SOLUTION

AMADA DIGITAL INNOVATION
V-factory

Fiber Laser Welding System FLW ENSIS

Laser Welding ; The arrival of new generation

Equipped with new AMADA-designed oscillator, it achieves high speed, high quality processing with a variety of the latest functions!

The fiber laser welding system proposed by AMADA realizes high speed and high quality welding processing which cannot be done by conventional laser welding.

A new type of oscillator solves various customer's challenges by utilizing Amada's proprietary beam control system. Contributing to even higher production processing.

Fiber laser Welding System

FLW ENSIS

FIBER LASER

*FLW (Fiber Laser Weld)

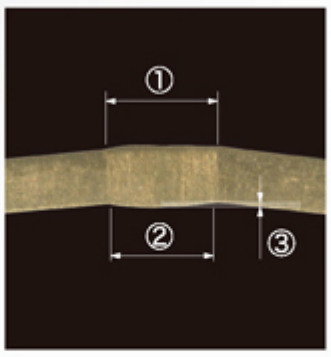
Typical Work Samples

Smooth welding bead

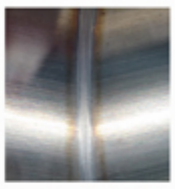
Work sample 【Sanitary pipe】

Material :SUS316L
Thickness :1.45mm (2.0S)
1.6mm
(Commercial item)
Part size :φ50.8～74×215mm
Commercial item : Reducer, Ferrule
Process time :3m30s

Macro data

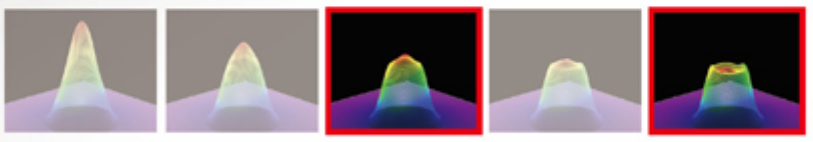


①Top side width	3.05mm
②Bottom side width	3.00mm
③Raised part (bottom)	0.11mm

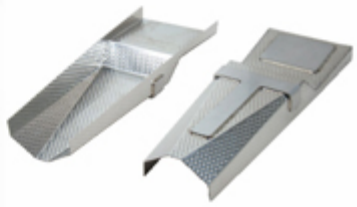


Enlarged view (bottom)

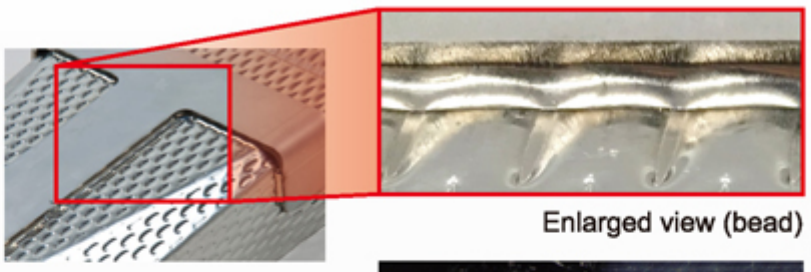
Countermeasures for gap variance



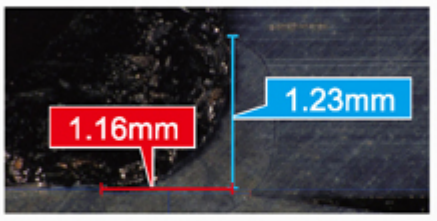
Work sample 【Chute】



Material :SUS304
Thickness :1.0±0.35+3.0mm
Part size :420×155×50mm
Process time :5m15s

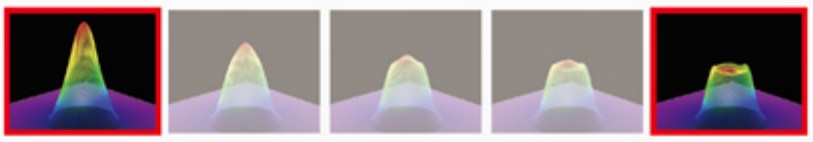


Enlarged view (bead)



