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FIBER LASER
LS 3015 HL

Muratec's Fiber Laser Combination Machine provides value-added

The LS3015HL Hybrid Laser is the latest innovation in Muratec's pursuit of value-added sheet metal processing. Leveraging the high-speed precision of fiber laser cutting and the accurate forming and tapping performance synonymous with Muratec's punch press technology, the Hybrid Laser provides superior quality and significant throughput increases.



Forming

Laser

Sheet Metal Production

**ADVANCED
HYBRID**

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LS 2512 HL



Tapping

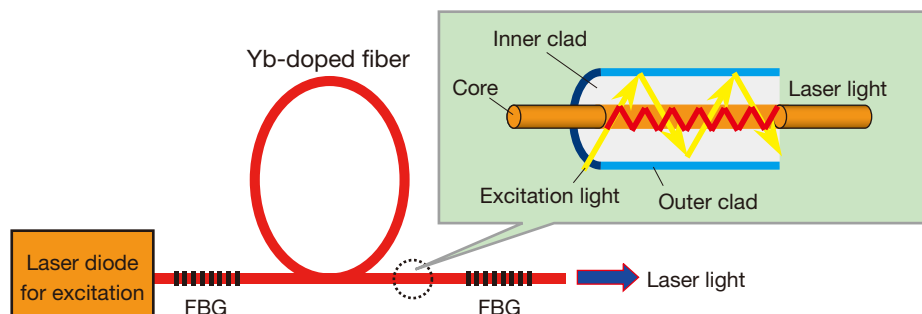


Principles and Characteristics of Fiber Laser

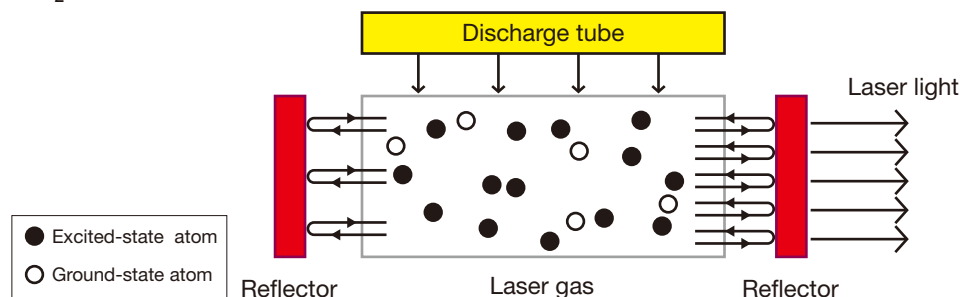
Laser Medium and Excitation Method

Fiber lasers are created using active optical fibers and semiconductor diodes. The laser beam is emitted by way of an armored, flexible, fiber optic cable. Amplification is achieved without the use of reflective mirrors and lenses. Therefore, optical misalignment due to thermal or mechanical influence is virtually eliminated.

Fiber Laser Beam Generation Method



CO₂ Laser Beam Generation Method

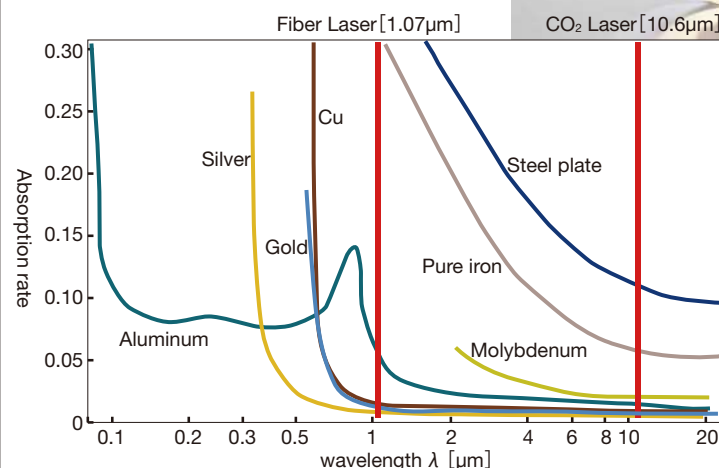
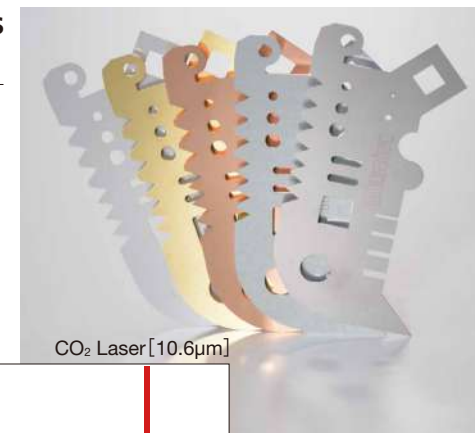


Fiber Laser Resonator by IPG Photonics

IPG is the world leader in the production of fiber laser resonators and amplifiers. By incorporating manufacturing processes that surpass the Bellcore standards for electrical components IPG products offer the highest quality and reliability.

Material Absorption Properties of Fiber Laser

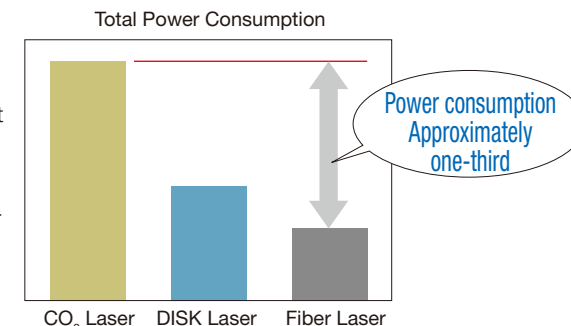
The fiber lasers short wavelength beam enhances the ability to process highly reflective materials such as Copper and Aluminum.



The wavelength of fiber laser is 1/10th that of CO₂ lasers. This difference greatly improves the absorption rate when processing reflective materials.

Low Power Consumption

The fiber laser resonator has a lower power consumption and a superior light conversion efficiency when compared to conventional CO₂ lasers. This efficiency allows for the use of a smaller chiller which in turn reduces the power consumption by approximately one third when compared to CO₂ lasers.



