Mazak Case Study

Pushing Productivity on the Optical Frontier

(CASTROVILLE, CA) – Though the dot-coms may still be struggling to find a business model that works, it remains undeniable that the infrastructure of the future will be largely electronic. And although the traffic may be ethereal bits and bytes, the multiplexers, amplifiers, and other networking technology are the equivalent bricks-and-mortar backbone of a broadband infrastructure.

That's how Rikk Jefferson, operations manager for Monterey Machining & Manufacturing Inc. (Castroville, CA) sees it. Formerly a part of Synchronous Communications (San Jose, CA), Monterey Machining was separated from its parent when Motorola acquired Synchronous, a provider of optical networking technology, in a $260 million transaction in early 2002. That separation made Synchronous Monterey's primary customer, and made productivity even more paramount for the small manufacturing company.

"We started with two little no-name machining centers in the shipping area," Jefferson recalls. "Then we upgraded by adding two FH-5800 horizontal machining centers from Mazak [Florence, KY], one 18 months ago and the second a year ago. On our old horizontal, we could pump out 40 parts in a 24-hour period. We can do the same on one of our new machines in 8 hours, a 3-to-1 increase in productivity."

That boost comes from a number of sources, primarily the 30-hp standard spindle drive with 224 ft.-lbs. torque, more than twice the horsepower of Monterey's previous horizontal. This is important because Monterey produces prototypes as well as part runs in the thousands on its equipment. "We average between 75 and 80 percent metal removal on most of our parts," says Jefferson. "We want them lightweight, yet sturdy. We use 6061-T6 aluminum, the same as that used for many aerospace parts."

Super Shoebox

One of the parts Monterey supplies Synchronous is called an EDFA (Erbium-Doped Fiber Amplifier). Roughly the size of a shoebox, the EDFA is a two-piece module consisting of a bottom tray and a top piece available in a variety of sizes for use in fiberoptic networks. The erbium-doped fiber is a proprietary Synchronous product designed to deliver optimal performance while minimizing laser pump power requirements. Where metropolitan wide-area networks must allow wide fluctuations in the number of wavelengths, the EDFAs suppress and control noise gain, making high-performance all-optical networks possible.

Jefferson uses the two-pallet shuttle system standard on the Mazak FH 5800 to load a tombstone while machining is done on the other. The four-sided tombstones have a bottom and top part on each side. “When the tombstone comes off, I have four complete parts and another tombstone ready to go,” he says. “There’s no stopping between runs.”

In addition to loading and unloading pallets while the horizontal is cutting, the high-speed machining of the FH-5800 further improves Monterey’s productivity. It provides high-speed cutting rates of up to 1968 IPM for X, Y, Z axis, 0.7 G acceleration, 3.2 seconds chip-to-chip automatic tool change, a 1.7 seconds table index per 90° of rotation, and three spindle choices for various applications. “When we tried to do hogging on the other machines, it burned the spindle out,” says Jefferson. “We called the machine manufacturer for help, and they referred us to the spindle manufacturer. Making this tray on our old equipment, the radii would be oblong or egg-shaped, not a true radius. A three-eighths would come out as one-half. Smoothness on the bottom would be less, and repeatability was off. Not so on the Mazak, which is right on every time.”

A part like the bottom tray of the EDFA has to be flat because it acts as a heat sink to disperse heat from the lasers that pump the fiberoptic cable. If it isn’t flat, the laser won’t sit right, and it will throw the signal out of phase, Jefferson says.

Jefferson found himself going through a lot of end mills on his former machining centers. “When the tool would hit a corner on one of our parts, it just stayed at the same speed. This would make the tool flex and prevent it from cutting. I love the high-speed module on the Mazak Mazatrol control because it slows travel down at the corner, leaving a higher-tolerance radii. The fastest our old machines could go is the starting point for our Mazaks.”

Progressive Programming

Jefferson does all part prototyping and machine programming for Monterey, usually in EIA code, which posed no problem for the Mazatrol control on his FH-5800s. “There are between 300 and 400 different parts we run,” he says. “I use Mazatrol to incorporate all my EIAs into subroutines so I can activate the the high-speed module when I want it. Not only do the radii come out better, the Mazatrol program means I don’t have to go in and manually enter G-code after every single line of every subroutine in EIA.”

The Mazak Tool Eye tool sensor also works with the Mazatrol control to reduce setup time, further increasing Monterey’s productivity. The Tool Eye uses a proprietary arm that automatically registers tool data in the CNC when the probe in the tool tip touches the part. Tool offset is registered automatically and stored for the next time the job is recalled. “I have certain programs that run on every single model we make,” Jefferson says. “All I have to do is tell the EIA to call up this subroutine and the Mazatrol already knows what tool to use and where it’s at. Programming is faster and setup is a breeze.”

