



YAMAZAKI MAZAK CORPORATION

1-131 Takeda, Oguchi-cho, Niwa-gun, Aichi-Pref., Japan  
TEL: +(81)587-95-1131 FAX: +(81)587-95-3611

[www.mazak.com](http://www.mazak.com)

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SUPER TURBO-X SERIES



SUPER TURBO-X  
S E R I E S

2412  
3015  
4020

# Advanced SUPER TURBO-X series



## ■ Table feed system with high-speed feedrate (X-, Y-axes)

SUPER TURBO-X 2412 50 m/min (1969 IPM) SUPER TURBO-X 3015 50 m/min (1969 IPM) SUPER TURBO-X 4020 36 m/min (1417 IPM)

## ■ Advanced MAZATROL PREVIEW 3 CNC

### SUPER TURBO-X unique features:

- Constant beam length for stable cutting performance
- A wide variety of automatic operation systems are available

The SUPER TURBO-X can be easily integrated into an Extensible Manufacturing Cell

High-precision, CO<sub>2</sub> laser processing machine

# SUPER TURBO-X 2412, 3015, 4020



# Table feed system

Designed for excellent table access, ease of operation, and convenient processing of a wide variety of workpieces. Ease of loading/unloading for not only of regular size worksheets but also remnant material even for a single part.



## Work lifter

High positioning accuracy and ease of loading/unloading for a heavy worksheet is ensured. Marring on the bottom sides of stainless steel worksheets can be significantly reduced.



## Auto open/close protective cover

The total machine cover, which covers the entire processing area, protects operators from the laser beam and cutting spatter. Oil smoke and dust can be recovered by the dust collector.



A variety of Intelligent Functions provides incomparable operator support for exceptional ease of operation and the optimum machine efficiency



Yamazaki Mazak has developed a variety of functions for the improvement of productivity, high accuracy cutting and operator support. A variety of unique technologies has been developed that incorporates the expertise of experienced machine operators that realizes unsurpassed productivity and higher accuracy cutting.



ISF

## INTELLIGENT SET-UP FUNCTIONS

A wide variety of automation functions are available for ease for operation and reduced setup time.



Auto Nozzle Changing



Auto Profiler Calibration



Focus Detection



Auto Nozzle Cleaning



Auto Focus Positioning



IMF

## INTELLIGENT MONITORING FUNCTIONS

Operation status of laser processing can be monitored. The laser processing head is equipped with a sensor with to check piercing and to detect defects (burning or plasma). If any defect is detected, the operation is corrected or paused to realize optimum cutting. SUPER TURBO-X is equipped with following INTELLIGENT MONITORING FUNCTIONS.