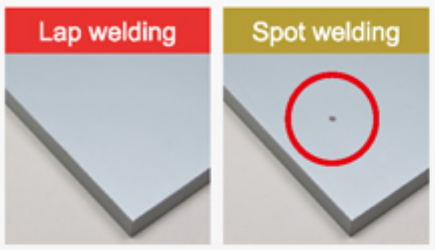
Cross section view

Integrated spot welding process

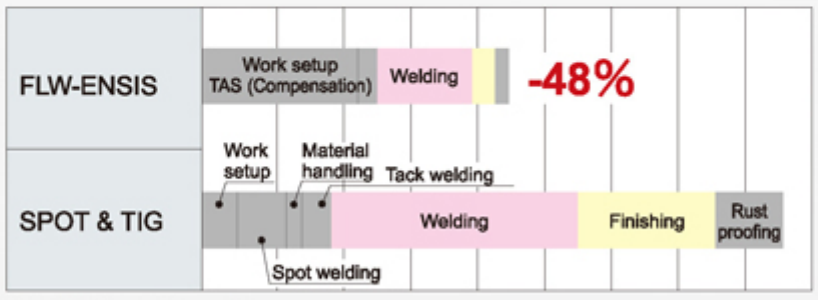


Work sample 【Control box】

Material :SECC
Thickness :1.6mm

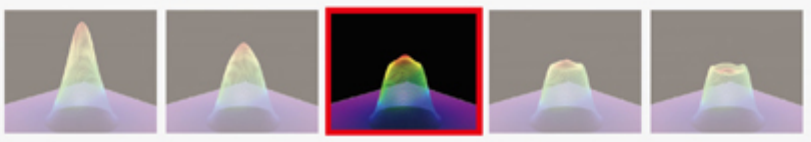


Minimize thermal effects on the back side

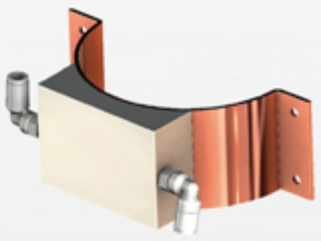


Lead-time comparison

Welding differing metals

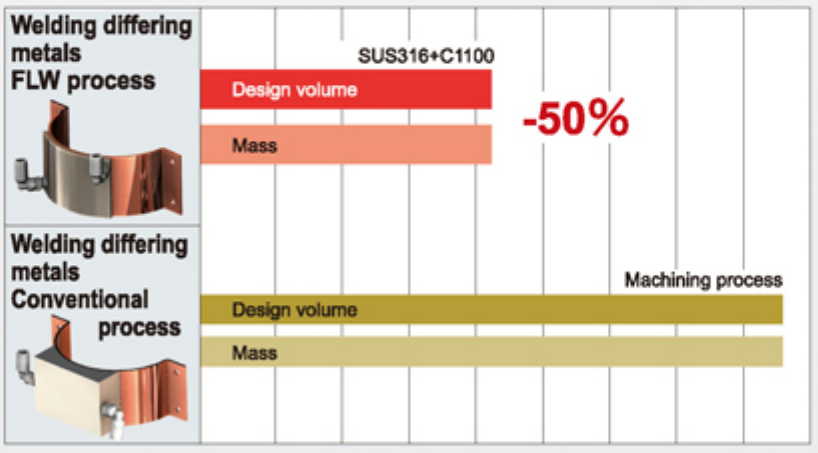


Work sample 【Heat exchanger】



Material :SUS316+C1100
Thickness :1.0mm+2.0mm
Wire :Wire for brazing
Diameter :φ1.6

Laser brazing (Brazing)



FLW-ENSIS New Technologies

1 High speed and high grade processing

Advantage of Fiber laser welding

❶ Low strain welding by high energy density

FLW-ENSIS has a much higher energy density than other welding sources, so high speed welding with low strain and deep penetration is possible.

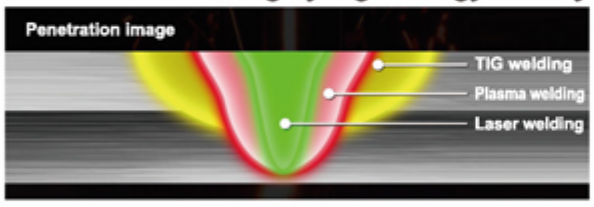
❷ Reduce finishing work

Continuous welding of CW realizes optimal airtightness, smooth and high grade bead.
This greatly reduces the work of finishing process and improves the productivity of the customer.