Power consumption Approximately one-third

Better cost performance by utilizing features of Fiber Laser

Significantly Reduced Maintenance Costs

Mirror cleaning, laser gas, and other CO₂ consumables become a thing of the past when utilizing fiber laser.

Operating Cost Analysis

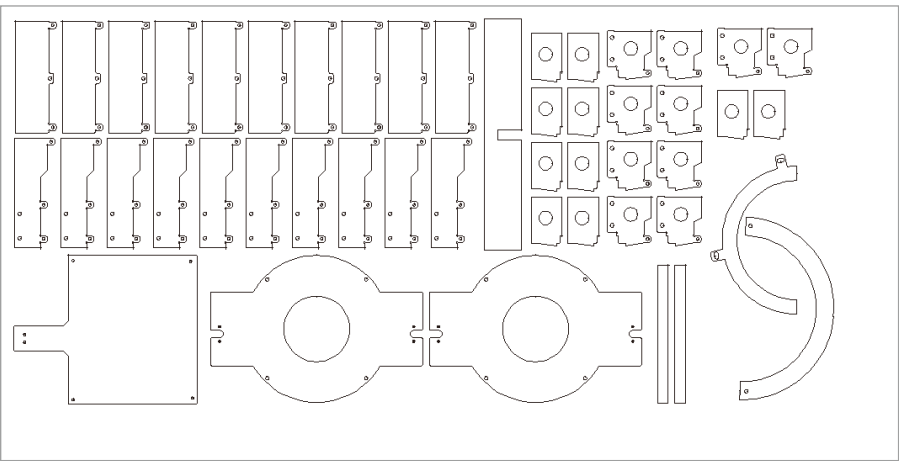
Effective monitoring of power and gas consumption rates allows for accurate operating cost analysis. Real-time monitoring of material processing times provides actual job cost feedback.



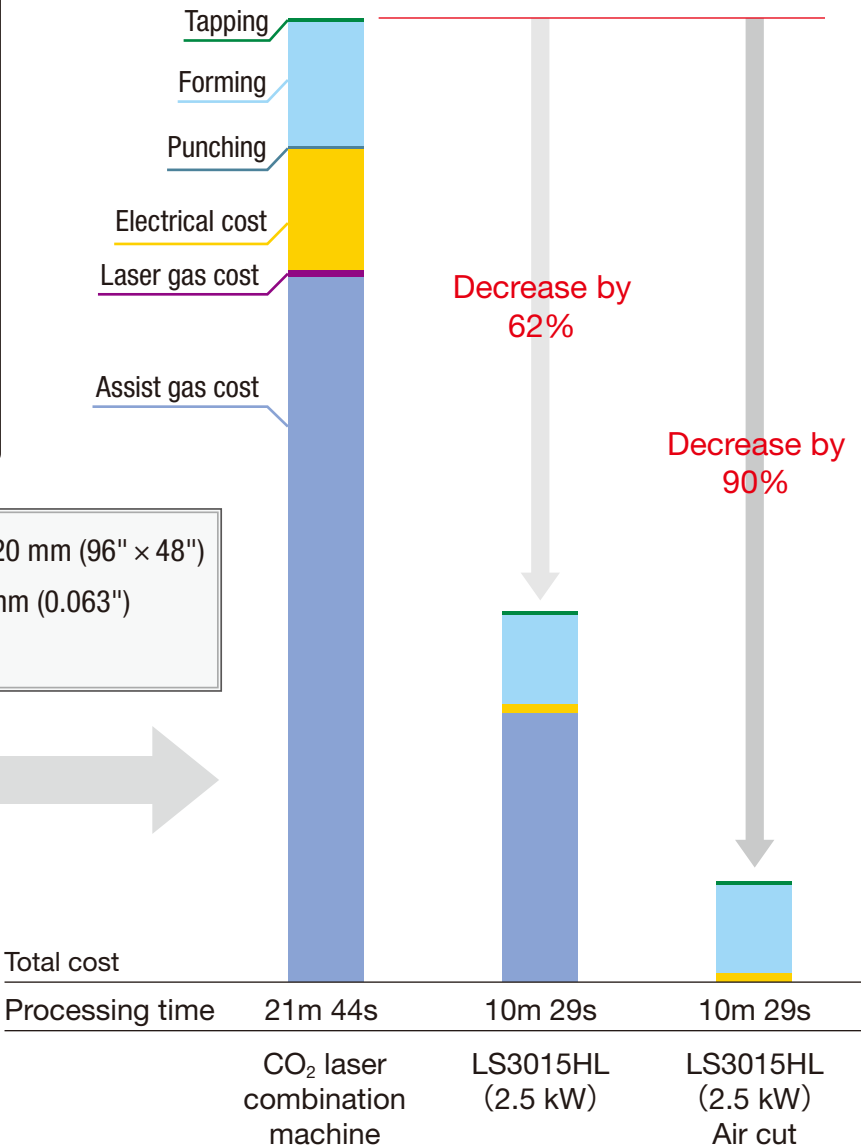
Cost Reduction using Hybrid Laser

Low running cost can be achieved due to the high-speed cutting of the fiber laser with air assist gas and cost performance utilizing the integrated forming and tapping operations.

- Material size: 2440 mm × 1220 mm (96" × 48")
- Material, thickness: mild steel 1.6 mm (0.063")
- Number of Parts: 48



Total Cost Comparing

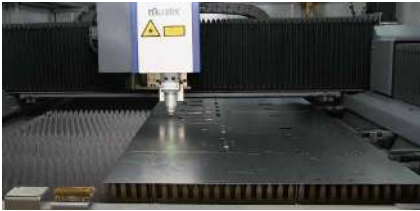


Electricity costs for compressors, etc. are not included.

Flexible Production by Forming & Tapping with Fiber Laser

New Hybrid machine with fiber laser basis

In order to achieve the most value from the fiber laser system, material is processed on traditional slat pallets using flying optics providing high speed and high accuracy.