Pierce Detection



Burn Detection



Plasma Detection

# Intelligent Machine

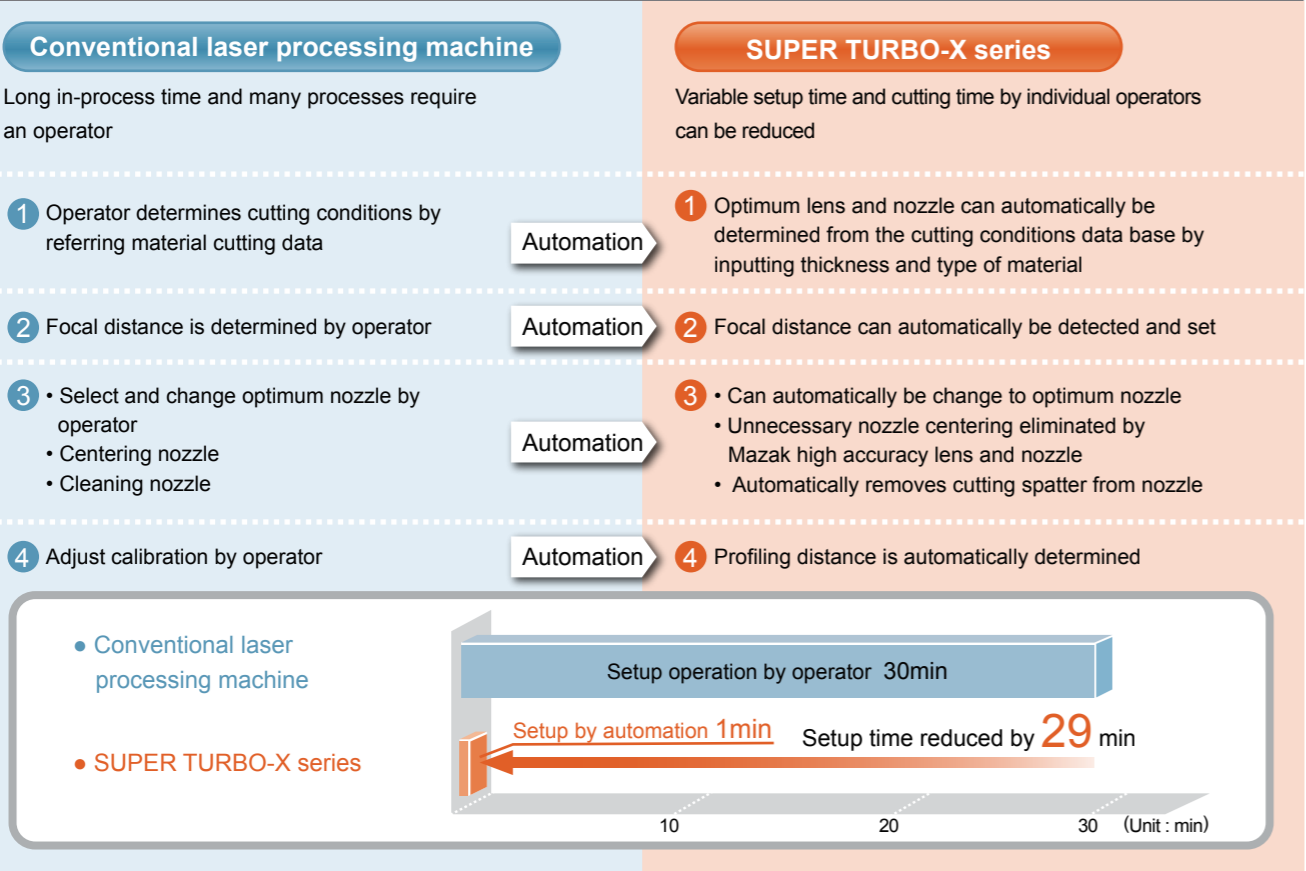


## INTELLIGENT SET-UP FUNCTIONS

A wide variety of automation functions are available for ease for operation and reduced setup time.

ISF

### Example of reduced setup time



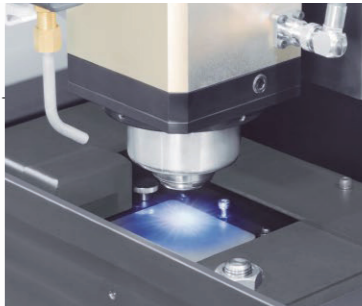
### Auto Nozzle Changer

Automatically change to optimum nozzle for continuous automatic operation. Storage capacity : 4 nozzles



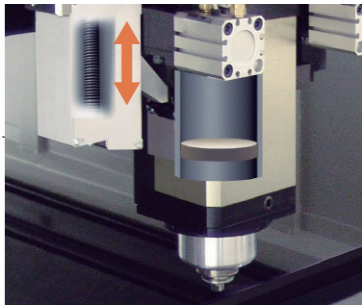
### Focus Distance Detection

Traditionally focal distance measurement and adjustment requires considerable setup time as well as a skilled and experienced operator. Even unskilled or inexperienced operators can now easily perform these operations by using the Focus Detection system by program commands. Additionally, this system automatically compensates for focal distance changes which occur due to lens contamination.



### Auto Focus Positioning

By moving a lens up or down, the focal point position can be changed automatically. As a result, the focal point can be positioned for the optimum piercing performance as well as cutting for the maximum productivity.



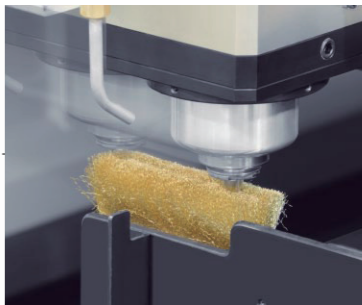
### Auto Profiler Calibration

Cutting distance position must be maintained for dross free cutting. When installing a new nozzle, gap distance is properly maintained with the use of auto profiler calibration. This automatic calibration maximizes the time between necessary operator interventions.



### Auto Nozzle Cleaning

The torch head can be moved to the nozzle cleaning brush by program command which removes spatter that has adhered to the nozzle.



# Intelligent Machine



## INTELLIGENT MONITORING FUNCTIONS

IMF

Operation status of laser processing can be monitored. The laser processing head is equipped with a sensor with to check piercing and to detect defects (burning or plasma).  
When a defect is detected, the operation is corrected or paused to realize optimum cutting.