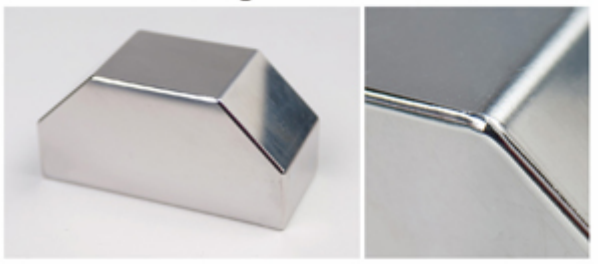
❸ Low processing cost

Compared with the conventional CO_2 laser welding machine, the heat exchange efficiency is very high, and the electricity can be drastically reduced.
Optical components such as mirrors and lenses inside the oscillator are eliminated, and customer maintenance costs are reduced.

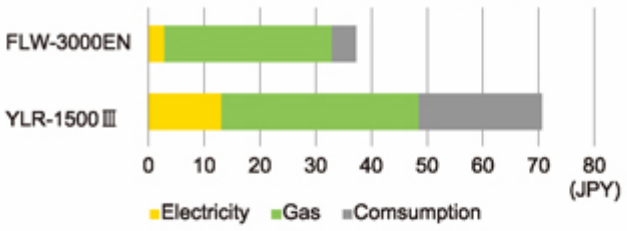
❶Low strain welding by high energy density



❷Reduce finishing work



process cost comparison (SUS t1.0 Welding length1.0m)



2 Latest welding technologies

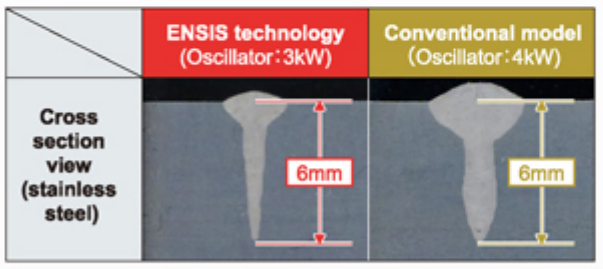
Improvement of welding capacity by ENSIS technology

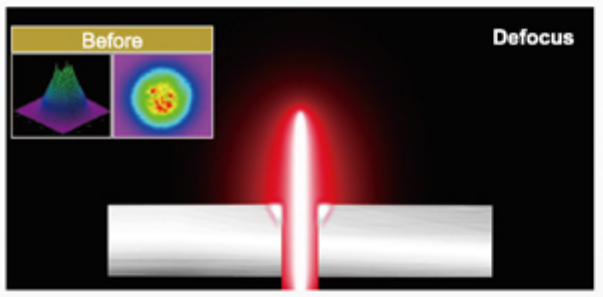
❶ The 3kW oscillator has the penetration ability equivalent to 4kW of the conventional machine

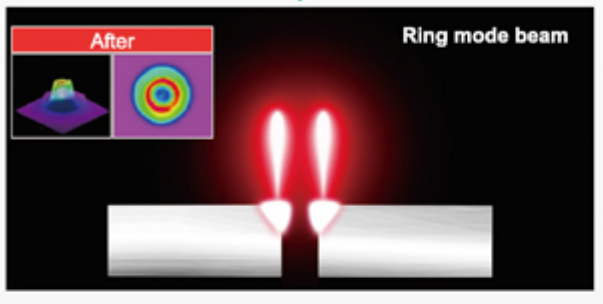
The 3kW oscillator (ENSIS-3000) has a very high energy density, allowing high speed welding with deep penetration.

