



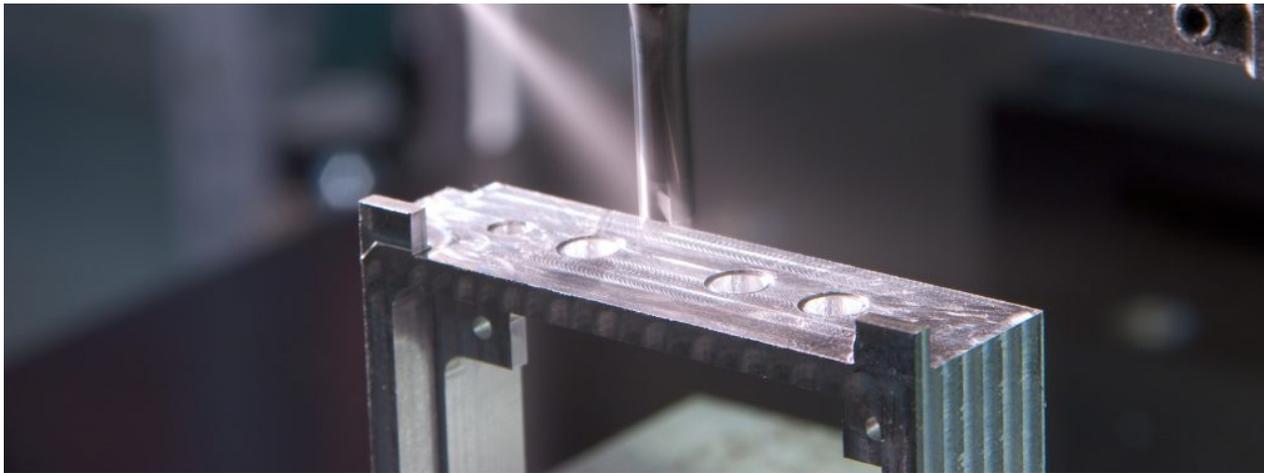
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The Future Looks Bright for Lights-Out Moldmaking

May 1, 2018 by [Clare Goldsberry](#) - Contributing Editor



The concept of untended machining for making molds, once inconceivable, is now a reality



At a conference for moldmakers I attended about 20 years ago, the group discussed how to find employees to work the third shift. It seemed that everyone at the meeting was having problems filling their third shifts. Also, if they could find people to work the third shift, the result was often mistakes that required rework when the first shift came on. Someone in the group mentioned a new idea just beginning to take shape in mold shops as machine tool and software technology was evolving: untended machining.

"It will never work!" shouted one mold shop owner in the crowd. "You'll ruin the machine and the workpiece!" Said another shop owner, "You'll set your shop on fire!"

Back in the mid-1990s, untended, or lights-out, machining seemed as alien as the idea of autonomous cars; something out of science fiction that would result in disaster if no human was present to avert the outcome.

Since then, lights-out machining in mold shops has become more prevalent. "Almost everyone is doing it to some extent," said Steve Ortner, president of **Absolute Machine Tools Inc.** (Lorain, OH). "Whether running a

seeing that it's not just the large mold shops benefiting from untended machining. Smaller 'mom and pop' mold shops that run 10-14 hours can really benefit from implementing automation," Cope commented. "Everyone needs to get more productivity out of their machine tools and many can't afford to put on a second or third shift. We see companies installing pallet loaders and those types of systems and set up jobs to run automatically. When it finishes one job, the machine will go get the next one. This gives them more hours of production in a day. Productivity is key."



A You Ji VTL-2000 ATC+C from Absolute Machine Tools with a Capto 120-tool automatic tool changer and FANUC robot. The setup is used for loading heavy tools.

Bill Womacks, business development manager, milling and tapping for toolmaker **LMT USA Inc.** (Waukegan, IL), concurred with Cope's statement. "Reducing downtime is key in the use of untended machining—increasing productivity and getting high utilization," Womacks said.

Moldmaking is a different animal than typical machining or fabrication jobs, where one setup is often done to produce thousands of the same part. Moldmaking consists of a lot of "one-off" part manufacturing. Every mold is different, but the processes to make them are much the same.

However, because of the nature of moldmaking and the need to maximize machine tool utilization to get a good return on investment (ROI), moldmakers are increasingly finding ways to implement automation and realize its benefits.

Tim Peterson, president of **Industrial Molds Inc.** (Rockford, IL), said his company has been performing untended machining for so long that it doesn't seem new to them anymore. It was Industrial Molds'



A QuickTech i42-ROBO robot arm.

automated has its benefits.”

Peterson noted that even if the company had an infinite labor supply, the machinery has to pay for itself by maximizing its use. Untended machining means that machine tools work

nights, weekends, and holidays.

Electroform Co. Inc., (Rockford, IL), has a long history of running automation—close to 20 years. “I’ve seen the software evolve and the technology is less expensive,” said Wade Clark, owner and president of Electroform. “Automation is very expensive to get into and payback is slow in the moldmaking industry. [But] machine tool companies are getting more user-friendly with their controls, making the machines easier to run.”

Ortner of Absolute told ME that over the past 10 years untended machining has been enabled by “smarter machines”—not necessarily with controls or the machine itself but with add-ons such as laser tool setters and probes.

“Tool life is a big issue for untended machining,” said Ortner. “If you don’t know how long your tool will last doing the job, it becomes a train wreck if the machine does not know the last tool failed before bringing in another tool. Being able to predict tool life and look at load monitoring and adaptive feed rate are absolutely critical to success with untended machining.”

LMT USA’s Womacks explained that he also sees more mold shops moving toward greater automation due to improved technology, especially on larger molds that run for days.

