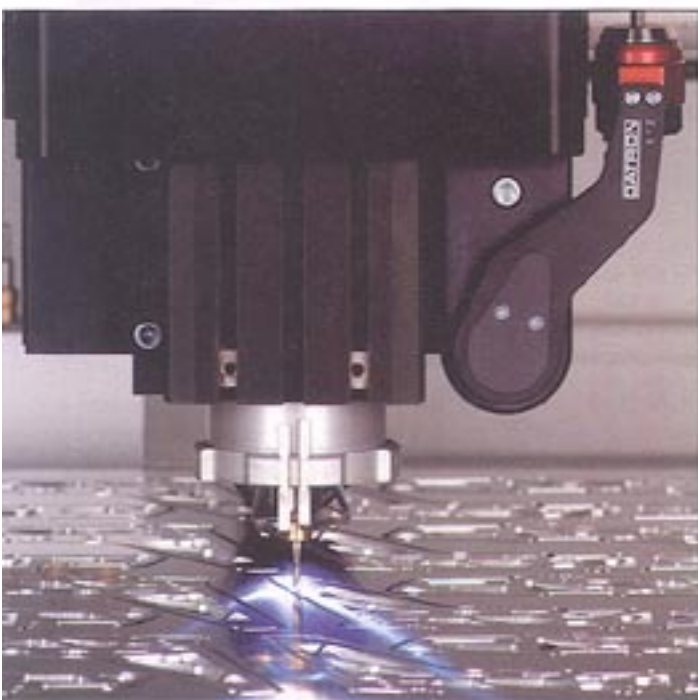


SETTING UP FOR BATCH PROCESSING

How to produce the most parts in one run with limited operator intervention.

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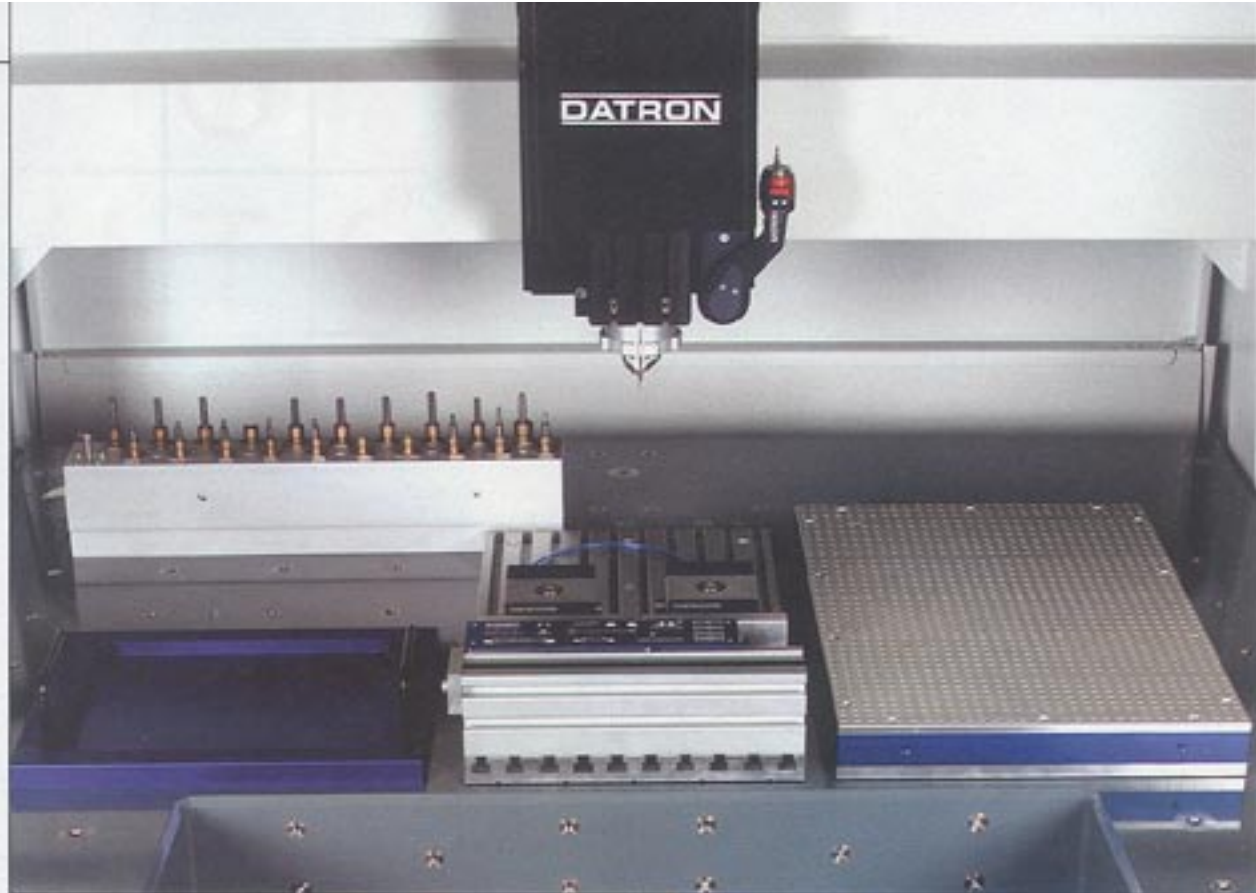
Unattended high-speed batch machining with micro tooling requires a large machining table partnered with the right workholding system.