Fiber Laser Processing

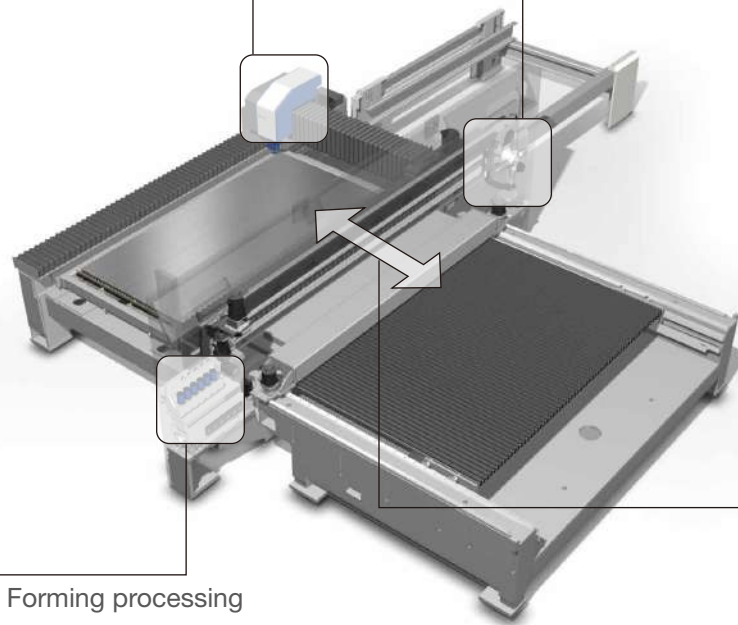
Forming Operations by Servo Drive

Support for various forming processes is done with upper and lower servo drives. Forming operations are performed on a stable brush table. Tool conditions in the control allow adjustment of all forming profiles.



Forming processing

Tapping processing



High Quality Rigid Tapping Unit driven by servo motor

Servo-controlled tapping supports a large variety of machine and roll-type taps. Automatic chip vacuum, tap lubrication, tap breakage sensor and tap life management is included.

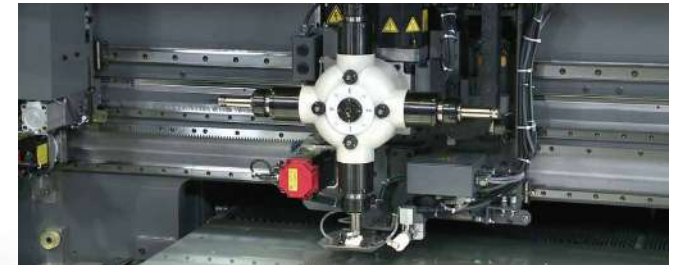
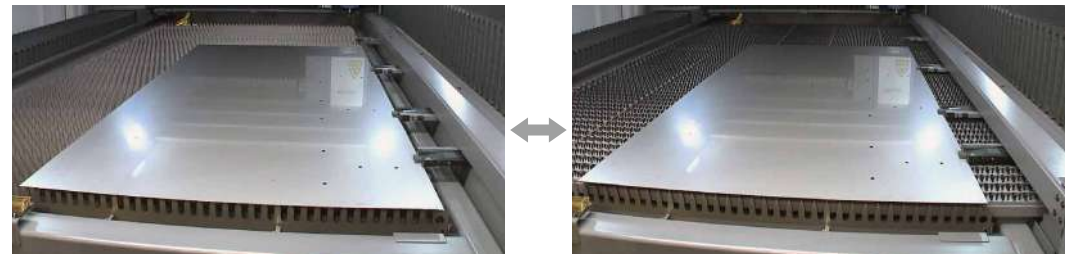


Table Shift

The material is moved from slats pallet to brush table by a fork unit. Provides seamless table shift transfer from cutting to forming. Designed to maintain quality throughout cutting and forming processes, the fork unit transfers material from the laser pallet to the brush table, utilizing work clamps to keep the material from shifting during transition.



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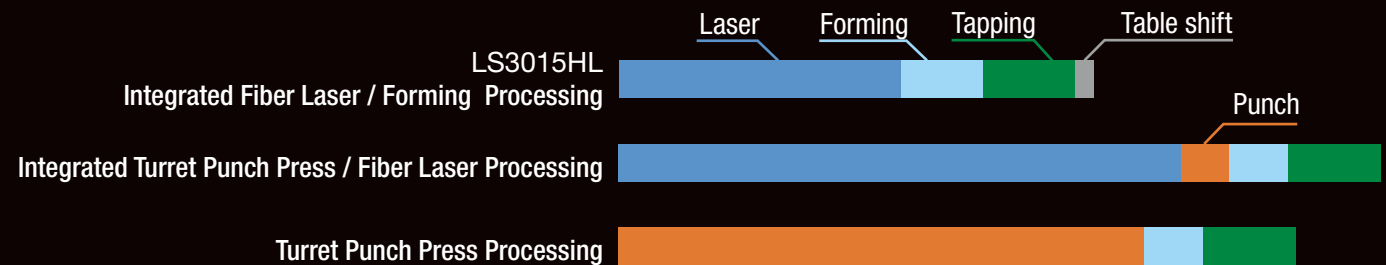
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Comparison graph of processing time

- Material size: 2440 mm × 1220 mm (96" × 48")
- Material, thickness: mild steel 1.6 mm (0.063")
- Number of Parts: 48
- Forming Operations: 98
- Tapping Operations: 53



Forming and Tapping Value-Added Fiber Laser Operations

Forming unit

Forming accomplished with upper and lower servo drives.

Maximum processing capacity	5 tons (5.5 US tons)
Number of forming stations	8
Tooling type	LS3015HL/LS2512HL special tooling
Forming drive (method)	Rack & pinion
Maximum forming sheet thickness ^(*)	6.35 mm (0.25") 12 mm (0.47") (option)
Repeat accuracy	±0.03 mm (±0.001")

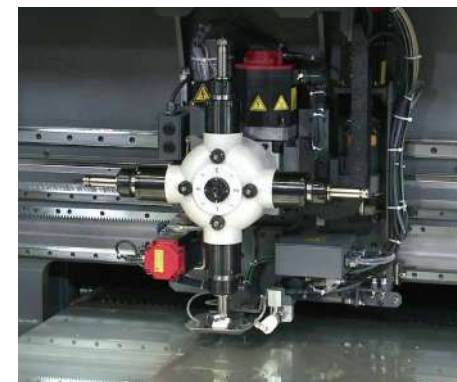
Up / Down forming tool operations are provided as standard. High quality forming is achieved by tool condition settings on a stable brush table. The basic 8 station tool cartridge can be expanded with an optional tool changer.



