Mazak Case Study

Productivity…It's Just a Phone Call Away

It's a weekday afternoon. The sun is shining, the weather is warm, and Dan Poppo, president of Eagle Performance (Golden, CO), is on his boat in the middle of a lake. Back at his plant, his turning center is unattended and in full production. Even at the lake, Poppo can keep an eye on it with just his cell phone and laptop PC.

Today's computer technology, wireless connectivity, PC controlled machine tools and the ability for all these devices to communicate with each other have ushered in a new age in unattended manufacturing. It's the ability to monitor, and at times even repair, machine tools from anywhere in the world, not just a nearby lake.

This has allowed Dan Poppo unprecedented flexibility in his business. Since his is a one-person job shop, the ability to monitor his machine tool from anywhere has allowed him the versatility to make sales calls and serve his customers while not being tied to his factory. With this system he gains lights-out, 24-hour productivity with low labor costs.

Poppo said, "Now, with a cell phone connection and laptop, I have the ability to keep my turning center running on weekends or even 24 hours a day, producing parts and making profits. When I'm not physically at the plant, I can check the machine every few hours to make sure it is turning parts and running properly. If the bar feeder runs out of stock or jams up and sets off an alarm while I'm away, I can get to the plant, fix it and be producing parts again quickly. I don't have a surprise in the morning because of a shut-down machine. On the road, I can also get current production status from the turning center to show a customer how many of his parts have been produced and when the job will be finished. It's the best way to have 24-hour production without the labor investment."

Poppo has dreamed of this capability since the time early in his career when the screw machine shop where he worked almost burned down. The shop's owner would let the machines run for several hours unattended while he went home for dinner. However, one time chips clogged the oil coolant return drain on a machine. As the coolant spilled outside it, the tools overheated. A large drill was used for this particular job, cutting into tough 8620 steel. The drill cut into the part, but with no coolant, jammed and couldn't back out. When Poppo's

employer returned to the plant, there was cutting oil all over the floor, smoke everywhere and the part and drill were glowing cherry red. Luckily the disaster was averted.

Poppo said that with today's technology this is easily avoided. Now he can call a machine's control and see exactly what it is doing. If there is a problem, he can give this same remote access to the manufacturer's service department—wherever they may be—so that he and the service department may analyze the same screen views together to find what caused it. Then, depending on the problem, repairs may possibly be made over the phone. In other scenarios, if the machine's control trips an alarm, the control will use a voice-mail program to call you and let you know what alarm went off. Or you can download a part program from your PC directly into the machine's control. Not all machine tools can do this, however. Ones that have the capability today are Mazak's CNC machine tools that use the company's latest Mazatrol PC Fusion 640CNC control, which was first introduced at IMTS 98.

This control is essentially a fusion of a PC using Windows® software and a machine control. It offers all the advantages of a PC and communications connectivity.

Mazak's Mazatrol Fusion Control has Mazak's Cyber Monitor software. This software allows communication over a local area network (LAN) for data transmission for remote monitoring of the spindle speed, motor loads, machine status, etc. from a host PC at any time. It also displays machine utilization, real time error display, spindle load and RPM graphs, and supports Legacy and third party CNC connectivity. As an option, Mazak also offers their NET-OP that is used for remote machine diagnostics and repair for greater machine productivity.

Poppo has a Mazak Quick Turn 250 HP turning center that uses a LNS Quickload Servo S2 bar feeder. To monitor it from his boat (or just about anywhere within his cell phone's area), Poppo uses his laptop and Symantec's PC Anywhere communications software. Other communication software packages are also available to link a PC with a CNC. Poppo said that a PCMCIA card is needed for the CNC to link with the telephone line. Mazak's connection from their machine is just a standard telephone line running from the CNC to a phone jack.

He added, "for laptop communication you need a PCMCIA card and a wireless data transfer service. Basically, the PCMCIA card allows communication over wireless or phone lines. Phone lines are already set up for voice data. That's how the Internet transfers data. Land lines are already set up this way also. However, wireless data transfer is what you need to communicate with a machine tool and you need a special service for that.

“Next you have to get the wireless data-transfer service to communicate with a land line because they send information at different transfer rates. Once I configured the software and modem settings for wireless communication I was in business.

”Now I can monitor the machine from anywhere within my calling area. I load it up with bar stock and let it run. I’ll just check on it once in a while to make sure it’s still running and no alarms have been tripped. I even program the machine using its controller from my laptop while I’m at home or on the boat. Or I can download a part program written from my PC into the machine’s controller.”

Poppo added, “Let’s say I’m at home and I forgot if I greased the chuck before I left the shop. I can easily call up the maintenance screen on the CNC controller through my laptop to check it.”

However, there are still some limitations to this system due to safety concerns, Poppo said. Mazak has designed the system so that you can’t override the machine’s speeds or feeds, start or stop it, or change program parameters through a phone connection. But Poppo is working with Mazak to develop an automatic power shutdown sequence over the wireless connection. “When the machine comes to the end of the program, I can initiate auto shutdown. The machine will come to a neutral position and then it will power itself down. This way, if the machine has run long enough, and I just want to shut it down for the evening without going to the shop, I can log onto the machine and stop it.”

Poppo added that you could even put a camera in your plant to monitor a machine through a wireless connection. So if you are away from the machine you can view your employees as well as the machine. Mazak demonstrated this at IMTS 1998.

“I can even use a camera as a sales tool,” Poppo noted. “I could visit a potential customer and call the machine and show him the technical capabilities that I have to offer and my plant set up.”

Lights-Out Manufacturing

Poppo said, “Up until now, any shop that lets their machines run at night, and there’s a lot of them that do, are crossing their fingers hoping for the best. If I’ve got my machine tools running during the night, I don’t want a crash. The jobs I run unattended at night are the ones that are simple to do.”

For Poppo’s complicated jobs, he uses tool management and Mazak’s Tool Eye that checks the tool’s offset. If a tool becomes dull, the Tool Eye can detect the offset variation and alert the control. Or the spindle load can be programmed to sense an increase in power that

can alert the controller to go to a redundant tool. If the tool were damaged, an increase in spindle load would signal a problem and stop the machine or go to a redundant tool. Tool management also allows a new tool to be selected after a pre-determined number of cycles with the existing tool. These types of features are needed for unattended operation and can be integrated into wireless communication to let the operator know of any problems.

Why Mazak?

Poppo chose Mazak because of its technically advanced Mazatrol Fusion 640 Controller that runs Window® software. Other manufacturers didn't have this capability and a few are still running DOS based programs that can't communicate with a PC using wireless or land line technology.

Poppo said, "I think sales and resale value are going to be a big concern ten years from now. If a used machine can't be linked up to a central command center, it won't be worth having."

Poppo believes that advances in machine tool controls and connectivity will be the biggest differences between machine tool manufacturers now and in the future. And the ones that don't commit to this technology will lose out.