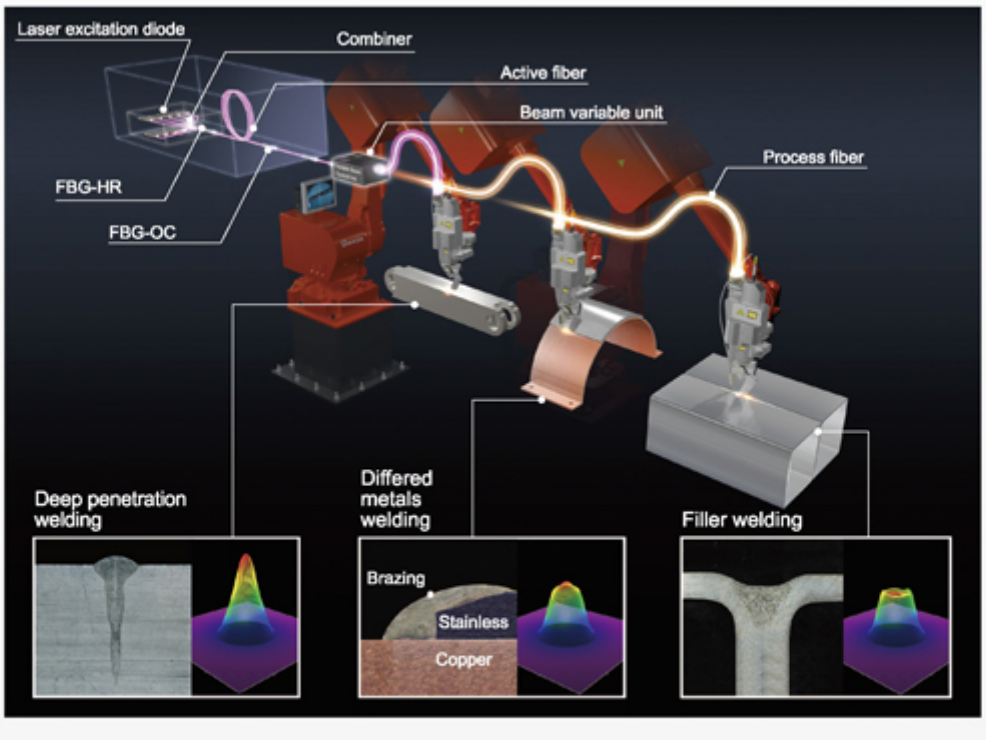
❷ Beam control according to processing application

ENSIS technology improves adaptability from finer welds to products with gaps far better than conventional machines.
Optimum conditions can be set according to the application without replacing the lens or process fiber.





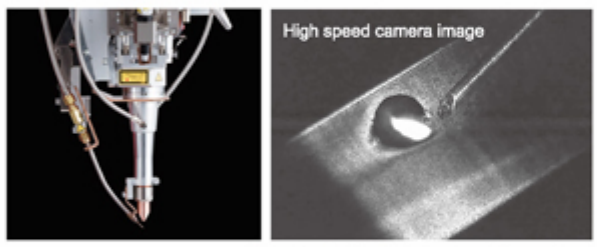




FLW-ENSIS welding Technologies

Push-Pull filler wire function

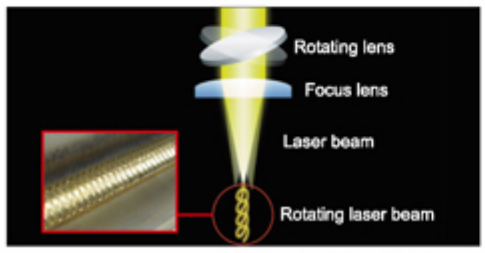
This function realizes stable processing of overlay welding which is difficult with conventional laser welding.
By pulling out the filler wire from the molten point, stable wire cutting is possible. This allows continuous processing of filler welding.



Push-Pull filler wire function

Beam weaving function

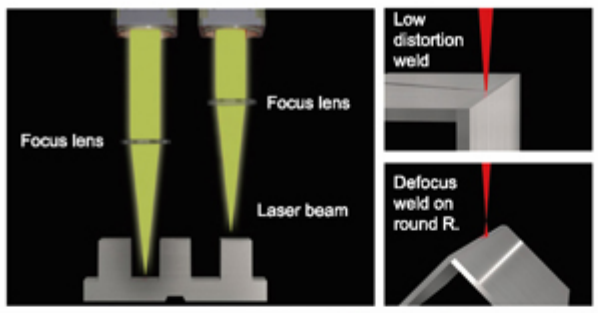
By rotating the laser beam at high speed, it is possible to weld the product with wide gap.
It is also effective for stable processing of filler weld.