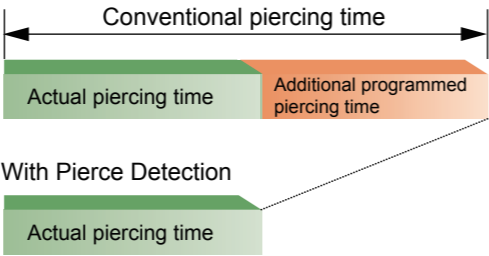
## Reduced piercing time for medium and thick worksheet

Optimum piercing can be done by Pierce Detection and Auto Focus Positioning



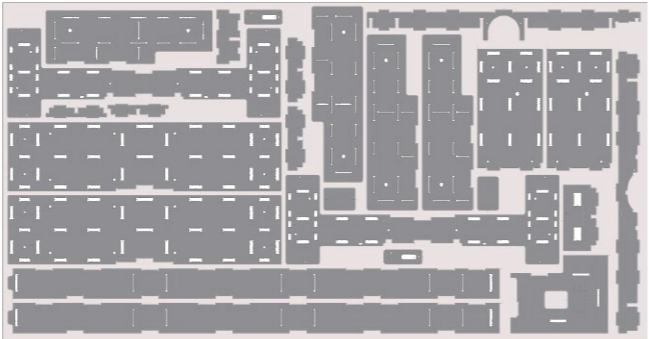
### Pierce Detection

Normally, it is quite difficult to stabilize piercing operations for medium/thick worksheets resulting in piercing problems. The Intelligent piercing sensor detects when the laser beam pierces the material and completes piercing. This function ensures continuous piercing operation resulting in the minimum piercing time.

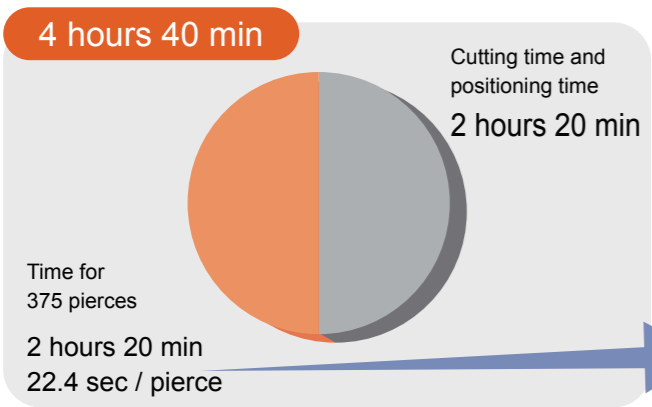


### Comparison of cutting time

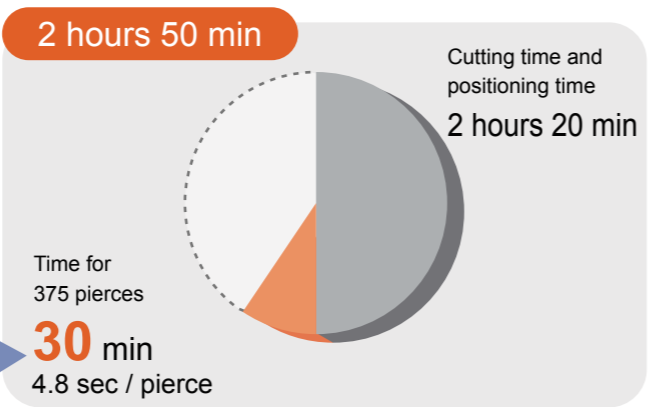
Material	Mild steel
Size	3000×1500 mm (118.11"×59.06")
Thickness	16 mm (0.63")
Assist gas	Oxygen
Number of pierces	375 pierces



### Without Pierce Detection and Auto Focus Positioning



### With Pierce Detection and Auto Focus Positioning



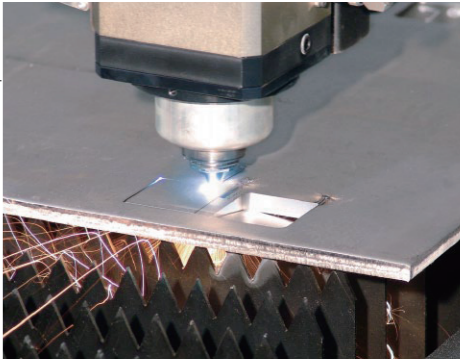
## Detection of Defects Provides:

- Higher operation rate
- Higher output
- Multiple machine operation by one operator
- Lower labor expense



### Plasma Detection

Plasma generated during cutting of medium/thick stainless steel worksheets frequently results in cutting failure that stops machine operation. The Plasma Detection monitors plasma generation during processing and makes automatic adjustments to maintain optimum conditions for consistent cutting quality.

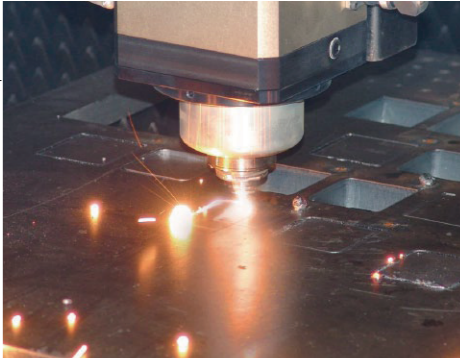


Plasma



### Burn Detection

Normally burning generated during the cutting of medium/thick mild steel worksheets often results in cutting failure. The Burn Detection monitors for abnormal burning during processing and automatically stops cutting if any is detected.



