PRODUCTIVITY GAINS ARE IN OUR FIBER

Mitsubishi is proud to unveil its new Fiber Laser line, which ushers in a new era of laser processing performance. There are plenty of fiber laser systems available out there, but you’ve never seen one like this before.

WHAT IS FIBER LASER?

Fiber laser technology uses rare-earth elements, in this case, ytterbium, to dope the optical fiber of the active gain medium. The fiber couples the light, and acts as a flexible path for delivering the beam to the processing head. The technology eliminates bend mirrors, so it effectively eliminates the need for beam adjustment and alignment, improving consistency. The process can support high kilowatt inputs, and features accelerated cutting speeds. Think: more than 2,000 inches per minute!

SMALLER FOOTPRINT

Because fiber laser technology relies on coiled fiber optics to deliver light to the head, as opposed to mirror-directed beams, significant space savings can be realized with fiber laser technology. We know that square footage is at a premium in your facility.

WHERE DOES IT SHINE?

Applications for fiber laser technology abound, and cover a wide range of possibilities but the real sweet spot is in high volumes and fast processing of thinner gauge materials. Fiber lasers can handle up to .75” thick material, but serious gains in speed can be achieved with .187” and thinner. Also, reflective materials, including brass and copper, aren’t an issue for fiber laser technology.

THE MITSUBISHI ADVANTAGE

Fusing our world-leading laser processing machines, rich in history and technical prowess, with an advanced fiber laser beam, we’ve evolved laser processing to an entirely new level of performance. The NX-F 3015 two-dimensional fiber laser processing system comes standard with a fiber laser resonator and a z-axis linear drive, a preset auto focus processing head, and a safety cover. The Mitsubishi 700 series control with 64 bit NC and a 15 inch touch screen NC panel is the latest most sophisticated control from Mitsubishi. The machine also features a Multi chamber dust-collection mechanism, and a camera for material alignment.
STANDARD FEATURES

• Mitsubishi’s High-speed Control for Lasers (MHC-L), an original control method which maximizes fiber lasers high speed cutting capability. Controls beam on/off timing in 1 µs (micro second) increments. The system includes a timing calculator that allows the machine to deliver fast rise time when the laser needs the power.

• Motion Cut – features the beam on/off time and axial movement simultaneously to eliminate the need for axes to stop.

• Head Position Camera with display below the control panel for ease of operation allows the operator to make head adjustments even if the work piece is far away

• Eco Mode reduces cost during standby by up to 70 percent

• Step by Step Maintenance Guidance provide ease of use for operators no matter what the experience level

• Power Control System provides power stability of ± 1%

• Automatic Focusing allows for easy and consistent focusing

• Helical Rack and Pinion offer improved contact ratio which can lead to improved accuracy

• Automatic Lubrication of Motion System

• Reduction of Cutting Time by fast command execution.

• Power Control has achieved faithful and stable output in response to instructions on DR control and good processing at low power (Marking and thin plate cutting)

• Hot Reserve Function allows continuous operation

• Climate Control reduces overheating in the resonator from high humid conditions

• Long-Term Stable Processing by all fiber composition
One of the main advantages of Fiber technology is the speed in thin gauge material processing. However feedrates alone do not tell the entire story of increased productivity. Superior control and communications technology can accelerate processing. This is at the core of Mitsubishi’s fundamentals, as a control, servo’s and drive manufacturer our single source machine solution maximizes the benefits of Fiber technology and help bring your processing to a whole new level.

- Mitsubishi has always developed high speed controls and servo’s. It is part of who Mitsubishi is. The Fiber technology is a perfect fit for Mitsubishi’s sophisticated controls and servo’s. Their original control method maximizes the speed of Fiber.

- Mitsubishi’s High Speed Control – controls beam on/off time in 1 µs (micro second). This precise timing allows more accurate and faster processing time and it’s only attained with Mitsubishi’s NX-F Series.

- Mitsubishi’s high-speed serial communication unit functions between the CNC and control board reducing any delay in signals.

- Mitsubishi’s Laser Power Control Board is exclusive to Fiber technology and allows for fast rise time to accommodate the necessary speed gains in Fiber Technology. 2G in the X and Y with a 4G Linear Z-axis.

- Helical rack and pinion reduces noise, and allows for an increase in acceleration in X and Y axes provides increased accuracy and longer life time.

- New light weight cutting head redesigned exclusively for Mitsubishi’s Fiber laser to optimize increased cutting speeds.
Fiber lasers deliver their energy through an integrated flexible optical fiber. Fiber lasers have a monolithic, entirely solid state, fiber-to-fiber design that does not require mirrors or optics to align or adjust. These features make fiber lasers easier to integrate and operate in production, medical and other laser-based systems. Fiber lasers are typically smaller and lighter in weight than traditional lasers, saving valuable floor space. While conventional lasers can be delicate due to the precise alignment of mirrors, fiber lasers are more rugged and able to perform in variable working environments. These qualities permit fiber laser systems to be transported easily.