Beam weaving function

NC auto focus control

It is possible to change the focal position without changing the robot trajectory.
Multiple conditions can be set in one setup from low distortion weld to defocus weld on round R.



NC auto focus control

Easy setup operation

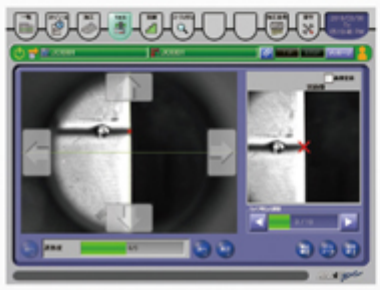
Setp NAVI (AMNC)

Setup information of program data can be browsed on AMNC.
Data created with VPSS 3i_WELD can be saved with photo and memo of setup when processed.


Setp NAVI (AMNC)

TAS (Teaching Assist System)

The system takes a photograph of fixed point and corrects the program of the seam contours of the parts. It is easy to use even if the worker can not operate the robot.
This automatic detection function can be used for the subsequent components.


TAS (Teaching Assist System)

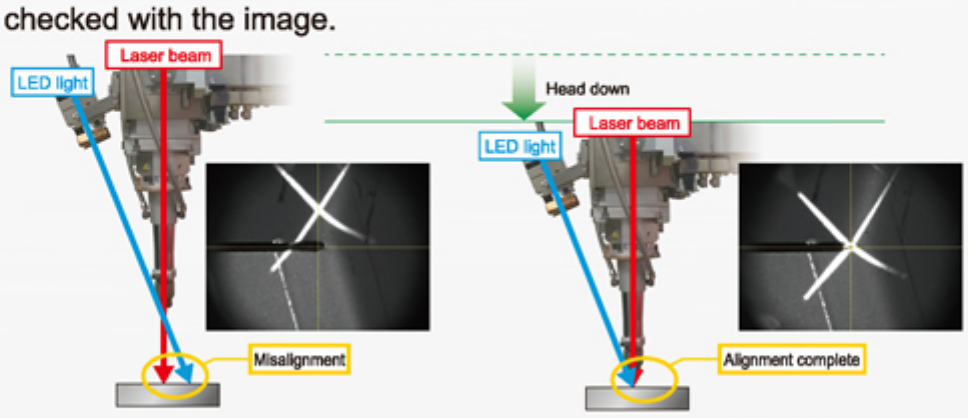
Process condition file

Standard conditions can be registered for each sheet thickness / material. Customers can create their own processing condition file for each product.


Process condition file

Z-indicator

In this system, LED light and CCD camera are mounted on the head, and at teaching operation the target position can be easily checked with the image.



Z-indicator

FLW-ENSIS

3 Welding by digitalization

Offline setup of teaching operation

VPSS 3i_WELD ◆Software

❶ PD (Production Designer)

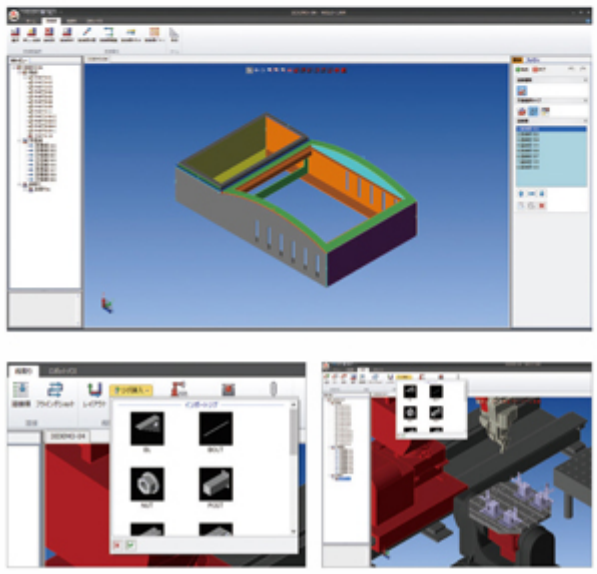
Import 2D and 3D CAD data.
Edit the positioning and development for laser welding
Development data can be used in all sheet metal processes.
By adding welding attributes, program time is reduced.