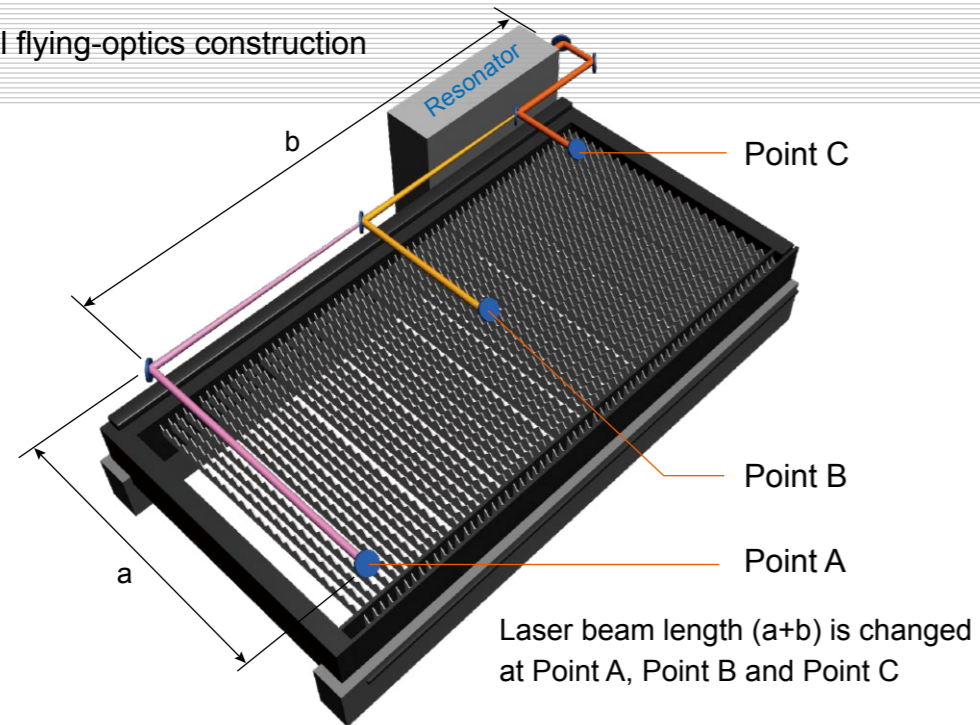
Burning

## Higher Accuracy

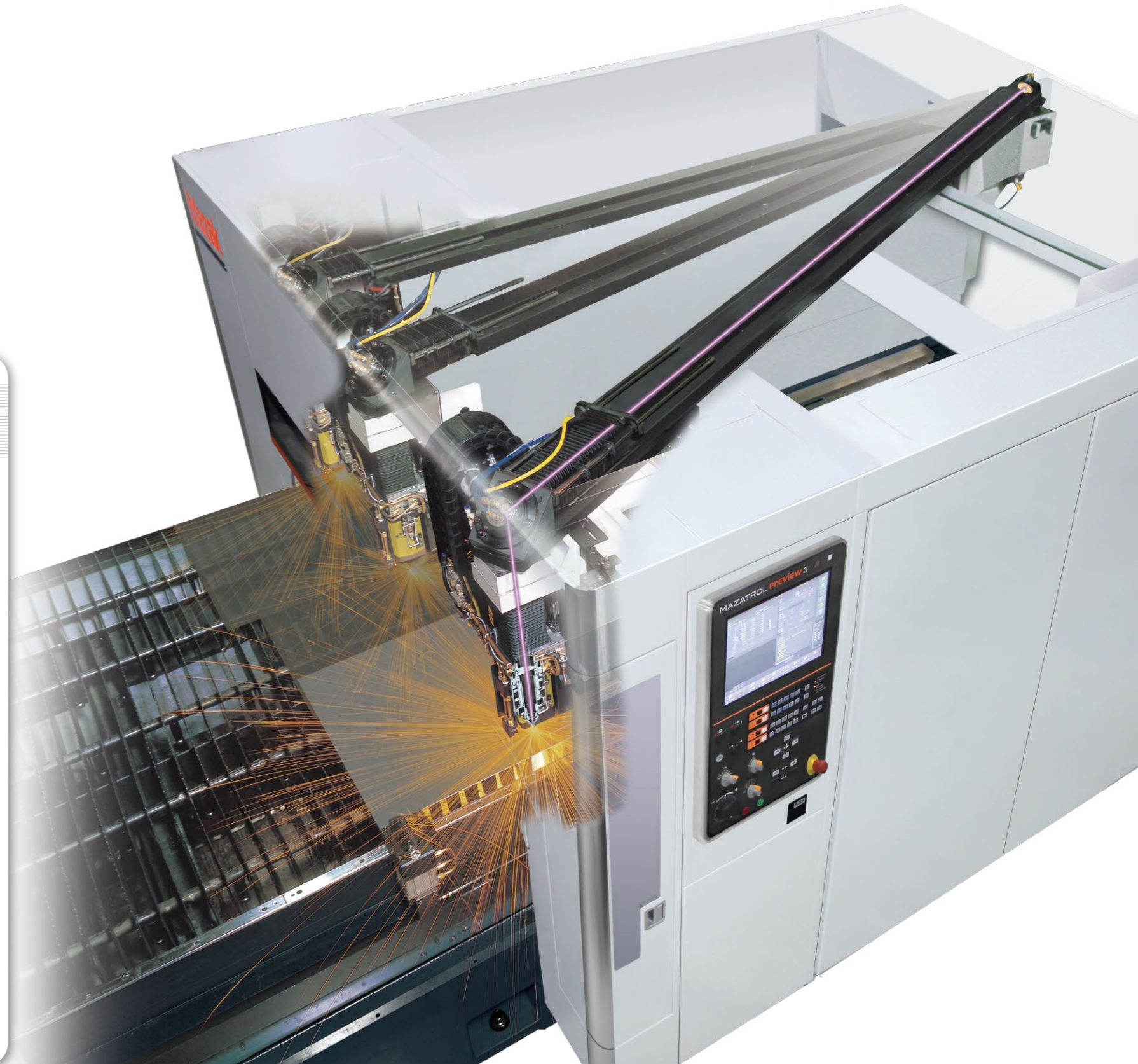
Mazak's unique constant-beam length system,  
ensures uniform high accuracy cutting anywhere on machine table