Tapping unit

Servo driven high quality rigid tapping.

Number of tapping stations	4 (standard) 8 (option)
Tap size range	M2 ~ M10 (#2 ~ 3/8) ~ M12 (~ #1/2) (option)
Type of tap	machine tap or rolling tap
Maximum tapping sheet thickness ^(*)	6.35 mm (0.25") ^(*) 12 mm (0.47") (option)
Repeat accuracy	±0.03 mm (±0.001")
Tap tool breakage	by photo sensor
Tap tool lubrication	spray type



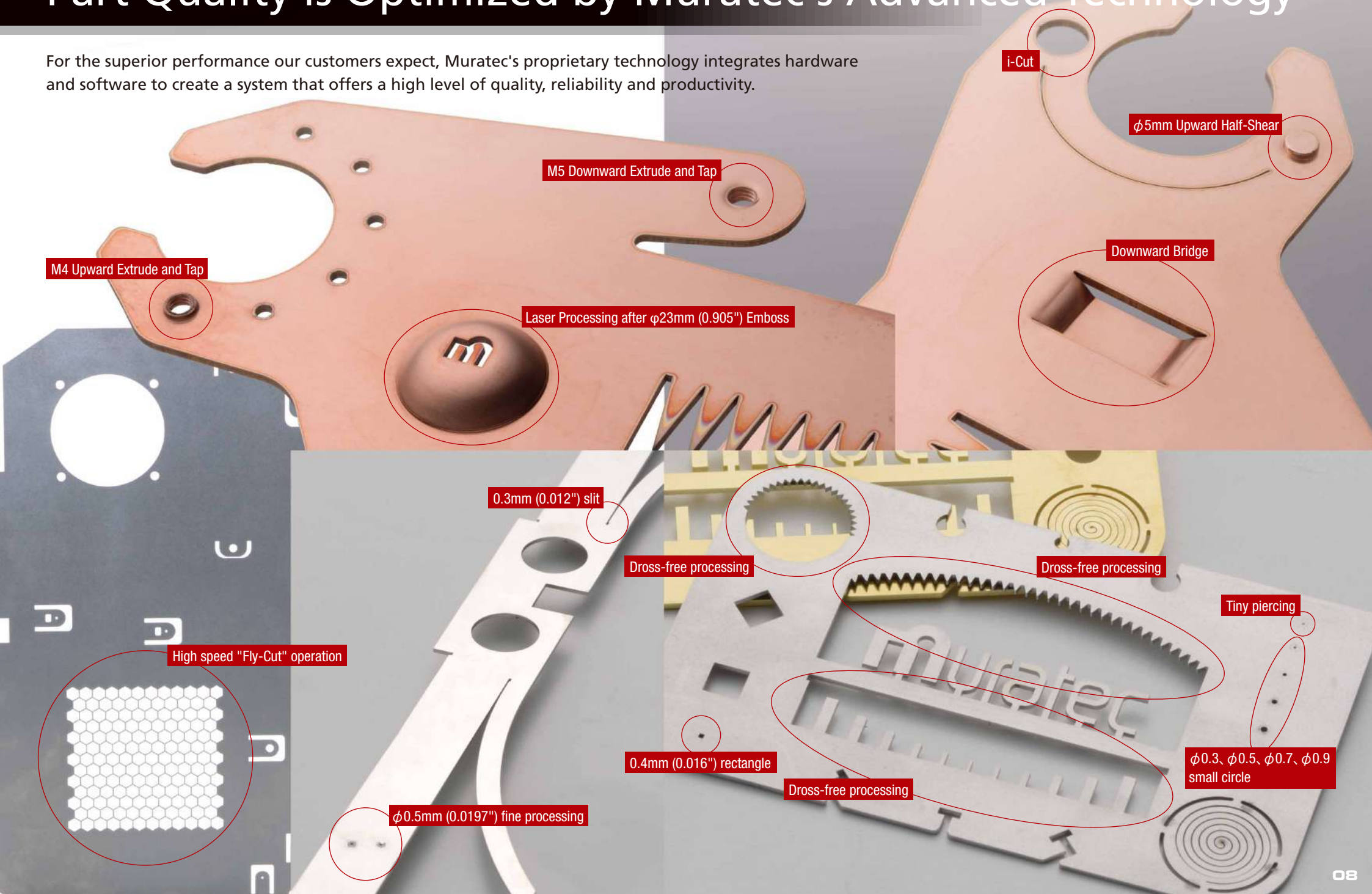
High quality tapping, feed rate and rotation are controlled by a servo motor. Automatic chip vacuum, tap lubrication, tap breakage sensor and tap life management are supplied as standard.



* This shows possible loading work dimensions for forming & tapping, but not capability of forming & tapping.

Part Quality is Optimized by Muratec's Advanced Technology

For the superior performance our customers expect, Muratec's proprietary technology integrates hardware and software to create a system that offers a high level of quality, reliability and productivity.

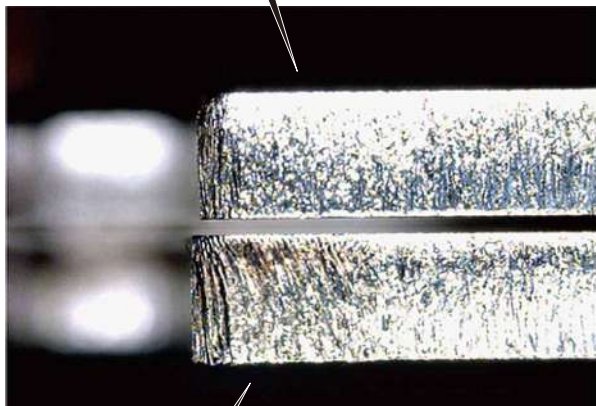


Control System to Maximize the Potential of Fiber Laser

MVHS control (Microcomputer Control by Variety of High Speed Outputs)

The Muratec designed laser output control system MVHS can adjust within milliseconds acceleration and deceleration commands, which enables smooth pulse output to realize high quality cutting.