❷ Data creation with no mistakes in simulation function

Weld conditions are assigned to data regarding which welding attribute is added by PD, thereby creating robot motion data suitable for processing.
Jig data can also be registered. It is possible to create a program without mistakes by collision check at simulation.

❸ Improvement of productivity by offline teaching

By performing offline teaching, it is possible to create a program without stopping the machine, thus improving the operation rate.



4 AMADA IoT V-factory

**V-factory utilizes IoT to visualize real-time tasks at the factory and realize high value-added production.
All employees involved in production, from the director of the customer plant to the operator,
share the same information via "My V-factory" and use it to solve the current problem quickly.
It is used for high value-added production and cost reduction.**

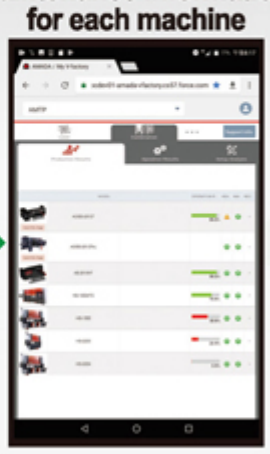
The information is shared among everyone involved in manufacturing to solve issues quickly.

My V-factory (WEB contents) can visualize the machine performance and also identify the production failure on customer's mobile device.

Production results

Factor of failure

Maintenance information for each machine

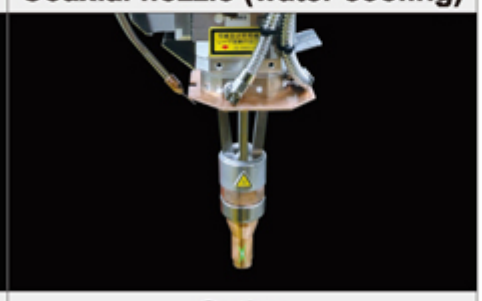


Identify cause

Analysis of downtime operation factors

5 Other function (including option)

Nozzle Selection according to processing

Name	Side nozzle	Slim nozzle	Coaxial nozzle (water cooling)
Image			
Standard/Option	Standard	Standard	Option
Shield	◎	○	○
Operability	△	◎	◎
Durability (against spatter)	◎	△	◎
Filler	△	◎	◎

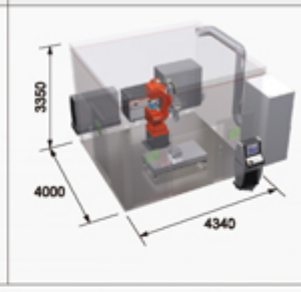
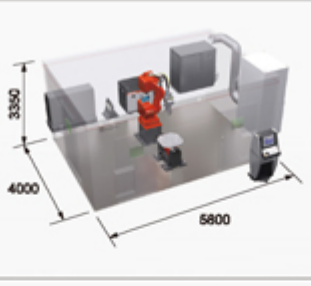
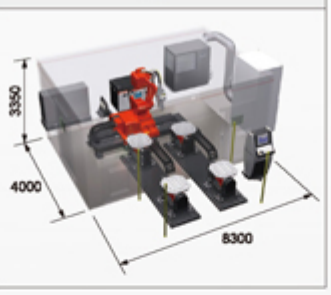
Cutting torch •Option