For many shops doing high-speed micro-machining operations, producing a batch of parts involves an operator tied to a machine making one piece at a time. Based on this scenario, labor costs about \$0.40/min, and machines operate at approximately \$0.20/min. So an 8-hr day of this one-up production runs around \$0.60/min. Batch processing, however, can improve these costs.

With a large machine table and the right workholding, a shop can batch process parts unattended, during a second shift for example, to reduce both labor and machine costs. Large table sizes also let shops handle unexpected emergency machining tasks without disrupting regular workflow.

Batch processing, or batch machining, on large machine tables reduces operator intervention by accommodating sizable "blanks." Cycle times for full batches can then coincide with an operator's shift, allowing him to load a batch in the morning and attend to other duties during the day. At shift's end, the operator removes the completed batch and sets up another to run unattended overnight.

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Large tables, such as on this Datron Aluminator CNC machining center, not only accommodate large material blanks but also combinations of workholding systems for high-speed batch machining.



Datron's Quick-Pallets provide fast, flexible, and low-cost workholding for simplifying batch-machining setups and changeovers.

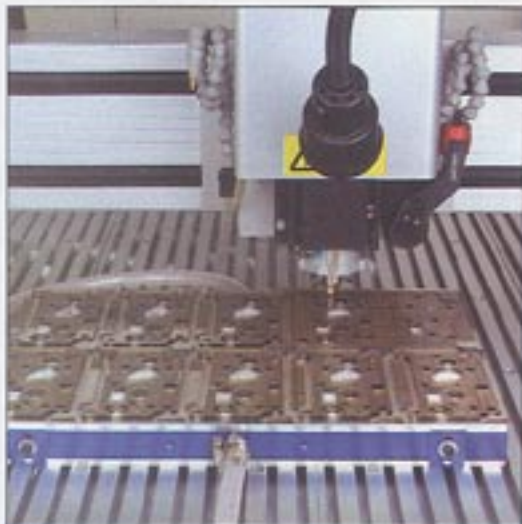
In the morning, the operator removes the overnight batch and starts another. One operator does two shifts' worth of work, but this example reflects an ideal situation — the machine operating unattended for most of the workday and at night. While this may not fit neatly into every application, the closer a shop gets to this ideal, the more efficient and cost-effective its operation. Also, the shop must identify alternative labor functions to fill the void left by the operator's diminished production role.

Currently, there are many workholding/workhandling tools available for batch machining that are often used in conjunction with one another. However, some optimize batch machining better than others.

For instance, low-cost manual pallet changers, such as Datron Dynamics' Quick-Pallets, combined with pick-and-place grippers and large machine tables, offer optimum micromachining batch processing. Quick-Pallets let shops change workholding setups in seconds and use a vacuum to secure the pallets, which are keyed to a fixed position on the machine table. After completing a batch, operators remove the pallet, clean the table surface, and install a new pallet. The system's lightweight pallets work well for different workholding applications, including pneumatic short-stroke clamps, vacuum plates, and blank panels for custom-workholding solutions.