Machine diagnostics on the Mazatrol control also benefits Jefferson’s shop. “It helps us out a lot,” he says. “With the other, when something goes wrong, you have to really break it down to investigate what’s wrong. With the Mazatrol, a screen pops up, tells you where the problem is, and how to fix it. You’re back running a lot faster.”

Productivity has improved on a number of fronts for Monterey Machining, and improved part quality also deserves mention. “Essentially, we can make our parts better than the print

calls for on our Mazak equipment," Jefferson says. "I just throw a block in, hit start, and walk away. We can count on our Mazaks to meet the demands of our jobs."

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PHOTO CAPTION 1: *Top (left) and bottom (right) components of an EDFA (Erbium-Doped Fiber Amplifier) show the precise machining requirements demanded of this part, used in optical fiber networks. Flatness, for example, must be precise so signals are not thrown out of phase.*

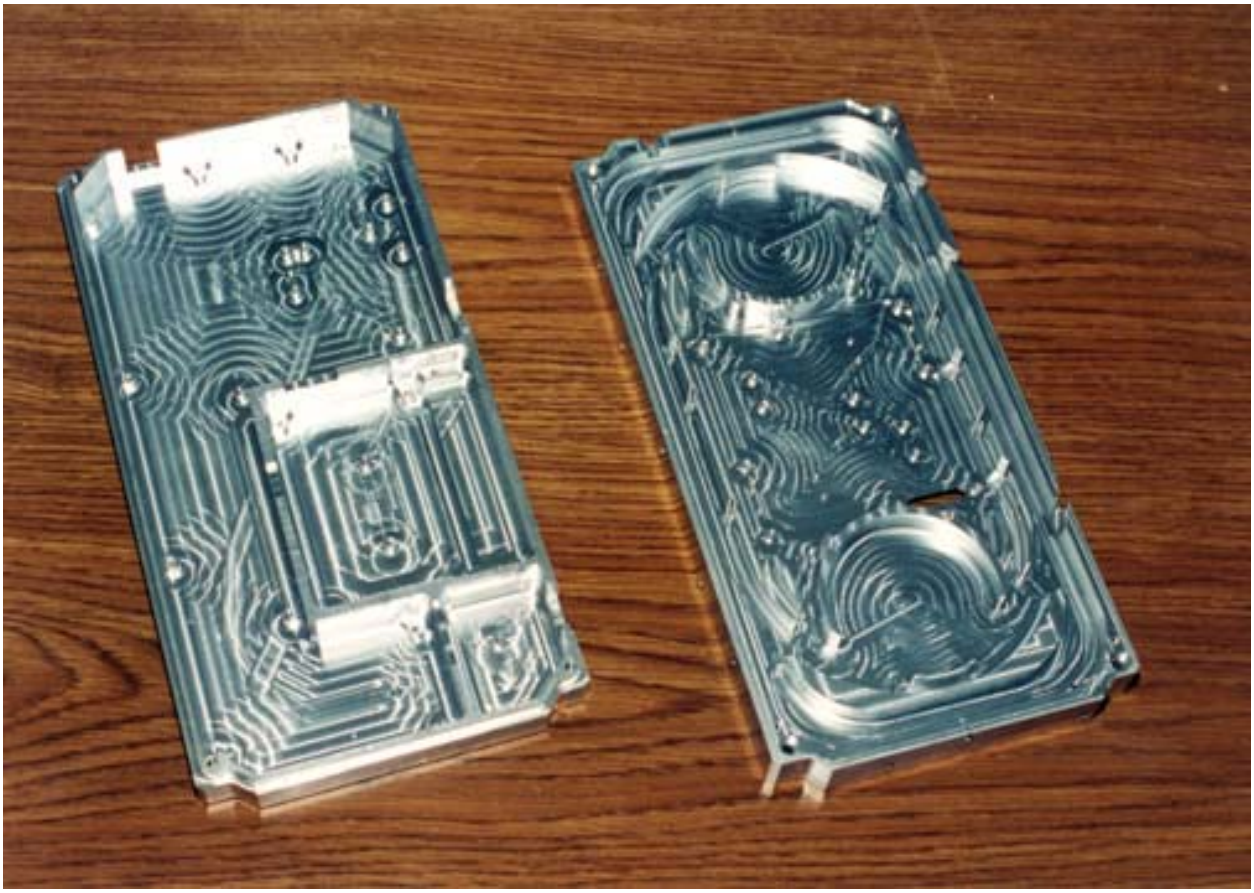

PHOTO CAPTION 2: *Rikk Jefferson, operations manager, holds a network component machined on his Mazak FH5800. Monterey averages 75 to 80% metal removal on the parts it makes.*

PHOTO CAPTION 3: *Loading pallets while the machine is cutting boosts productivity.*