The laser beam is directed from the laser resonator to the cutting torch using Mazak's exclusive constant-beam length delivery system. Stable production is realized thanks to the constant-beam length that provides uniform cutting performance anywhere on the table. Additionally, the resonator is integrated with the machine proper to minimize optical axis adjustments as well as reducing floor space requirements.

Typical flying-optics construction



Generally, flying optics construction has the issue that laser beam quality is not stable when the laser delivery path distances changes. As a result, cutting performance is not the same at different table locations. The long-standing challenge for laser processing machine manufacturers is to maintain a constant beam delivery length. Even today, many manufacturers have been developing various technologies to solve this problem. The Mazak constant beam delivery system eliminates this problem by not changing the beam length. This system does not use special optional components.



Ease of Operation



Designed for ease of operation

Optimum button layout with ergonomic design

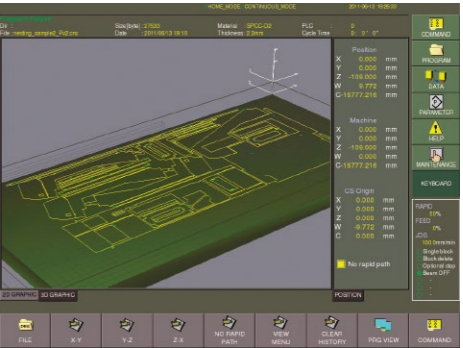
15" touch screen

Organized screen layout for convenient operation

Fast access to frequently used displays, such as command screen, position screen and programming screen

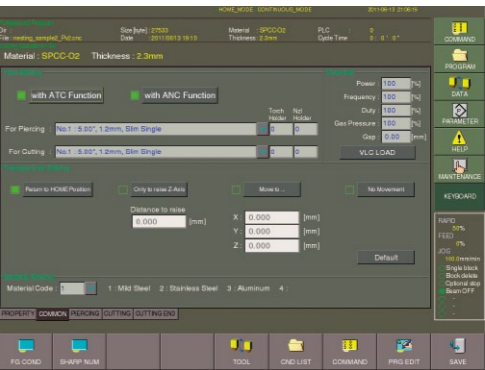
Graphics screen

3D display of cutting path  
can be displayed after entering data.



Automatic determination of processing conditions

The required lens, nozzle, feedrate and laser output are automatically determined by the CNC for different materials and thicknesses. Cutting conditions can be edited while monitoring operation and registered in the CNC. The next time the same material is processed, the new cutting conditions will automatically be used.