Teaming Quick-Pallets with pick-and-place grippers lets shops machine along a part's circumference and face. Grippers pick up parts from pallets and secure them in 4th (and 5th)-axis positions for such machining.

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High-vacuum workholding systems, like Datron's Vacuumate, optimize batch-machining operations.

Some economy-minded shops try to increase efficiency by adding automatic pallet changers — costing from \$10,000 to 20,000 — to their machining centers. With these pallet changers, operators exchange freshly made parts with a new blank to facilitate continuous machine operation and reduce machine-idle time. Unfortunately, automatic pallets can keep operators at machines. In the long run, a company may spend a great deal of money without further automating its unattended batch processing.

Like automatic pallet changers, robots involve substantial investments in money and time. Besides the cost of a machine tool, adding a robot may require another \$30,000 to 40,000, but they do save money in labor costs.

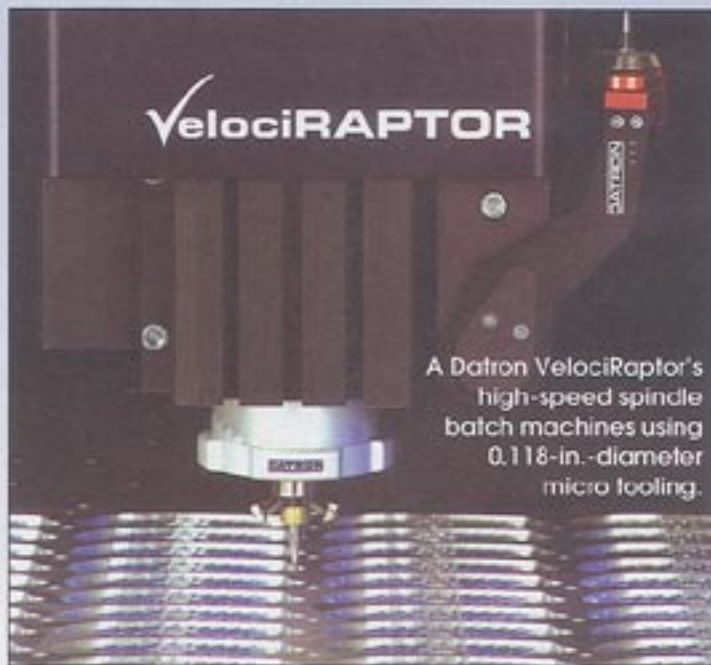
Rather than simply programming robots, shops must teach them tasks, so there's significant setup and preparation time for batch processing. Additionally, a robot's size and shape can limit its access to a machine tool's work envelope. Lastly, shops have to present robots with the parts to be machined, which often means developing a custom-designed magazine that continuously feeds parts to the robot. CT

High-speed batch machining with micro tooling

Using microtooling in high-speed batch machining involves mills and drills with diameters of 0.250 in., or less, running at high rpm. Typical micromachining CNC systems sport high-frequency spindles turning at speeds from 6,000 to 60,000 rpm for fast feedrates that produce significantly shorter cycle times with intricate workpieces, as well as superior edges and surface finishes.

Datron Dynamics' machines, for example, accommodate high-speed batch machining with 60,000-rpm spindles that produce low force, feedrates up to 1,000 ipm, and quality surface finishes with tooling 0.250 in. in diameter and smaller. The machines' environmentally friendly Ethanol-Mist coolant systems also enhance surface finishes and eliminate secondary processes like deburring and degreasing.

Other machine features, such as Z-Correction probes and automatic tool-management systems, along with the company's Quick-Pallets and Vacuumate workholding systems, let shops batch machine parts in lights-out production. The machines are well suited for manufacturing EDM electrodes, hot-stamping and embossing dies, 3D molds, and rapid prototypes. In addition, shops use the machines for 3D precision engraving, producing front panels, and machining automotive and aerospace parts.



A Datron VelociRAPTOR's high-speed spindle batch machines using 0.118-in.-diameter micro tooling.

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