“It’s an advantage to the company and the people because you don’t have to have a guy monitoring the machine constantly,” he said. “With the new tool breakage detection systems on machine tools, you can test

Success in attended machining with new machine tools and improved cutting tools depends on the equipment shops have. "With some older machine tools, they can't even use the higher-end cutting tools," Womacks noted.

New Tech a Big Help

Ortner observed that the machine won't know if a tool breaks, making adaptive feed rate control and load monitoring on the spindle important features in successful lights-out machining. "If the tool gets dull it pulls a load, so the adaptive feed rate will slow down or speed up to keep the load consistent. That's one big new thing not available 10 years ago," he said. "However, it's important to remember that any time an operation is completed with a tool, it needs to be checked, preferably with a laser tool setter."

Are tools getting better? "Yes, definitely," Ortner said. "Tooling changes accommodate different geometries and new coatings extend tool life." He commented that machines and spindles have matured and any further increments on the machine side will be small. "It's coming down to pure physics. When I look at the speed of the machine—with regards to the spindle—it's a lot different today, but I don't see any major changes in the next 5-10 years. You can only move a machine so fast and the spindle can only do so much. Unless a new technology emerges that I don't know about, most of the gains from here on out will come from the software and tooling."



Jody Wilke of Industrial Molds operating the company's high-speed machining cell, which

the software to hold the close tolerances we need.

Many moldmakers have noted that on open-tolerance machining, automation works really well. When making big chips such as when hogging out a mold base, automation has a huge advantage because the work goes much faster.

Considerations and Caveats

To be successful at untended machining, there are several considerations and caveats. "If you don't have a good quality system in place, you can't be successful with untended machining," Peterson said. "You need a systematic approach to overcome the obstacles. We used our quality system to get better, identify issues, go through the problems, and refine our process."

Industrial Molds has a system in place in which two cavity blocks and two core blocks will run at the same time. "Start with where you are—one CNC with a toolchanger is automation," Peterson advised. "Then begin to standardize your process so that everyone knows this is how we always do it and we don't have different guys doing different things."

Peterson recommends having a good QA system established, which he said helps with getting procedures in place. "It also allows ISO to be the bad guy. We can tell them they have to follow our quality system and do what ISO says. That ends the personal blame game. It can be a cultural change especially if, for example, your shop is built around a superstar craftsman. It recreates the culture from 'this is the way I do it' to 'this is the way we do it at Industrial Molds.'"

Electroform's Clark recommends that moldmakers plan each individual job as it goes through engineering, to get engineering, milling and EDM requirements in sync. "Look at your weekends and overnights to determine run times," he said. "It's also important to prove out one piece before beginning to run critical components lights-out."



An EDM cell at Industrial Molds includes a Sodick AG60L EDM with Erowa automation.

valid points. “We’ve burned up machines, we’ve wrecked machines,” Peterson said. “But automation can work and you can run 24/7—especially when you think about how much money you’re [wasting] by not running the shop at night.”

CNC machines are capable of running 24/7 because they have enough toolholders or magazines, but when EDMing, a shop operating 24/7 will burn through a lot of electrodes, Peterson explained. Also, how do you change the workpiece in the middle of the night? That makes scheduling critical.

Shortened lead times, improved quality and consistency in the mold build are just a few of the benefits, Peterson said. “Doing something the same way all the time results in a certain look in the molds we build. It doesn’t matter whose job is in the machine—it has a look. If that quality level isn’t good enough, it generates a non-conformance; the automation doesn’t do it right. It’s capable but it’s a closed-loop system. Is it the right consistency for your customers?”

Another consideration before running a job untended is tolerances. “A lot of the tolerances we need to hold are two to three tenths,” said Clark of Electroform. “Is your machine capable of maintaining this type of accuracy over a 24-hour period?” Fixturing has to be considered as well, he added.

Also, shop temperature control maintains the equipment’s thermal stability. “Can the machine be stable enough to hold tight tolerances you’re needing overnight or a weekend? If you don’t know, automation can be

system can run.

Hurco's Cope agreed. "Automate those job functions that require less skill."

Peterson noted that untended machining can be unsettling for employees: "Is automation going to take my job? That's a fear they have." Another issue is the feeling that automation takes away autonomy in the mold build process. "Typically, moldmakers are a pretty independent bunch," said Peterson. "They like problem solving. If you have to do it the same way every time, it can be a bit of a rub for some moldmakers."

That is another reason having systems and processes in place for untended machining is critical to a mold shop's success. "If you just naturally define the process, you define the training and the issue of it being harder to find skilled people is alleviated," Peterson said. "You have a process that defines what to do and how to do it."

Mold shops will always need people to think. They know the process of what you expect; if quality issues come up, there's a process in place to solve them, Peterson explained.

While automation can help when a shop is experiencing a shortage of skilled labor, Clark emphasized that "automation requires people to set up the machine and get the planning done."

Automation, programming and robotics are not new to the younger generation of mold shop employees. They are accustomed to looking at computer screens and allowing the machine to respond to the inputs. "Today, younger people want the technology," Peterson stated. "If you don't have the technology, how do you attract the new worker? The technology is changing to meet the knowledge of the new workers."

Tsarehardsky commented that automation is something Xcentric considers an "augmentation" to its business; a way to add capacity and improve lead times for customers who need things faster.

"We're attempting to accommodate them in creating parts for them as fast as possible," he said. "Our use of automation [doesn't mean] we need fewer people. It would be a benefit to any worker to say that he or she can work a highly complex job and set up an auto-run."

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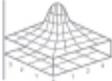
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