Unsurpassed speed of operation

MAZATROL preview 3

10% faster compared to previous model

Advanced hardware

- State of the art CPU for unsurpassed operation speed
- High-response, high-speed machine motion

Optimum acceleration / deceleration for the reduction of cutting time

- Tolerance control ensures high-speed corner cutting
- ACTIVE VIBRATION CONTROL for stable high-speed cutting

Improved laser operation response

- Laser control is improved to generate optimum laser power in the minimum time
- Improved performance for fly cutting and sharp edge cutting

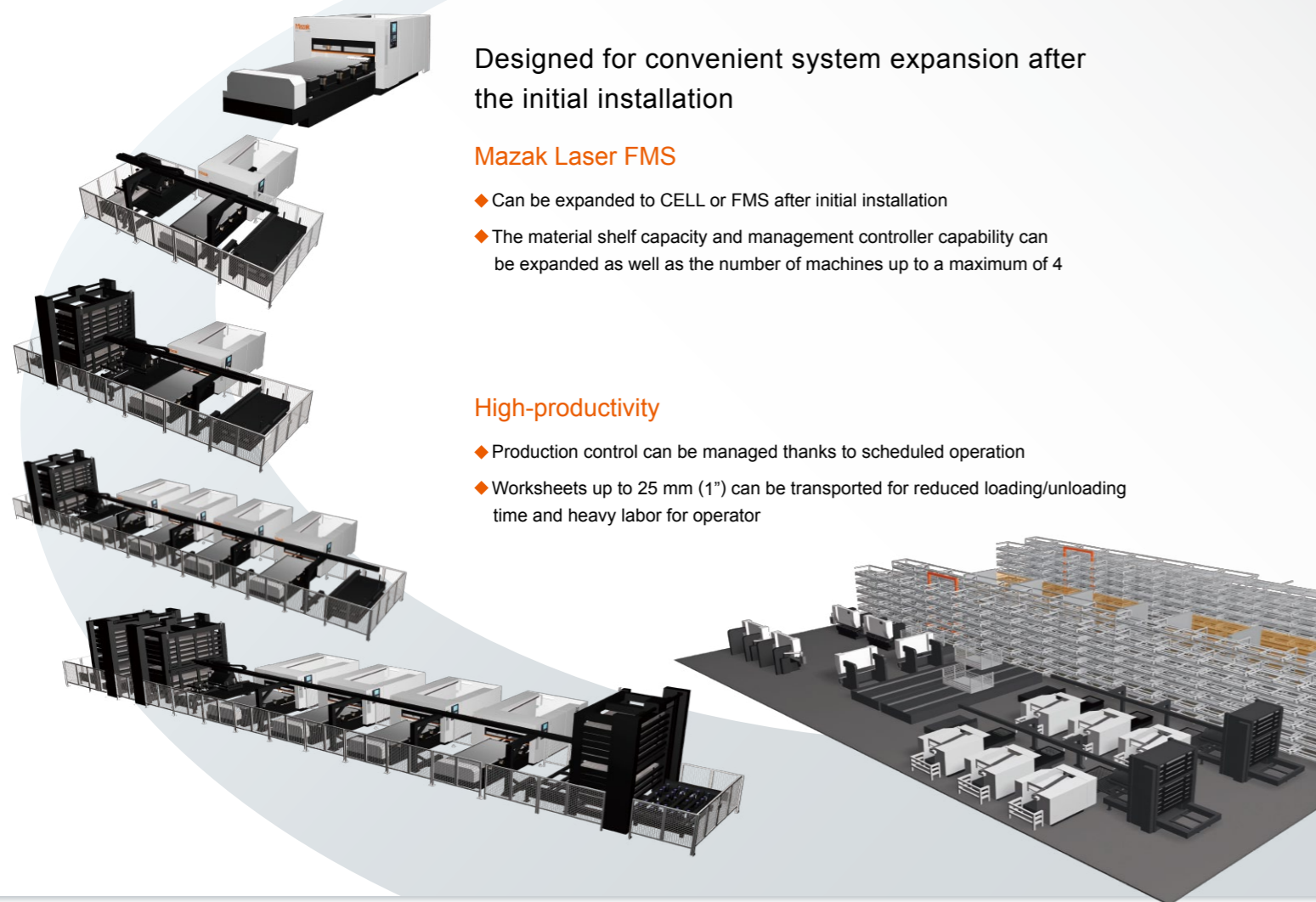
# Automation

## 2 pallet changer

Material setup and sorting finished workpieces can be performed during laser processing for reduced machine idle time



Variety of automation systems  
available to meet a wide range of production requirements  
**EXTENSIBLE MANUFACTURING CELL**



Designed for convenient system expansion after the initial installation

### Mazak Laser FMS

- ◆ Can be expanded to CELL or FMS after initial installation
- ◆ The material shelf capacity and management controller capability can be expanded as well as the number of machines up to a maximum of 4

### High-productivity

- ◆ Production control can be managed thanks to scheduled operation
- ◆ Worksheets up to 25 mm (1") can be transported for reduced loading/unloading time and heavy labor for operator