Easy exchange from welding nozzle to cutting is possible


Cutting torch

6 Lineup

Selection according to work size and product lot

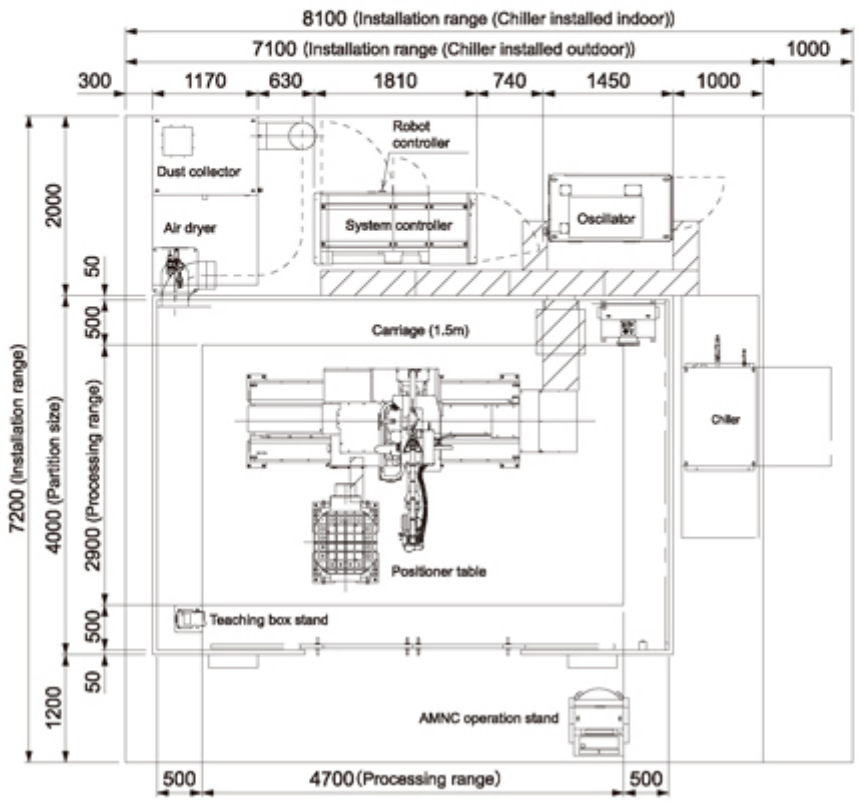
Model name	Model 1	Model 2	Model 3	Model 5
Robot	•	•	•	•
Positioner table		•	•	•
Carriage			•	•
Shuttle				•
Image				

* M3: Travel stroke: 1.5m, 3.0m, 4.0m
* M5: Travel stroke: 4.0m
* Dimensions are size of partition. The height is 3750mm including the duct.
* Other equipment installation range is required separately.

■Floor layout

Unit: mm

◆Mode3: Robot + Positioner table + Carriage



■Lineup

The following lineups are prepared according to product size, lot and product application.

◆Model 1 : Robot
Model 2 : Robot + Positioner table
Model 3 : Robot + Carriage + Positioner table
Model 5 : Robot + Carriage + 2 Positioner table (shuttle spec)

◆Carriage specification
Travel stroke : 1.5m, 3.0m, 4.0m

■Machine specification (standard)

Model	FLW-3000ENSIS
Registered model name	FLW3000EN
Oscillator/Chiller	* See the table below
Robot	MC2000 (Yaskawa)
Robot controller	DX100 (Yaskawa)
NC control	AMNC/PC
Process head	Amada
Partition	Full-cover partition
Dust collector	PXN-6XA (Sinto)

■Carriage specification

Travel stroke	m	1.5, 3.0, 4.0
Travel speed (max)	m/min	60
Positioning accuracy	mm	±0.1

■Positioner table (mounted surface plate)

Pass line height	mm	700
Payload (max)	kg	500
Rotation axis		±720°
Tilting axis		±90°

■Oscillator/Chiller specification

Item		
Oscillator model		ENSIS-3000
Power	W	3000
Wavelength	μm	1.08
Dimension W×H×L	mm	1450×1390×750
Required power	kVA	11.9
Mass	kg	400
Chiller model		RKE5502B-VA-UP2
Cooling capacity	kW	13.0
Dimension W×H×L	mm	1100×1700×854
Mass ( ) Operation	kg	340 (450)
Chiller Required power	kVA	9.0
Total Required power (Model3) incl. Dust collector	kVA	40.7

For Your Safe Use
Be sure to read the operator's manual carefully before use.

- In order to operate this machine there must be a dedicated partition for safety.
- This sytem requires a dedicated shield for material when the wavelength 1.08 μm.

* Specifications, appearance and equipment are subject to change without notice by reason of improvement.
* Use these registered model names when you contact the authorities for applying for installation, exporting, or financing.
* The specifications described in this catalog are for the Japanese domestic market.

This laser product uses a Class 4 invisible laser for processing and a Class 3R visible laser for positioning.

- **Class 4 invisible laser : Avoid eye or skin exposure to direct or scattered exposure of beam. Never touch or look into the beam.**
- **Class 3R visible laser : Avoid direct eye exposure.**

AMADA CO., LTD.
www.amada.com

inquiry

AMADA head office is certified and registered of ISO14001.

Jan.2019