Processing quality by using MVHS control



Enlarged drawing

Processing quality by using the conventional control

Beam Monitoring System

Stable operation is achieved by monitoring light quantity at cutting spot as well as optical parts. The laser beam is measured from the optics to the focal point in an effort to maintain optimum cutting conditions. The system allows for continued cutting as long as the variables do not exceed the range of acceptable conditions thus extending productivity. Optical contamination is also monitored in order to improve maintenance scheduling and avoid unscheduled down time.

Light Reflection Monitoring System

The equipped reflected light monitoring system prevents the laser beam from reflecting back to the resonator and the damage of the resonator. This is achieved by constantly monitoring the beam in real-time and providing feedback for corrective measures.

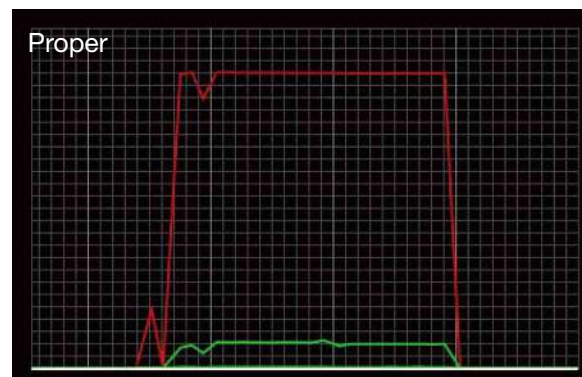
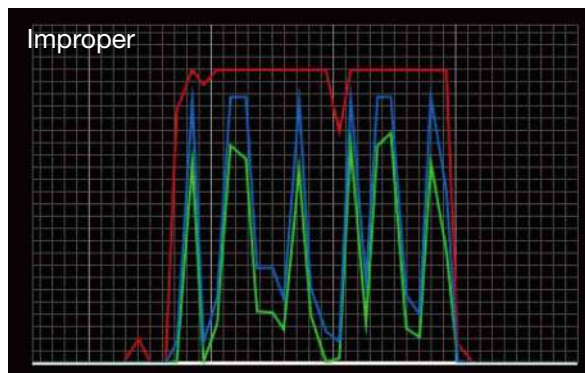
Process Monitor Function

The cutting process is monitored for the correct pierce and cutting parameters by gauging the amount of visible and infrared light. If improper conditions are detected the machine will shut down to prevent damaging parts.



Improper cut example

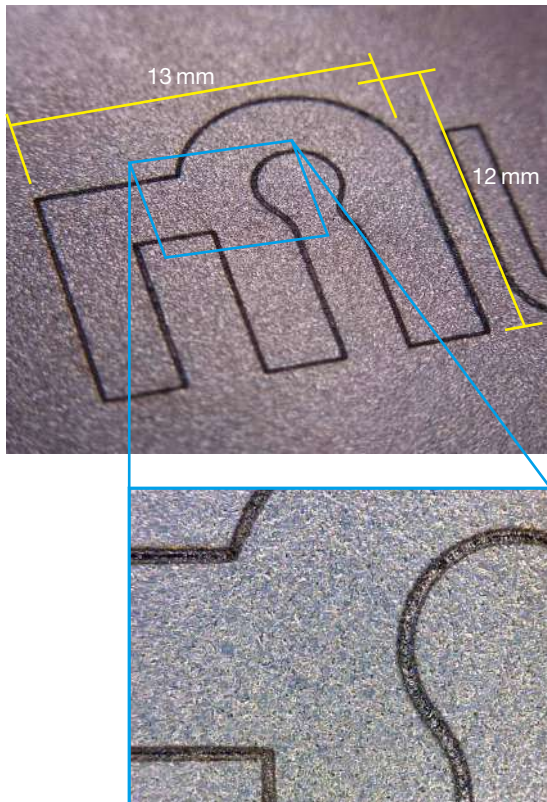
State of waveforms at time of processing



Red --- laser output
Green --- visible light
Blue --- infrared light

Laser Marking Process

Muratec's fiber beam output control enables stable laser irradiation processing in a low power band which provides a high quality marking process.



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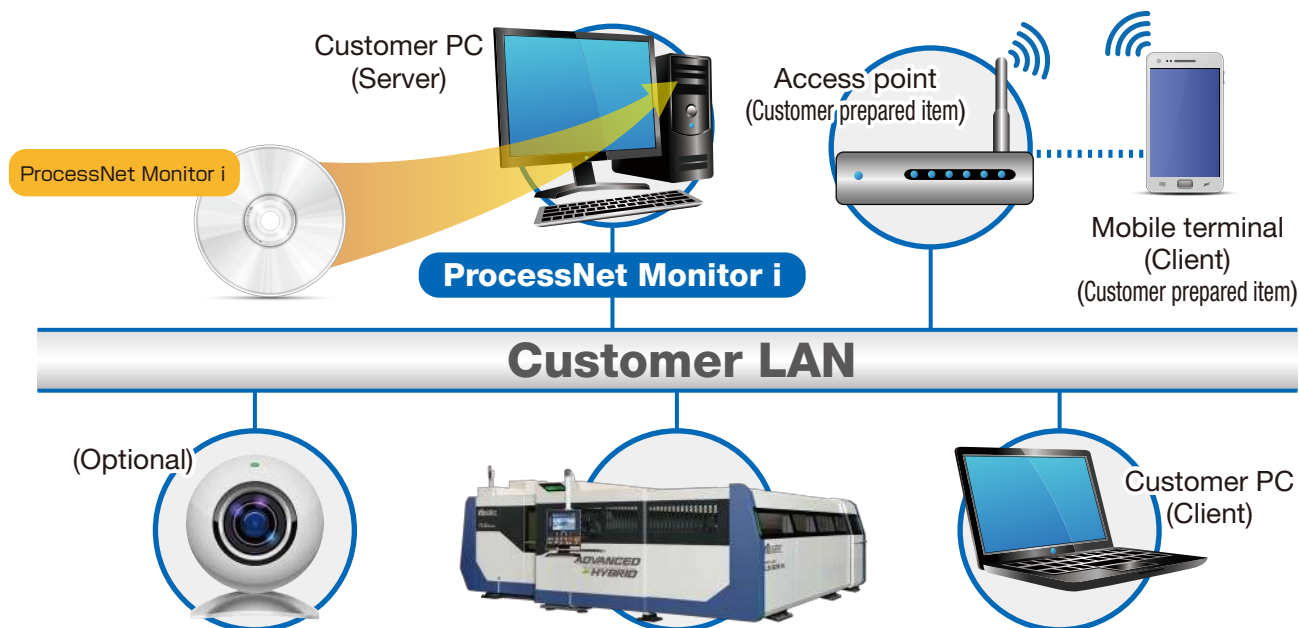
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Obtain Operating Conditions

ProcessNet Monitor i

The software system which can monitor the machine condition, the power consumption and alarm history is standard equipment. The information can be obtained remotely from a PC connected to the systems network. The software provides data that can be used to improve productivity as well as cost analysis.