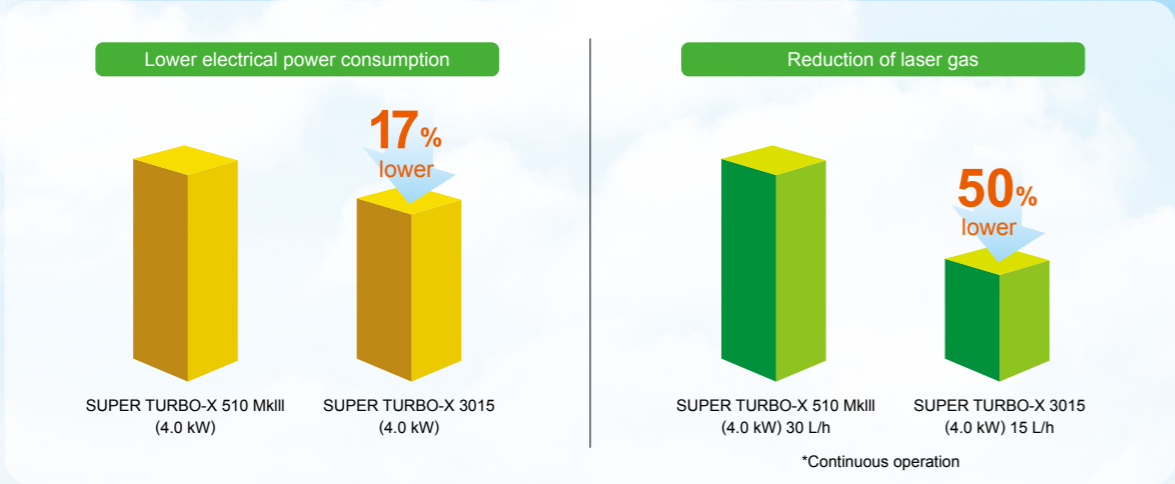
# Environmentally Friendly

## Environmental considerations

The environment and our impact on natural surroundings have always been important concerns of Yamazaki Mazak. This is shown by the fact that all factories in Japan where Mazak machine tools are produced are ISO 14001 certified, an international standard confirming that the operation of our production facilities does not adversely affect air, water or land.

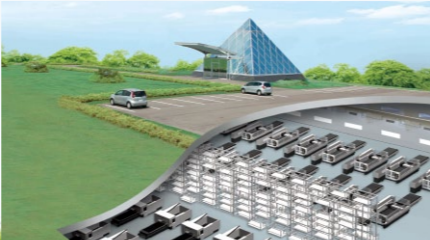
## Lower operation cost

The SUPER TURBO-X series reduces the amount of laser gas used when compared to conventional laser processing machines as well as the gas used for purging optical components. Additionally, electrical power consumption is reduced as well.



## YAMAZAKI MAZAK OPTONICS CORPORATION

The temperature of this underground factory is controlled virtually year round by geothermal energy. The entire assembly area is a clean room which minimizes dust contamination of the beam delivery mirrors and the torch lenses. As a result, the time required for machine assembly is reduced.



## Machine specifications

		SUPER TURBO-X 2412	SUPER TURBO-X 3015	SUPER TURBO-X 4020
Max. workpiece size		1250 mm×2500 mm (49.21"×98.43")	1525 mm×3050 mm (60.04"×120.08")	2000 mm×4000 mm (78.74"×157.48")
Work table height		900 mm (35.43")		
Axis travel	X-axis	2520 mm (99.21")	3070 mm (120.87")	4020 mm (159.06")
	Y-axis	1270 mm (50")	1545 mm (60.83")	2020 mm (79.53")
	Z-axis	90 mm (3.54")		
Rapid traverse rate		X, Y: 50 m/min (1969 IPM)	X, Y: 50 m/min (1969 IPM)	X, Y: 36 m/min (1417 IPM)
		Z: 25 m/min (984 IPM)		
Max. feedrate		50 m/min (1969 IPM)	50 m/min (1969 IPM)	36 m/min (1417 IPM)
Positioning accuracy		±0.01 mm / 500 mm (±0.0004"/ 19.69") (X, Y)		
		±0.01 mm / 100 mm (±0.0004"/ 3.94") (Z)		
Repeatability		±0.005 mm (±0.0002") (X, Y, Z)		
Machine weight		11,000 kg (24250 lbs)	12,700 kg (27998 lbs)	20,700 kg (45635 lbs)
Electrical requirement <sup>*1</sup>		47 kVA (2.5 kW) / 66 kVA (4.0 kW)		
Sound <sup>*2</sup>		Less than 80 dB		

<sup>\*1</sup> Without dust collector  
<sup>\*2</sup> Equivalent continuous sound pressure level at operator position (dependent on equipment)

## Specifications of Laser Oscillator

Resonator	2.5 kW, 4.0 kW
Laser gas	He, N <sub>2</sub> and CO <sub>2</sub>
*Gas consumption rate	10 L/h (2.5 kW) 15 L/h (4.0 kW)