**MAIN FEATURES**

- Excellent Beam Parameter Product (BPP)
- Constant BPP Over Entire Power Range
- Small Focus over Large Working Distance
- Over 30% Wall-Plug Efficiency
- Maintenance Free Operation
- Compact, Rugged & Easy to Install
- Estimated Diode Lifetime > 100,000 hours
Mitsubishi has led the way with patented resonator technology since the introduction of our cross flow CO₂ resonator. Our expertise in beam quality and efficiency have been adapted to the Fiber resonators coupled with our NX-F series machine. The resonator has exclusive technology developed by our engineers to optimize the performance of the resonator within the production environment.

The fiber laser is modular, built from multiple laser units, each one generating hundreds of watts of output power. This also allows the laser system to incorporate spare modules and power margins. Due to this modularity the YLS series of high power laser is set to operate below the rated current. Thus, in the unlikely event that a module fails the laser will automatically increase the power to the rated output leaving the laser with no output power loss and no halted production. An error message will then alert the user of the specific issue that requires service. This feature also increases the lifetime of the diode because of the reduced output strain therefore increasing the overall life of the laser.

<table>
<thead>
<tr>
<th>Normal Operation</th>
<th>Hot Reserve Function During Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>80%</strong> unitX5units</td>
<td><strong>100%</strong> unitX4units</td>
</tr>
<tr>
<td>Electric current reduction per module improves redundancy</td>
<td>Remaining Modules working at 100%, with no change in power and continuous operation</td>
</tr>
</tbody>
</table>
MOTION CUT ADVANTAGE

For maximum production on a fiber laser, especially when running components with complex geometries or in smooth curves, Mitsubishi has upped the traditional ante to introduce the Motion Cut (M-Cut) technology.

STRONG CONTROL LINEAGE

Mitsubishi’s industry leading laser control expertise has once again been brought into play in designing controls for the NX-F 3015 laser. The Mitsubishi High Speed Control for Lasers (MHC-L) is an original control method that is now being applied to fiber optic laser technology to maximize the fiber laser’s number one attribute – speed.

BLAZING SPEED

New software calculates the timing to control the resonator according to the position of the axis. A high-speed communication unit between the CNC and the control board allows for ultra-fast serial communication thanks to signal delay reduction. The laser power control, exclusive to fiber lasers, provides fast rise times, and the resonator itself is customized to control the beam ON/OFF timing, even at high speeds.

TOUGH GEOMETRIES

Traditional technologies worked fine for square or rectangular cutting in fiber lasers, as they relied on the axes perpendicular travel coincides with the 90 degree right angles of these types of shapes. But when faced with complex geometries or smooth curves, traditional controls slowed down the process due to axial stoppage at start point. The MHC-L M-Cut controls the ON/OFF timing to eliminate the need for axes to stop. This increased speed in difficult geometries increases process speed, and ultimately, the bottom line.

IT ALL ADDS UP

At 2.5 kW, the Mitsubishi NX-F Fiber laser isn’t the most powerful resonator on the market – and that’s by design. Power isn’t the sole determinant of process time. The M-Cut time-saving control allow an operator to cut multiple shapes without the axes having to stop, providing industry-leading speed with less power input, and greater cost efficiency per part.

<table>
<thead>
<tr>
<th>Material</th>
<th>Mild Steel</th>
<th>Aluminum 5052</th>
<th>Stainless Steel 304</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>Nitrogen</td>
<td>Nitrogen</td>
<td>Oxygen</td>
</tr>
<tr>
<td>.04</td>
<td>:42</td>
<td>:39</td>
<td>:39</td>
</tr>
<tr>
<td>20 ga</td>
<td>:44</td>
<td>:40</td>
<td>:40</td>
</tr>
<tr>
<td>16 ga</td>
<td>:44</td>
<td>:43</td>
<td>:43</td>
</tr>
</tbody>
</table>

Time, materials and thicknesses shown above reflects this geometry.
ABANDON ONE-STEP-AT-A-TIME PROCESSES WITH AUTOMATED SOLUTIONS FROM MITSUBISHI

Automation changes everything. Mitsubishi Laser has more automated installations than any other manufacturer. From modular cells to fully automated storage and inventory systems, our automation systems allow you to run back-to-back jobs with virtually no supervision. The right automated system can drive incredible profits, and no one knows laser automation like Mitsubishi.

If you’re already automated, the NX-F Series is fully compatible with all Mitsubishi MSCIII, EL4 and River System automation, making it easy to integrate into existing automated operations.