Display of Current Machine Conditions



The system software will display the machines current state of processing including flow rate and power consumption. Additionally video can be used to monitor the laser operation in real-time. (Optional camera installation required)

Display of the Operating History



The system stores the laser processing information from the previous four weeks of production. The volume of work and the load conditions can be obtained for production comparisons.

Display and Classification of Production



Processing time, setup time, and down time by alarms can be displayed. Factors that can provide improvement in operating rates can be easily accessed and checked.

Alarm History



Past operational alarms of the laser are displayed in the system by rank. The content of an alarm that was most frequently generated can be obtained and used as a preventive measure to improve the operating procedures.

Energy Use Results



The power and gas consumption as well as flow rate for the previous four weeks are displayed. Energy consumption from the laser can be obtained for accurate cost accounting.

Note:

- 1) In case of a remote connection from the outside of the company, it is necessary for customers to set VPN environment.
- 2) Purchase and configuration of illustrated hardware and LAN equipment, such as PC's, Access point, mobile terminals and cameras are the responsibility of the customer.
- 3) As for the purchase, installation and setting of equipment that you will be required to perform, please consult with the division in charge of management of your information or an outside professional company.

Make the Most of Your Fiber Laser

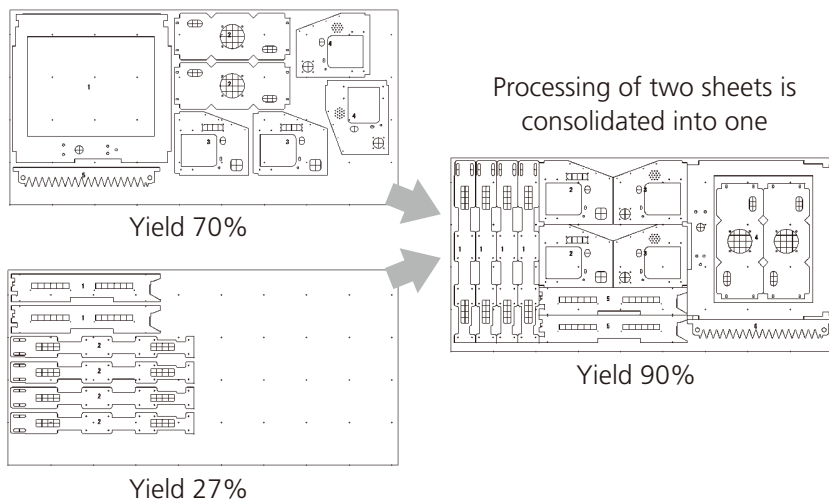
Automatic programming system CAMPATH G4 Advanced

CAMPATH G4 Advanced is an automatic programming system that integrates CAD with superior operability to improve operator efficiency. The CAM side reflects superior knowledge of laser processing. It helps make the processing data which achieves stable & high quality laser processing by decreasing operator's work load.

The scheduling transfer through network, which is standard function, supports high productivity.

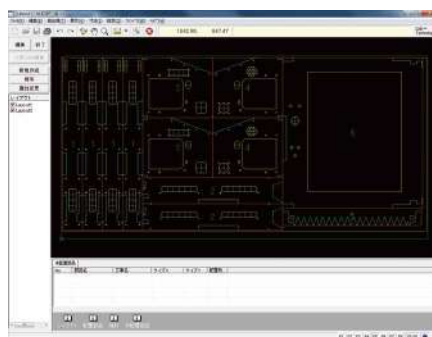
Batch programming of Common Edge cutting

Common Edge cutting, by nesting parts next to each other, helps achieve high yield processing. This can promote total cost reduction by reducing the amount of material required and improve total processing time.



Traditional Common Edge cutting has been accomplished by manual nesting.

With Campath G4 Advanced, it is possible to generate automatically by batch programming, achieving operational efficiency improvement.



Reduce total time of programming

Conventional programming : 6 min 40 sec → Batch programming : 2 min 20 sec

This is an example time. It will change based on number of parts and detail of processing

List of Functions

Laser attribute edit functions

Multiple part tab edit functions

Automatic laser condition settings

Approach interference avoidance function

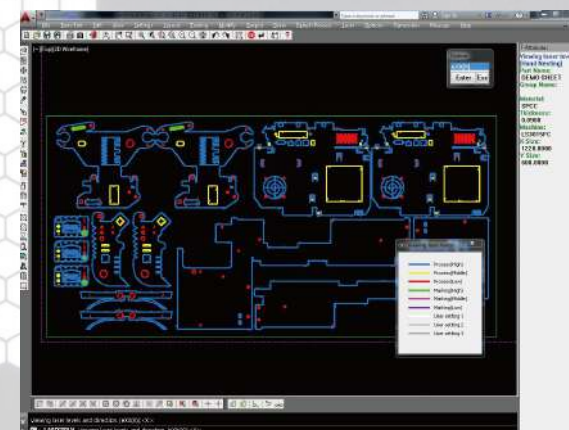
Processing order edit function

Positioning path edit function

Laser head interference and avoidance simulation

Temperature distribution simulation

NC Data Collection (Schedule data file)



Processing attribute confirmation

Automation with high efficiency, safe & reliable operation

Full sheet load/unload Stocker system FS3015TL

This tower system provides a stable prolonged production cycle. Muratec's years of automation, innovation & engineering know-how has produced a system that is efficient and reliable.

