Mazak

OPTIPLEX DDL SERIES

Mazak

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OPTIPLEX DDL SERIES 18.09.0 A 99J450017E1

Mazak

OPTIPLEX DDL

SERIES

Mazak

DIRECT DIODE LASER

Continuing our tradition of utilizing the most advanced technology available
The newest member of the Mazak DDL series - the OPTIPLEX DDL 6.0 kW

Direct Diode Laser processing machine

OPTIPLEX DDL SERIES

OPTIPLEX 3015 DDL

OPTIPLEX 4020 DDL

DIRECT DIODE LASER

Shorter wavelength than a fiber laser for high speed cutting of thin worksheets including highly reflective materials such as aluminum, copper and brass.

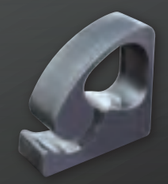
MAZATROL CNC SYSTEM

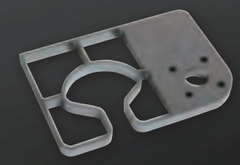
High speed response CNC system for high speed operation. Large 19" touch screen with operation similar to your smartphone or tablet.

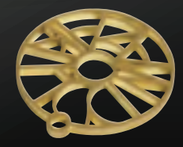
HIGHER PRODUCTIVITY

The Multi-Control Torch and the variety of Intelligent Functions provide incomparable operator support for exceptional ease of operation and the optimum machine efficiency.

WORKPIECES







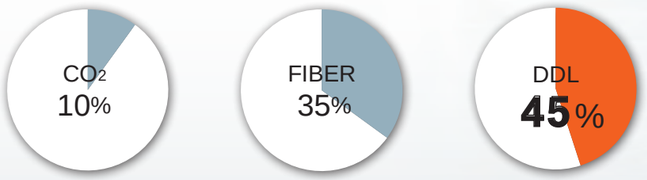
Higher Productivity

Direct Diode Laser

The advanced technology of the Direct Diode Laser provides higher productivity and higher efficiency than other systems.

Laser energy conversion efficiency

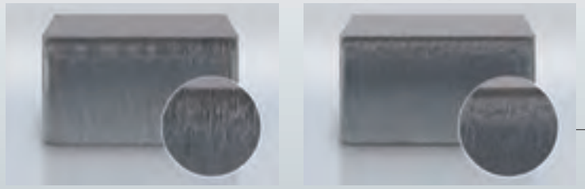
The conversion of electrical power input is significantly more efficient for the Direct Diode Laser compared to CO_2 and fiber lasers.



Improved cutting surfaces of thick plates

Thanks to the Direct Diode Laser, the cutting surfaces of mild steel from mid to thick plate are high quality.

22 mm (0.87") mild steel (oxygen assist gas)



Cutting surface by fiber laser

Cutting surface by Direct Diode Laser

Cutting surface with better edge quality

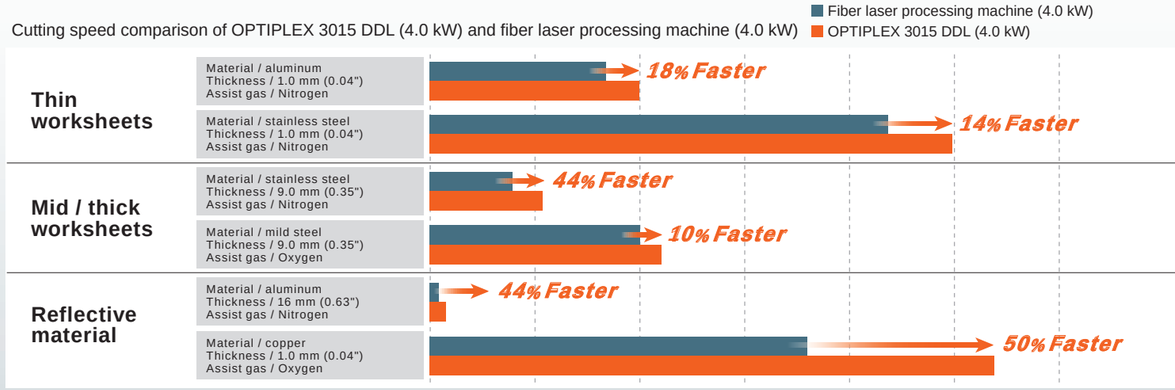
Stable cutting over extended periods of operation

Thanks to the longer focal point, cutting can continue even if the lenses expand due to heat.

High Productivity

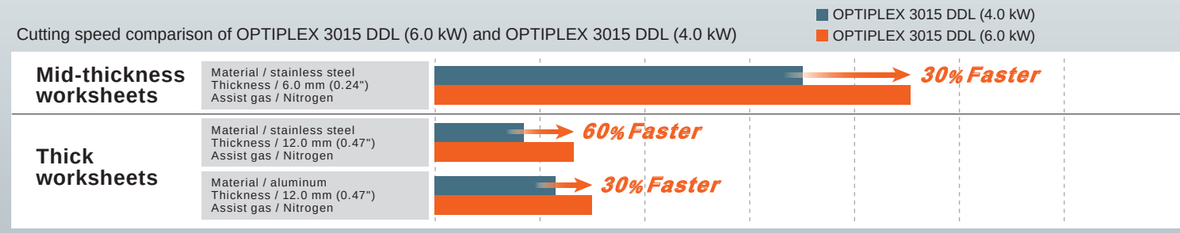
The Direct Diode Laser has a shorter wavelength than a fiber laser which improves high speed cutting of thin to mid worksheets including highly reflective materials such as copper and brass.