\*Continuous operation

## CNC standard specifications

	MAZATROL PREVIEW 3
CPU	64 bit
Control method	Control method
Minimum program increment unit	0.001 mm (0.0001")
Programming method	EIA/ISO
Display	15" color LCD (TFT)

Standard and optional equipment

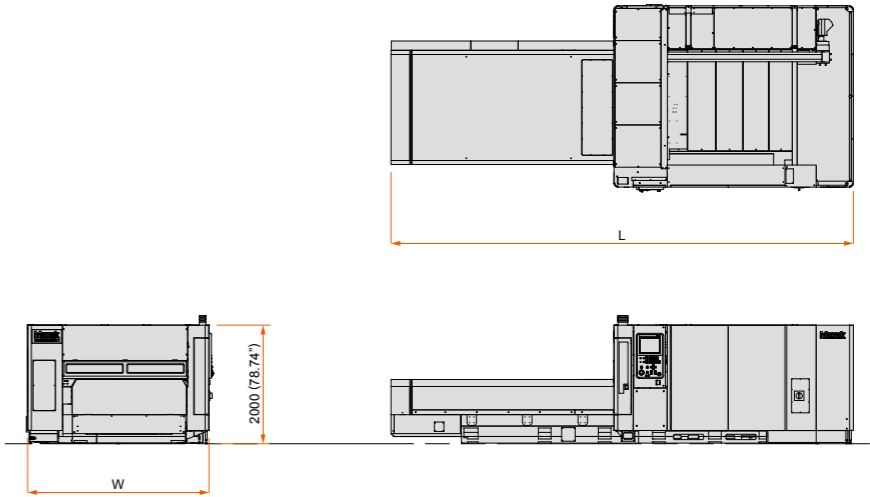
		● : Standard ○ : Option		
		2412	3015	4020
Machine	Auto nozzle changer (storage capacity:4)	●	●	●
	Auto profiler calibration	●	●	●
	Focus detection	●	●	●
	Auto nozzle cleaning	●	●	●
	Non-profiler with retry function	●	●	●
	Workpiece clamps (4) & locator	●	●	●
	Manual clamp (1)	○	○	○
	Work lifter	●	●	●
	Side air blast	●	●	●
	Intelligent monitoring function	●	●	●
	Auto open/close protective cover	●	●	●
	Work light	●	●	●
	Oscillator status indicator light	●	●	●
	Chiller unit	●	●	●
Torch	5" servo focus torch without lens	○	○	○
	7.5" servo focus torch without lens	●	●	●
Lens	5" Mazak high accuracy lens (2.5 MPa)	○	○	○
	7.5" Mazak high accuracy lens (2.5 MPa)	●	●	●
	Additional 7.5" Mazak high accuracy lens (2.5 MPa)	○	○	○
Nozzle	Mazak high accuracy nozzle adaptor (3)	●	●	●
	Mazak pencil nozzle Φ1.2, 2.0, 3.0 mm	●	●	●
	Additional Mazak high accuracy pencil nozzle (3)	○	○	○
	Mazak pencil nozzle (Single) Φ1.2, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 mm (3)	○	○	○
	Mazak pencil nozzle (Dual) Φ2.5, 3.0, 3.5, 4.0 mm (3)	○	○	○
	Nozzle for auto focus length measurement & adjustment (1)	●	●	●
Assist gas	3rd assist gas piping (Supply 3.0 MPa)	●	●	●
	4th assist gas piping (Supply 3.0 MPa)	○	○	○
	Assist gas changer (3 types)	●	●	●
	Assist gas pressure NC control	●	●	●
Factory automation	2 pallet changer	○	○	○
	Auto power off	●	●	●
	Preparation for FMS installation	○	○	○
	Scrap conveyor	●	●	●
	Preparation for dust collector	●	●	●
	Dust collector	○	○	○
CNC	MAZATROL PREVIEW 3	●	●	●
	Ethernet I/F	●	●	●
	USB port for PC	●	●	●
	NC retry function	○	○	○
Others	Manuals (CD)	○	○	○
	Manual (paper)	●	●	●
	Additional manual (CD)	○	○	○
	Additional manual (paper)	○	○	○

Floor space

Unit: mm

Standard machine dimensions

	SUPER TURBO-X 2412	SUPER TURBO-X 3015	SUPER TURBO-X 4020
W	2600 (102.36")	2900 (114.17")	3400 (133.86")
L	6600 (259.84")	7400 (291.34")	9300 (366.14")



Machine dimensions with optional 2 pallet changer

	SUPER TURBO-X 2414	SUPER TURBO-X 3015	SUPER TURBO-X 4020
W	4100 (161.42")	4380 (172.44")	4960 (195.28")
L	10800 (425.2")	11900 (468.5")	14800 (582.68")

