughput limited by machining speed, improving productivity comes down to reducing setup times, he says.

For that, the shop depends on its latest Matsuuras: 13 MAM series four- and five-axis machining centers chosen specifically for lights-out production. Among the top performers is the MAM72-63V, a five-axis machine designed for processing large, geometrically complex components within a work envelope that measures 24.8 by 17.7 inches and accommodates workpieces as heavy as 770 pounds. The company also uses the MAM72-35V, a smaller, five-axis model capable of processing workpieces measuring as large as 13.77 inches in diameter and 9.44 inches high. Various H.Plus-300 series HMCs complete the lineup. All are teamed with stand-alone, multi-pallet systems from Matsuura that contain anywhere between 2 and 32 pallets. That means the shop can machine as many as 32 different parts, one right after the other, on a single milling machine.

The configuration of the MAM machines enables

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the company to automate production of difficult workpieces by virtually eliminating interference areas, Mr. McNab says. Specifically, their fixed spindle and tilting table configuration maximizes the rigidity of the tool and toolholder when milling awkward part features, even when machining irregularly shaped workpieces as large as 24.8 inches in diameter.

The shop also depends on the CAMplete TruePath software furnished with the Matsuuras for bridging the gap between CAM input and the machines. Rather than blindly sending CAM system output through a postprocessor to the machines, the company uses this software to analyze, modify, optimize and simulate five-axis tool paths in a seamless, five-view, 3D environment. This helps avoid problems before production begins. John Leonard, shop foreman, believes the software has been instrumental in the company's success with lights-out machining. "Today, an operator can preview the entire routine and anticipate and correct potential issues before any machining even starts," Mr. Leonard says. "This drastically reduces setup times and gives us an invaluable edge over the competition."

Combined with support from Methods, the flexibility and automation capabilities of the Matsuuras have helped streamline MAC Machine's production process. The multi-pallet systems and CAMplete software have reduced setup times by 85 percent. Additionally, cycle times have been slashed by 70 percent by reducing the number of cycles required to machine a part. However, successfully automating short-run, high-mix jobs has resulted in the greatest savings. "Unattended machining has allowed us to operate second and third shifts with fewer machinists," Mr. McNab says. This has effectively reduced our labor rate by 30 percent and has allowed us to be more competitive." ■



George McNab, president of MAC Machine, stresses the importance of a skilled workforce. Here, one of the shop's machine inspectors (ABOVE) checks dimensions on a solid billet aluminum part for an aerospace industry outflow assembly (BELOW).

