

A NEW BEAM

Fiber lasers
can boost productivity,
cut complexity

Noted for its plasma equipment, motion controls and process-optimization software, Hypertherm Inc., Hanover, N.H., is entering the laser-cutting field with a fiber laser that boasts fast cutting speeds with reduced ownership and maintenance costs compared with CO₂ lasers.

“We put together a business plan a little over three years ago,” says Tate Picard, head of Hypertherm’s laser division. “This related to the expansion of our laser system offerings. It was agreed to embark on an R&D project to understand fiber lasers, see how they play in the marketplace and what benefits they offer when compared [with] CO₂ laser systems or other cutting technologies, such as plasma. Through this R&D effort, we felt we could make it much easier for our partners and their customers to apply laser-cutting technology for their fine-feature cutting requirements as well as successfully address market requirements.”

Hypertherm’s fiber laser has been in development for three years, with effort focused on optimizing the cutting application process rather than the laser itself. Hyper-

therm has been doing field trials and working with its channel partners. It has built several systems to demonstrate live cutting at trade shows, and the company will launch the product officially for wide-scale deployment in the fourth quarter of 2010.

“At the end of the day, it’s less about what is ‘in the box,’” says Picard. “Customers want to know what kind of material they can cut and at what thickness and what kind of performance will the cutting tool yield, so we always focus on the application,” he says.

For instance, if a customer wants to cut a 12-mm-thick mild-steel plate, the company offers all the parameters required for the application, and if the client uses the company’s CNC control technology, it’s all done automatically. Cutting capacity

of the laser will be ½-in.-thick mild steel and ⅜-in.-thick stainless steel.

“We’ve tied together all the system components in the architecture with a network called HyperNet, which is a Hypertherm-designed network, and we’ve recently been granted a patent for it,” says Picard.

Instead of selling directly to end users such as job shops, Hypertherm will follow its traditional channel model and sell its fiber laser systems to OEMs that will then build their systems using the laser.

Hypertherm’s 1.5-kW fiber laser will be sold as “a complete cutting application package that includes the CNC control, the gas management, the height control, the fiber laser and an offline software package for nesting,” says Picard.

Two better than one

Another unique aspect is the ability to have a plasma system and fiber laser system on the same cutting table, says Picard.

“If you have thin-sheet material or need fine-feature cutting that might not be necessarily suited to a plasma system, then the

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customer could have both cutting systems on one machine," he says.

In cases where thicker cuts and higher productivity cutting are needed, for which lasers generally are not well suited, the plasma system can be used. The two processes are complementary.

Machitech Inc., Saint-Marc-des-Carières, Québec, will be one of the OEMs using Hypertherm's fiber laser and developing this dual-cutting system using both plasma and laser cutting heads on one table.

"We are actually offering a system that is going to be a bit different than a standard fiber laser," says Danyel Benoit, director of international sales for Machitech, which builds cutting systems using plasma, oxy-acetylene and now lasers. "Our lasers will be offered in two different styles. We will have a laser-only system, and one that will be a fiber laser/plasma combination machine using dual heads.

"This system will allow our customer to use the right technology for the appropriate material thickness. If they're cutting anything that is 1/2 in. thick or under, they'll get a 40 percent speed gain and an excellent cut quality with the fiber laser. Then with anything that is 1/2 in. thick or thicker, the plasma can be used, which will give them a much lower operating cost and

equivalent edge quality to a high-wattage laser and about three times the speed using our Hypertherm Hy-Definition plasma cutting head."

Machitech will offer a 5-ft.-by-10-ft.-bed combination machine along with a 5-ft.-by-10-ft.-bed fiber laser and possibly an 8-ft.-by-20-ft.- or 10-ft.-by-20-ft.-bed laser only and combination system.

"I've seen the equipment perform already, and it's definitely equivalent to other companies I've worked with and other fiber lasers I've seen," says Benoit. "At the moment, Hypertherm is coming out with a single power level, which they feel hits the sweet spot for the metal-cutting industry. Contrary to other suppliers that will offer anything ranging from a 500-W to 20-kW laser, Hypertherm is only producing the 1.5-kW laser, which will accommodate most of what sheet metal job shops and OEMs will want to cut and where the biggest benefits will come from.

"We already have commitments for orders locked in, but what we are doing now is coordinating our deliveries and our product introduction with Hypertherm's official product launch of their fiber lasers."

Fiber laser benefits

A fiber laser has many benefits, says Picard. There is no practical limit to a laser system's bed size because a fiber laser can deliver the laser beam to any length and with no power loss at the cutting area, he says.

"A fiber laser just simplifies machine design," Picard says. "If you think about CO₂ lasers and how the machine has to be designed, you basically need to have a constant beam path length for the CO₂ laser. The CO₂ power source shoots photons down this beam path, and somehow these photons get to the cutting head. This is done by using beam benders or mirrors. Each one of these bends has the potential for a little power loss and the alignment of the mirror to be a little off, and when you're putting multiple kilowatts of energy onto these devices, they can heat up and cool down during the cutting process, which can have a negative impact on cut quality and repeatability. All these things



Hypertherm says its fiber laser will increase cutting speeds while lowering ownership and maintenance costs.

go away with fiber lasers because they don't use mirrors or beam benders."

Hypertherm's fiber laser requires virtually no maintenance, says Picard. "The diodes used are specified by the manufacturer to have greater than 100,000 hours of useful life, which easily translates to 20 years of system use before performance begins to deteriorate. The core technology that is used in our design is based on the telecom work that's been done over the last 20 years. The diodes we use have the exact same wavelength and design used to bring fiber optic cable to the house."

Customers probably won't see any massive savings on the purchase price of a fiber-laser system, Benoit says. Where they will gain is on the annual operating costs associated with keeping the laser cutting at optimal performance.

"It has way better wall-plug efficiency, close to zero maintenance, no mirrors or resonator gas," he says. "The operating costs of the fiber laser are estimated at 10 to 20 percent of a CO₂ laser annually.

"Also, your operator won't need to be a laser guru and know everything about mirror and beam alignment along with having a good idea of what is causing problems when the laser is not cutting properly. This will be taken care of with the Hypertherm software and the efficiency of the system." **FFJ**

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Hypertherm says businesses can use its fiber laser alongside its plasma systems for greater cutting range.