High-Precision Fiber Processing of Thin-to-Thick Materials

ENSIS 3015 AJ

2kW Fiber Laser Cutting System
The ENSIS 3015 AJ is a revolutionary advancement in fiber laser cutting technology. This high-speed fiber laser cutting system has the ability to cut thin materials up to 4 times faster than a CO\textsubscript{2} laser. In addition, an innovative resonator enables the ENSIS AJ to deliver both speed and power — utilizing 2 kilowatts to process up to 1-inch thick mild steel.

Developed by Amada, ENSIS technology changes the laser beam mode to efficiently process thin-to-thick materials without additional machine setup. Adjustments occur automatically based on the cut condition selected on the machine’s AMNC 3i control. The ENSIS AJ was engineered specifically for manufacturers that require the high-speed cutting capabilities of a fiber laser and the thick material cutting capabilities of a CO\textsubscript{2} laser cutting system.

### An Evolution in Fiber Laser Technology

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### Amada’s ENSIS Technology

The AJ2000 fiber laser resonator contains a Variable Beam Control Unit that automatically adjusts the laser beam’s properties to process a wide range of material thicknesses.

Compared to the previous generation of Amada’s fiber resonator, the ENSIS fiber engine uses 60% fewer laser diodes and 75% fewer modules to generate 2kW of power. The simplified design does not require laser gas, mirrors, or any other items typically associated with CO\textsubscript{2} beam generation. A single fiber optic delivery cable to the laser cutting head eliminates the need for additional external mirrors.

The ENSIS AJ provides economical operation, high-speed cutting in thin material, and superior edge quality on thick plate.
**Enclosure & Drive System**

The ENSIS AJ includes a full enclosure that surrounds the entire cutting area with access for part removal. This design protects the operator from gantry movement and the shorter wavelengths emitted by fiber lasers. Also, the enclosure helps contain fumes for efficient dust collection and ensures a clean shop environment.

The ENSIS AJ utilizes a helical rack and pinion drive system for both the X and Y axes, while the Z-axis is equipped with a high-precision ball screw. This innovative drive system allows for higher acceleration and rapid traverse speeds compared to traditional rack and pinion systems. The helical design also ensures smooth and quiet motion.

**Sectionalized Dust Collection System**

Specifically designed to handle high-speed operation, the ENSIS AJ is also engineered to maximize safety. The area beneath the cutting table is divided into four sections. During the cutting process, only the ducts directly beneath the cutting head are open for fume extraction. The ducts in the other sections remain closed to improve dust collection.

**AMNC 3i Control**

With an upgraded processor, the AMNC 3i is the fastest Amada control available. The large touchscreen allows users to easily see more information and load programs based on filename. Thumbnail views of parts or nests provide for quick and easy identification. Also, the large screen ensures that shop floor editing of a program fast and efficient.

- 21.5" touchscreen display with 16:9 aspect ratio
- Simplified operation panel
- Amada automation system controls integrate into the AMNC 3i interface
- Network ready
- Limit control functions based on user level
- Optimized cutting data library
- Quick and easy control of feed, power, duty cycle, frequency, gas selection, and pressure control
Full-Featured Technology

Automatic Nozzle Changer
The nozzle is automatically exchanged based on the cut condition being used on the current NC program. In less than a minute, the current nozzle will be cleaned and a new nozzle will be selected and calibrated. This eliminates machine idling associated when an operator is not present.

WACS™
Water Assist Cutting System (WACS™) allows thick materials to be efficiently processed by cooling the material during laser cutting. With reduced heat buildup, the laser cutting head can accurately cut closely-nested parts and eliminate the need of traversing to different areas of the material.

WACS, automatic nozzle changes and Cut Process Monitoring, work together to allow a wide range of materials to be efficiently processed without operator setup or intervention.

Cut Process Monitoring System
Improved processing times and repeatable edge quality are ensured through automatic pierce detection and continuous monitoring of the cutting process.

Turn-Key Solution
The ENSIS 3015 AJ is a complete, turn-key solution. All of the items necessary for installation, training, and production are included with the purchase of the machine. All components are serviced and supported by Amada’s highly-trained service personnel.

Items Included:
- AMNC 3i control
- Interlocked enclosure
- NC assist gas
- B-axis NC focus
- Integrated beam purge
- 150 mm lens, 190 mm lens
- High-speed cutting head
- Active Cut
- Clean Cut™
- Dust collector
- Chiller
- Hoses
- Duct kit
- Gas lines and regulator

Advantages of Fiber Laser Technology
- Lower Operating Costs
  - No spatial cavity in oscillator
  - More efficient processing
- Expanded Capabilities
  - 1.08 μm wavelength: Better beam absorption
  - Cuts copper, brass and titanium
- Low Maintenance
  - No mirrors in the laser source
  - Simplified laser generation

Advantages of Amada’s Fiber Laser
- Proven Performance
  - Since 2006, the development and real-world application of Amada’s fiber lasers have resulted in proven performance and reliability
- System Integration
  - State-of-the-art AMNC 3i control with user-friendly graphical interface
  - Helical rack & pinion drive system provides higher acceleration and rapid traverse speeds

Environmental Advantages
- Energy Efficient
  - 3-4 times more energy efficient than a comparable CO2 laser
  - A smaller, more efficient chiller reduces environmental impact
- Elimination of Harmful Emissions
  - Solid-state technology does not require gas to generate the laser beam
With the dramatic increase in productivity achieved with the ENSIS AJ, material handling is more important than ever to realize full machine potential. Amada offers a variety of modular automation options that let you configure your system according to your specific operational needs. All are designed to help improve productivity and increase profits by reducing lead-time and cutting costs.

