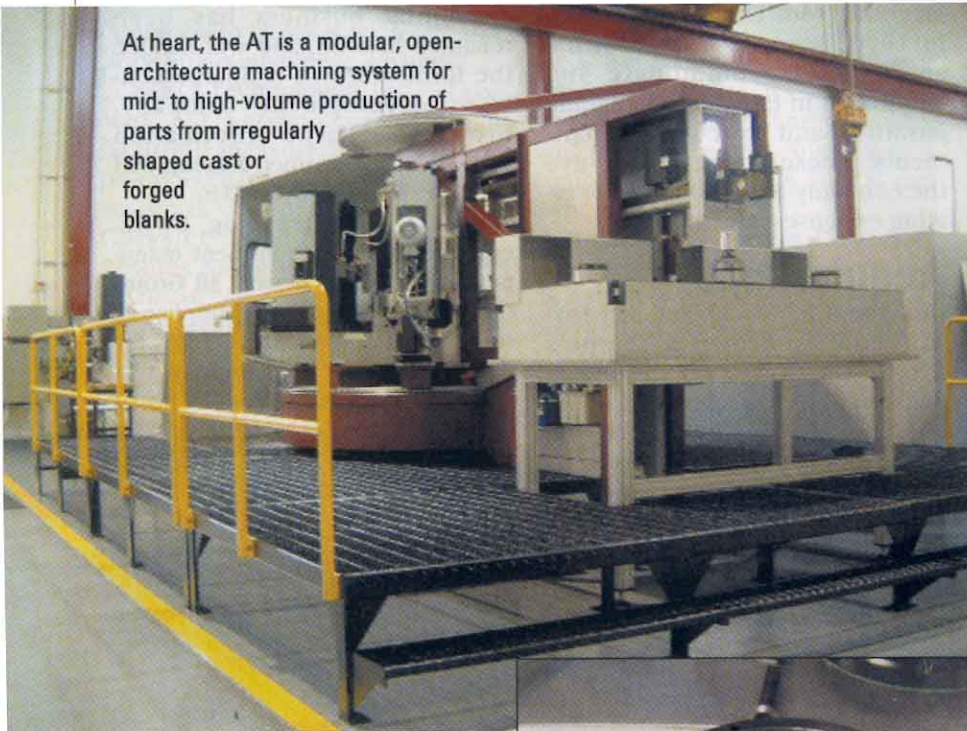


## Advancing Rotary Transfer Technology

At heart, the AT is a modular, open-architecture machining system for mid- to high-volume production of parts from irregularly shaped cast or forged blanks.



machine, for example, all 10 stations simultaneously release the modular pallets carrying fixtured workpieces. The table lifts and transports each modular pallet to the next pallet fixture, then lowers the modular pallet to the fixture pallet where it is located and clamped. It's the pallet chuck system that delivers accuracy and repeatability."

The workholding pallet chuck system features a powered chuck from Erowa Technology (Arlington Heights, IL) that precisely locates and clamps the modular pallet. Locational accuracy and repeatability between pallet fixture and the machining unit is  $2\mu$  or less. "The power chuck operates in principle like a Hirth ring coupling," says Weber, "in that there are a number of precision-ground teeth arranged in a  $90^\circ$  pattern that engage and lock to provide outstanding clamping accuracy and rigidity. Clamp force is 9000 N."

According to Martin Weber, vice president, manufacturing, Hydromat Inc. (St. Louis), the company's new AT (Advanced Technology) rotary transfer machine departs from proven design and processing features of its machine type to create "an entirely new processing method, one that opens the door to a wide variety of new applications."

The AT is a CNC-controlled, servo-driven pallet machine, designed for flexibility. "Workpieces can be set up and fixtured on modular pallets outside the machine, much like presetting a toolhead on a conventional rotary transfer machine," says Weber. Pallets are then transferred into the machine by an integrated load/unload station.

The machine table transports pallets from station to station.



The AT's rotary table is a transport device only. Its pallet chuck system delivers repeatability and accuracy by precisely locating and clamping the modular pallet.

Pallets with finished workpieces can be unloaded together and sent directly to a CMM or gaging station for verification and analysis. Loading and unloading of pallets and/or workpieces can be done automatically by conveyor, robot, or pick-and-place device.

"Unlike conventional rotary transfer machines," Weber says, "the table of the AT serves only as a transport device. On a 10-station

rotation—up to 5000 rpm—precision lathe-type operations can be combined with other machining operations at a single station, for example, heavy milling followed by turning.

At heart, the AT is a modular, open-architecture machining system for mid to high-volume production of parts from irregularly shaped cast or forged blanks. Available in 8 to 10-station models.

with a 115-mm-diam work envelope, the AT is configurable for part families or highly engineered complex component shapes.

Base units are modular single-piece castings that support the pallet fixture, fixture servodrive, and machining unit. "Each modular base unit can function as a three to five-axis CNC machining cell," Weber says. "with a range of tooling possibilities including horizontal or vertical toolspindle units, multitool turrets for multitasking, and/or an automatic toolchanging system with redundant or common tools to reduce downtime." The base-mounted fixture servodrive provides additional axes of movement via unlimited axial positioning of the pallet fixture, high-speed fixture rotation and a vertical *B* axis for horizontal or vertical milling. The entire

modular base is easily removed for tool change, complete part changeover, or routine maintenance.

**Processing flexibility** extends to the control system, a GE Fanuc (Charlottesville, VA) 2050 control system featuring a Windows(r)NT operator interface. Programs can be offset on the fly, and complete program changeovers can be done at the machine control, downloaded from a host computer, or done offline on any PC. No special programming languages are required beyond G code.

Weber describes piston-type parts for small-displacement engines such as lawn mowers, chainsaws, leaf and snow blowers, snowmobiles, and outboard marine engines as significant potential AT part candidates. "The design lends itself to a number of specific

requirements in piston manufacturing. Pistons must be clamped on the ID while being machining on the OD and piston face. Once clamped, machining involves drilling and recessing grooves for wrist pins and oil rings. Overturning the piston face and turning the OD are facilitated by the pallet fixture's servodrive, rotating the fixtured piston up to 5000 rpm while precision turning takes place." Other strong AT part candidates include complex brake systems, appliance and instrument housings, and valve and faucet bodies, including parts that require angular machining beyond the fixturing capability of conventional rotary transfer machines and other processes, he adds.