It corresponds to long-time operation as well as urgent products by manual operation.



Characteristics

Space saving — Install area reduced up to 43% (compared with conventional machines)

Increased productivity — Time savings from exchanging pallets and unloading products (compared with conventional machines, reduce up to 40%)

Reducing lower scratch of material in unloading — products unload by driving belt

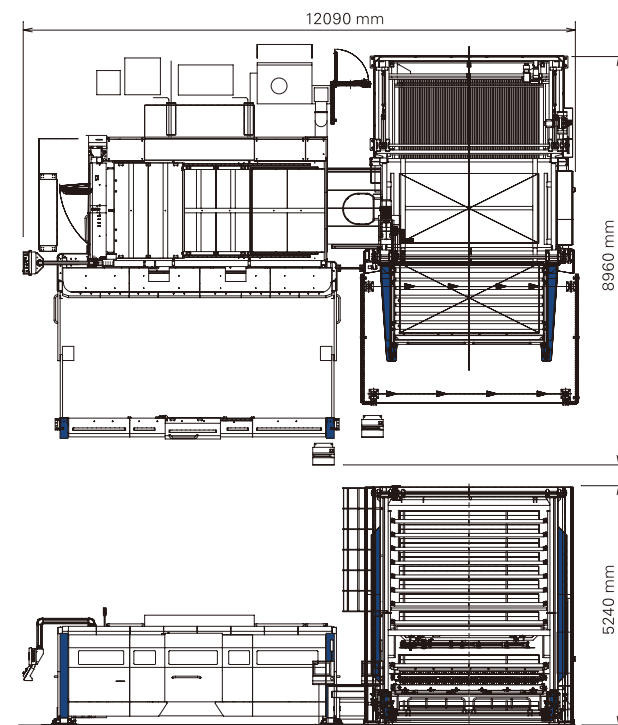
Carrying material up to 5'x10' 16t (0.630")



Slats pallet setting in the stocking system

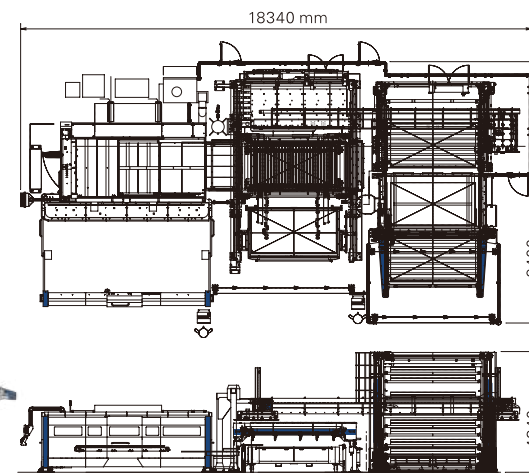


Placing the material by handing



Laser sorting stocking system FG3015TL

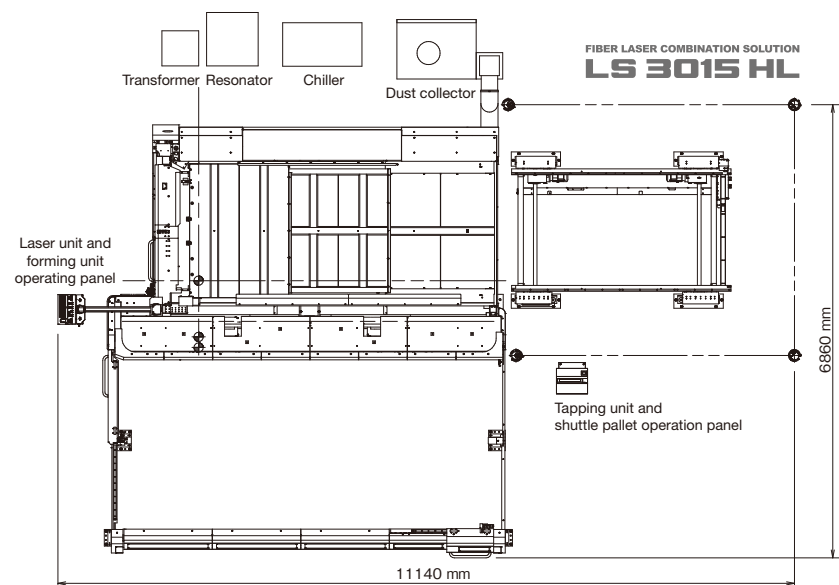
This innovative system is the ultimate in productivity. The fiber laser is integrated with an automated parts sorting system. The nest skeleton is unloaded and stacked. Parts are stacked and sorted, eliminating operator handling and reducing part damage.



Specifications

Material Thickness Capacities

Material	Assist gas	Thickness (mm)						
		4	8	12	16	20	24	25
Mild steel	Oxygen	2.5 kW						
		4.0 kW						
		6.0 kW						
Stainless	Nitrogen							
Aluminum	Nitrogen							
Brass	Nitrogen							
Copper	Oxygen							



LS 3015 HL

Maximum cutting area (X×Y×Z)	3075 mm × 1550 mm × 100 mm (121.0" × 61.0" × 3.9")
Maximum material weight	920 kg (2028 lbs) w/ automation 600 kg (1322 lbs)
Fast traverse speed	170 m/min (6693"/min)
Positioning accuracy	+/-0.01 mm (+/-0.001")
Repeat accuracy	+/-0.01 mm (+/-0.001")
Oscillation method	LD excitation fiber laser
Rated output	2.5 kW, 4.0 kW, 6.0 kW
Laser wavelength	1.07 μm
Installation area (L×W×H)	9417 mm × 6633 mm × 2405 mm (370.7" × 261.1" × 94.6") *1
Air supply	Flow rate 760 NL/min
	Pressure 0.5 MPa (71 PSI)
Power supply (Body & Dust collector)	22 kVA *2
Machine weight *3	Laser unit Approximately 10 tons
	Forming and Tapping unit Approximately 9 tons
	Table unit Approximately 4.5 tons