MITSUBISHI RIVER SYSTEMS

The River System precisely handles and inventories sheet metal through every stage of the fabrication process, enabling 24/7 material tracking, as well as extended periods of unattended operation. It dramatically improves production efficiency by virtually eliminating the non value-added activities associated with material management.

- Improves flow of material, workers and information in the factory
- Flexible for any fabrication equipment
- Expandable and upgradable in the future
- Reduces materials/products, search/transfer time
- Space saving and easy inventory control
- Efficient production process
- Reduces liability risk
- Reduces damaged material
- Stores partial remnant sheets
VERSATILE AND EXPANDABLE AUTOMATION

Auto-Flex MSCIII (Multiple Shelf Changer) Series is versatile and expandable. Mitsubishi offers several high-production options that can transform and expand the NX-F System for maximum versatility and throughput. Current Mitsubishi users can add an NX-F to an existing automated system. That’s the expandability of Mitsubishi.

TANDEM LOAD/UNLOAD SYSTEM

- Full load/unload cycle in approximately 65 seconds
- Heavy duty with up to 1 inch thick full sheet load/unload capacity
- Second material pickup loading station allows simultaneous preparation
- 4 motorized carts 2 load, 2 unload working simultaneously to increase throughput
- 11,000 lb per cart capacity
- 5x10 machines can accept raw material in 4x4, 4x8, 4x10 and 5x10 sizes

MULTIPLE SHELF TOWER

- Integrates a low-profile storage tower with 6,000 lb shelf capacity
- Up to 20 shelves can be added to one tower for a total of 120,000 lbs. of material capacity
- Heavy duty with up to 1 inch thick full sheet load and unload capacity
- Full load/unload cycle time in approximately 65 seconds
- 11,000 lb per cart capacity

TWO LASER SYSTEM

- Add a second laser to maximize productivity. A two laser FMS system allows up to six product carts for total capacity of 66,000 lbs. Compatible with NX-F, NX and eX models.
- Heavy duty with up to 1 inch thick full sheet load and unload capacity
- Full load/unload cycle time in approximately 65 seconds
- 11,000 lb per cart capacity

NEW FSC COMPACT SYSTEM

- Completely modular and expandable
- Lighting-fast system cycle time – full load/unload cycle in approximately 75 seconds
- Vacuum load system with thickness detection and sheet separator features
- Heavy-duty clamshell fork unload system with built in sheet raking system
- Heavy-duty up to 1 inch thick full size sheet load/unload capacity
TAKE CONTROL OF YOUR CUTTING

Competing manufacturers’ PC-based controls can’t touch the sophistication of the new Mitsubishi 700 Series CNC controls. Mitsubishi has utilized its vast experience developing the most sophisticated and accurate controls for laser machines and implemented new nanotechnology for finer, faster interpolation with greater power. Our CNC controls include a 15-inch touch screen, 64-bit Windows XP, ethernet for input/output and a USB port for further flexibility.

700 SERIES CNC ALSO FEATURES:

- Dedicated nano-control for highest precision machining
- Newest RISC-CPU and high-performance ASIC
- Improved and accelerated graphics with superior NC design simplify operations
- Network function adaptable for diverse factory environments
- USB Compatible
- Sheet detection
- LAN-Ethernet connectivity
- Decreased graphic time
- Increased cutting condition database
- Improved help diagnostic functions
- Micro-joint function
- 20 GB Hard Drive
- 2 Action Cutting provides automatic setup and easy operator interface
  
  Step 1 - use barcode reader and automatically load onto NC from CAD/CAM computer
  
  Step 2 - once data loaded, head moves to start positions, automatically measures the tilt, the size and the edge of the workpiece, and starts cutting
- New Reset - Restart Function
- Simple Nesting - rectangular nesting of dissimilar parts at control
- Advanced help and maintenance screens are a great aid for operators
- Sheet cut offs
- Email notification
- Multiple cutting with sheet size detection

Handle Box and Bar Code Reader combine for a more user friendly experience.
IMPROVED CUTTING CONDITION DATA

Cutting condition library memory is increased. The controller will now hold 1000 libraries of 17 conditions.

The libraries have become more intelligent. Nozzle diameter and lens focal length parameters are now data fields in the condition pages. This allows for new functions like Automatic Height Sensor calibration.

Automatic Height Sensor calibration calibrates height sensor whenever the nozzle is changed. This function will give more consistent processing capability.

MAINTENANCE GUIDE

Our new maintenance screens provide step by step instructions for most maintenance functions. All of these steps are built into the control for ease of use and convenience for your operator.

Safety is our main concern at Mitsubishi, our machine is built to allow our users to perform their own maintenance on certain components of the machine. This is why we have built special JIGS to make it easier and safer for our customers to keep their machines up and running at peak efficiency.