**Modular Automation for an Ever-Changing Market**

**MP-F/MP-L**
- Automated load/unload for a single laser
- Utilizes area above the laser shuttle table
- Expandable to Amada’s MARS storage system for additional capacity
  - Provides fast, efficient loading/unloading in a small footprint at an economical cost
  - Single shelf, compact system

**ASLUL/ASFH**
- Automated load/unload for a single laser
- Utilizes area above the laser shuttle table
- Expandable to Amada's MARS storage systems for additional capacity
  - Compact loading/unloading system
  - Single tower or twin towers
  - Multiple shelves support a variety of material types and thicknesses

**AMS**
- Provides maximum flexibility for multiple lasers
- Best expandability options
  - Allows modules to be configured to meet each customer's individual layout, expansion plans and changing needs
  - Engineered to accommodate multiple towers and lasers
  - Equipped with multiple methods of ensuring precise sheet separation

In order to provide the optimal automated solution, Amada’s highly-trained engineers and consultants are equipped to evaluate your entire manufacturing process. Digital layouts will be provided to give an accurate representation of how the system will fit in your shop environment. Overcarts, undercarts, extensions and towers are all modular and can be added at any time to accommodate growth based on your specific needs.

**Flexibility & Growth**

MARS material storage systems organize the manufacturing process — providing for continuous, on-demand production with minimal supervision.

ASFH compact tower systems leverage the vertical space in your facility to maximize material storage without compromising valuable floor space.
### Dimensions

<table>
<thead>
<tr>
<th>Travel Method</th>
<th>Stationary table, X, Y and Z-axis movement for cutting head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Method</td>
<td>X, Y and Z simultaneous 3-axis control</td>
</tr>
<tr>
<td>Drive Motors</td>
<td>Fanuc AC servo motors</td>
</tr>
<tr>
<td>Max. Sheet Size (X, Y)</td>
<td>120” x 60”</td>
</tr>
<tr>
<td>Max. Axis Travel (X, Y, Z)</td>
<td>121” x 61” x 3.93”</td>
</tr>
<tr>
<td>Max. Axis Positioning Speed (X, Y)</td>
<td>4,724”/min. per axis (6.693”/min. 45° vector)</td>
</tr>
<tr>
<td>Max. Speed Z-Axis</td>
<td>4,724”/min.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.0002”</td>
</tr>
<tr>
<td>Max. Material Weight</td>
<td>2,000 lbs.</td>
</tr>
<tr>
<td>Max. Material Thickness</td>
<td>Mild Steel………………….0.875”</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel…………………….0.375”</td>
</tr>
<tr>
<td></td>
<td>Aluminum……………………..0.312”</td>
</tr>
<tr>
<td>Assist Gas</td>
<td>4 ports with NC pressure control</td>
</tr>
<tr>
<td>Electrical Requirements</td>
<td>200V, 3-Phase, 60Hz</td>
</tr>
</tbody>
</table>

**Motion Package**

**Fiber Laser Resonator**

<table>
<thead>
<tr>
<th>Model</th>
<th>AJ2000 with ENSIS Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonator Style</td>
<td>LD excited Yb fiber</td>
</tr>
<tr>
<td>CW Output Power</td>
<td>2kW</td>
</tr>
<tr>
<td>Peak Pulse Output Power</td>
<td>2kW</td>
</tr>
<tr>
<td>Power Stability</td>
<td>±2%</td>
</tr>
<tr>
<td>Laser Wave Length</td>
<td>1.08 µm</td>
</tr>
<tr>
<td>Laser Power Mode Selection</td>
<td>CW, gated pulse (CNC controlled)</td>
</tr>
<tr>
<td>Laser Beam Mode Output</td>
<td>Multimode Mode</td>
</tr>
<tr>
<td>Beam Divergence</td>
<td>&lt; 3mm-mrad</td>
</tr>
<tr>
<td>Pulse Frequency</td>
<td>1 – 10000Hz</td>
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<tr>
<td>Pulse Duty</td>
<td>0 – 100%</td>
</tr>
<tr>
<td>Chiller Water Requirement</td>
<td>≥ 41 L/min.</td>
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<tr>
<td>Interlocks</td>
<td>Electrical, mechanical, and chiller</td>
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<tr>
<td>Electrical Requirements</td>
<td>200V, 3-Phase, 60Hz</td>
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<tr>
<td>Electrical Power Consumption</td>
<td>9kW</td>
</tr>
</tbody>
</table>

In the interest of technological progress, we reserve the right to make any changes to technical dimensions, construction and equipment as well as illustrations. Workpiece precision and material thickness to be processed are also dependent on production conditions, material, type of workpiece and its pretreatment.