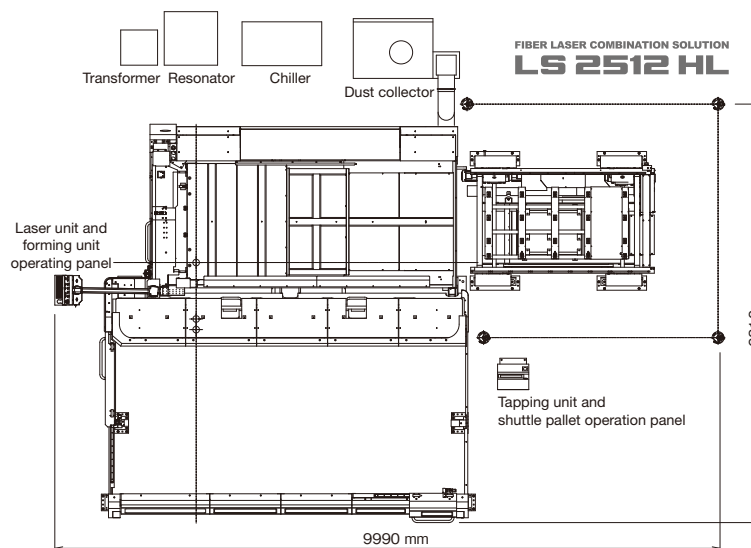
LS 2512 HL

Maximum cutting area (X×Y×Z)	2525 mm × 1265 mm × 100 mm (99.4" × 49.8" × 3.9")
Maximum material weight	620 kg (1367 lbs) w/ automation 400 kg (882 lbs)
Fast traverse speed	170 m/min (6693"/min)
Positioning accuracy	+/-0.01 mm (+/-0.001")
Repeat accuracy	+/-0.01 mm (+/-0.001")
Oscillation method	LD excitation fiber laser
Rated output	2.5 kW, 4.0 kW, 6.0 kW
Laser wavelength	1.07 μm
Installation area (L×W×H)	8317 mm × 5930 mm × 2405 mm (327.4" × 233.4" × 94.6") *1
Air supply	Flow rate 760 NL/min
	Pressure 0.5 MPa (71 PSI)
Power supply (Body & Dust collector)	22 kVA *2
Machine weight *3	Laser unit Approximately 9 tons
	Forming and Tapping unit Approximately 9 tons
	Table unit Approximately 4 tons

*1: Except peripheral equipment and maintenance area space

*2: Except required power supply capacity of peripheral equipment

*3: Except weight of peripheral equipment and shuttle pallet



* The machines shown in the catalogue include some optional items and may vary in appearance from the actual machines.

* Specifications and designs are subject to change without prior notice.

MURATA MACHINERY, LTD. MACHINE TOOLS DIVISION

International Business Dept.

2, Nakajima, Hashizume, Inuyama-shi, AICHI 484-8502, JAPAN
Phone: +81-(0)568-61-3645 Fax: +81-(0)568-61-6455

Headquarters

136, Takeda-Mukaishiro-cho, Fushimi-ku, KYOTO 612-8686, JAPAN
Phone: +81-(0)75-672-8138 Fax: +81-(0)75-672-8691
<http://www.muratec.co.jp>



MURATA MACHINERY USA, INC

2120 Queen City Drive, P.O.Box 667609, Charlotte, N.C. 28208, U.S.A.
Phone: +1-704-875-9280 Fax: +1-704-392-6541
<https://www.muratec-usa.com>

MURATA DO BRASIL, LTDA.

Estrada de Santa Isabel, 3383-KM 38,5, Itaquapecetuba-SP, CEP 08599-000, BRASIL
Phone: +55 (0)11-4648-6222 Fax: +55 (0)11-4648-6737
<http://www.muratec.com.br> e-mail: [murattec@murattec.com.br](mailto:muratec@murattec.com.br)

MURATA MACHINERY EUROPE GmbH

Hanns-Martin-Schleyer-Strasse 3, D-47877, Willich, GERMANY
Phone: +49-(0)2154-914-250 Fax: +49-(0)2154-914-283
e-mail: info@murattec.de

MURATA MACHINERY (SHANGHAI) CO., LTD

[Registry Add]
Room 1203A, Floor 12, Building 1, No.139, FuTeXiYi Road, China (Shanghai) Pilot Free Trade Zone, CHINA
[Contact Add]
150 Xin Gao Rd., Qingpu Industrial Zone, Shanghai, 201700, CHINA
Phone: +86-(0)21-6921-2300 Fax: +86-(0)21-6921-2331

BEIJING BRANCH

Rm. 309 Yu Lin Bldg., Xiang Jun Nan Li Er Xiang Jia No.5, Chaoyang-qu, Beijing, 100020, CHINA
Phone: +86-(0)10-6597-3048 Fax: +86-(0)10-6591-1795

GUANGZHOU BRANCH

Room 635, United Star Hotel, 172 Chang Gang Rd., C., Guangzhou, 510250, CHINA
Phone: +86-(0)20-8434-2882 Fax: +86-(0)20-8434-3463

MURATA (THAILAND) CO., LTD.

898/43-44 SV CITY TOWER 2,25th Floor, Rama 3 Road Bangpongpan, Yannawa, Bangkok 10120, THAILAND
Phone: +66-(0)2294-7734-40 Fax: +66-(0)2294-7732

PT.MURATA MACHINERY INDONESIA

Ruko Gyan Plaza D-4, Jl.Terusan Pasirkoja Blok 8, Bandung 40222, INDONESIA
Phone: +62-(0)22-6046633 Fax: +62-(0)22-6046612

MURATA MACHINERY VIETNAM CO., LTD

58 Nguyen Quy Duc street, An Phu Ward, District 2, Ho Chi Minh City, VIETNAM
Phone: +84-(0)28-6281-0601 Fax: +84-(0)28-6281-0860

MEIBAN ENGINEERING TECHNOLOGIES PVT.LTD.

[An associate company of Murata Machinery, Ltd.]
No 38, 7th Main, J.C. Industrial Estate, Yelachanahalli, Kanakapura Road, Bangalore -560 062 INDIA
Phone: +91-(0)80-2686-0600 Fax: +91-(0)80-2686-0605
<http://www.meibanengg.com> e-mail: office@meibanengg.com

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