Easily accessed maintenance area and nozzle changer
### Resonator Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>YLS-2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excitation method</td>
<td>Yb doped on Fiber</td>
</tr>
<tr>
<td>Rated Output Power</td>
<td>2500</td>
</tr>
<tr>
<td>Power stability</td>
<td>(+/-) 1%</td>
</tr>
<tr>
<td>Beam mode</td>
<td>&quot;Tophat&quot; or &quot;flat-Bottom&quot;</td>
</tr>
<tr>
<td>Beam outer diameter inch</td>
<td>.75<del>1.0 (20</del>25mm) (through 4&quot; lens)</td>
</tr>
<tr>
<td>Wave length</td>
<td>µm 1.07</td>
</tr>
<tr>
<td>Frequency setting range</td>
<td>Hz 10-3000 (100-3000 with power control)</td>
</tr>
<tr>
<td>Duty range</td>
<td>% 0-100</td>
</tr>
<tr>
<td>Output power adjustable range</td>
<td>% 0-100</td>
</tr>
<tr>
<td>Resonator unit Dimensions W x H x D in</td>
<td>33.7 x 46.7 x 31.7 (856 x 1186 x 806mm)</td>
</tr>
<tr>
<td>Resonator unit weight lb</td>
<td>770 (350kg)</td>
</tr>
<tr>
<td>Standard Features</td>
<td>Randomly polarized, 1070-1080 nm emission wavelength, ytterbium doped, red aiming diode</td>
</tr>
<tr>
<td>Climate Control</td>
<td>Standard</td>
</tr>
<tr>
<td>Laser Cabinet Style / Dimensions</td>
<td>12U Standalone NEMA 12 Enclosure (HxWxD, mm) 550x790x915</td>
</tr>
<tr>
<td>Chiller power requirements</td>
<td>11 KVA</td>
</tr>
<tr>
<td></td>
<td>3Ø 208 VAC +10% 60Hz</td>
</tr>
<tr>
<td></td>
<td>33 Full Load Amps</td>
</tr>
</tbody>
</table>

### Processing Machine Specifications

<table>
<thead>
<tr>
<th>Model Name</th>
<th>3015NX-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine structure</td>
<td>XY - Precision Rack &amp; Pinion - Z=Precision Ball Screw</td>
</tr>
<tr>
<td>Travel drive method</td>
<td>X-Y-Z simultaneous 3 axes (Z axis height control is also possible)</td>
</tr>
<tr>
<td>Max. workpiece size inch</td>
<td>120.1 x 60.0 (3050mm x 1525mm)</td>
</tr>
<tr>
<td>Table pass height</td>
<td>34.6 (879mm)</td>
</tr>
<tr>
<td>Processing access</td>
<td>Manual Door</td>
</tr>
<tr>
<td>Pallet changer</td>
<td>Provided</td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
</tr>
<tr>
<td>X-axis stroke inch</td>
<td>125.98 (3,200 mm)</td>
</tr>
<tr>
<td>Y-axis stroke inch</td>
<td>62.99 (1600mm)</td>
</tr>
<tr>
<td>Z-axis stroke inch</td>
<td>4.7 (120 mm)</td>
</tr>
<tr>
<td>Rapid travel speed (X, Y) inch / min</td>
<td>4724 (single axis), 6680 (simultaneous)</td>
</tr>
<tr>
<td>Max. processing feedrate inch / min</td>
<td>2360 (60 m/min)</td>
</tr>
<tr>
<td>Positioning precision inch</td>
<td>.0019/20 (0.05/500mm)</td>
</tr>
<tr>
<td>Drive motor type</td>
<td>Intelligent AC Servo</td>
</tr>
<tr>
<td>Max. workpiece weight lb</td>
<td>2050 (930 kg)</td>
</tr>
<tr>
<td>Machine unit dimensions (W x H x D) inch</td>
<td>408.3 x 88.6 x 116.2</td>
</tr>
<tr>
<td>Machine system weight lb</td>
<td>27845 (12630kg)</td>
</tr>
<tr>
<td>Machine power requirements</td>
<td>25 KVA 3Ø 208 VAC +5% 60Hz 74 Full Load Amps</td>
</tr>
</tbody>
</table>

### Processing Table

<table>
<thead>
<tr>
<th>Material Thickness (in)</th>
<th>.08</th>
<th>.16</th>
<th>.24</th>
<th>.32</th>
<th>.40</th>
<th>.48</th>
<th>.56</th>
<th>.64</th>
<th>.72</th>
<th>.80</th>
<th>.88</th>
<th>.96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel / Oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless Steel / Nitrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum / Nitrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper / Oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brass / Nitrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

MC MACHINERY SYSTEMS, INC.
1500 Michael Dr., Wood Dale, IL 60191 | Tel: 630-616-5920, Fax: 630-616-4068 | www.mitsubishi-world.com