Cutting speed comparison of OPTIPLEX 3015 DDL (4.0 kW) and fiber laser processing machine (4.0 kW)



The OPTIPLEX DDL with 6.0 kW Direct Diode Laser improves high speed cutting of mid to thick worksheets.

Cutting speed comparison of OPTIPLEX 3015 DDL (6.0 kW) and OPTIPLEX 3015 DDL (4.0 kW)



Multi-Control Torch and Intelligent Functions

The Multi-Control Torch and a variety of Intelligent Functions provide incomparable operator support for exceptional ease of operation and optimum machine efficiency

OPTIPLEX 4020 DDL

MULTI CONTROL TORCH

Optimum cutting with high-speed and high-accuracy can be performed by automatic setup - effective for both thin worksheets and thick plates. A variety of unique technologies has been developed that incorporate the expertise of experienced machine operators that realize unsurpassed productivity and higher accuracy.

The OPTIPLEX DDL series features advanced Intelligent Functions - the optimum nozzle can automatically be selected and changed for each material and thickness. Improved quality of processed components as well as reduced cutting time and running cost are ensured.

ISF

INTELLIGENT SET-UP FUNCTIONS

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

- Beam Diameter Control
- Auto Focus Positioning
- Focus Detection
- Auto Profiler Calibration
- Auto Nozzle Changing
- Auto Nozzle Cleaning

IMF

INTELLIGENT MONITORING FUNCTIONS

Operation status of laser processing can be monitored. The laser processing head is equipped with a sensor 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.

- Pierce Detection
- Burn Detection
- Plasma Detection

ICF

INTELLIGENT CUTTING FUNCTIONS

Automatic functions incorporating Mazak's expertise accumulated over many years that ensure high quality and high efficiency laser cutting.

- Fine Power Ramping
- Flash Cut

Intelligent Machine

ISF

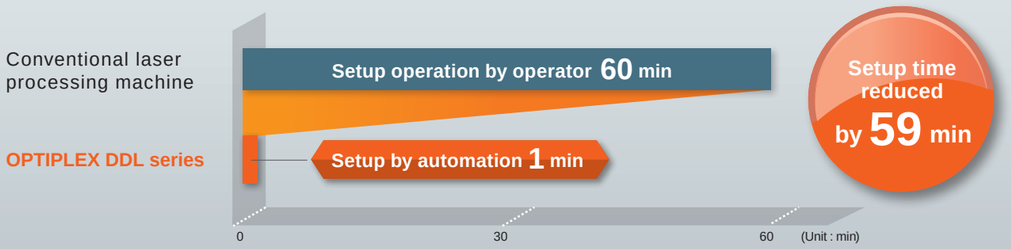
INTELLIGENT SET-UP FUNCTIONS

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

Example of reduced setup time

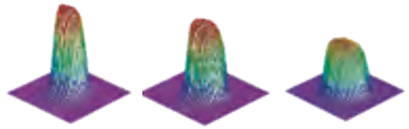
Conventional laser processing machine	OPTIPLEX DDL series
Long in-process time and many processes requiring an operator	Setup time variance between different operators is eliminated
Operator determines cutting conditions by referring to material cutting data	Optimum lens and nozzle can automatically be determined from the cutting conditions database by inputting thickness and type of material
Focus distance is measured by operator and adjusted according to material	Focal distance can automatically be detected and set
Select and change optimum nozzle by operator Cleaning nozzle	Can automatically change to optimum nozzle Automatically removes cutting spatter from nozzle
Adjust gap calibration by operator	Profiling distance is automatically determined

Automation



Beam Diameter Control

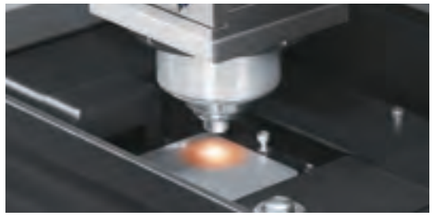
By moving the lens up or down, the laser beam diameter can be changed automatically. Stable cutting is realized — improved cutting speed for thin worksheets and increased cutting performance for thick sheets.



Change to optimum beam mode for worksheet thickness and material

Focus Detection

Focal distance measurement and adjustment require 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 Nozzle Changing

Automatically change to optimum nozzle for continuous automatic operation.
The storage capacity is up to 8 nozzles.

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 intervention.

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

IMF

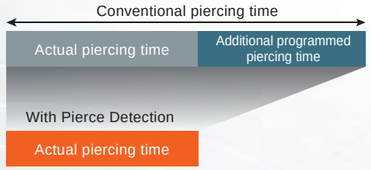
INTELLIGENT MONITORING FUNCTIONS

Monitoring of operation status of laser processing. The laser processing head is equipped with a sensor to detect piercing and defects (burning or plasma).
If any plasma is detected, the operation is corrected to ensure high quality cutting.
If burning is detected, the cutting is automatically stopped.

Reduced piercing time for medium and thick worksheets

Pierce Detection

During the piercing cycle, if cutting starts before the completion of piercing, the result will be cutting failure. To avoid this, normally the piercing program is made for a longer cycle than the anticipated piercing time. By Pierce Detection, sensors detect the penetration of the laser beam through the material, and then cutting starts automatically - eliminating non-cutting time for higher productivity.



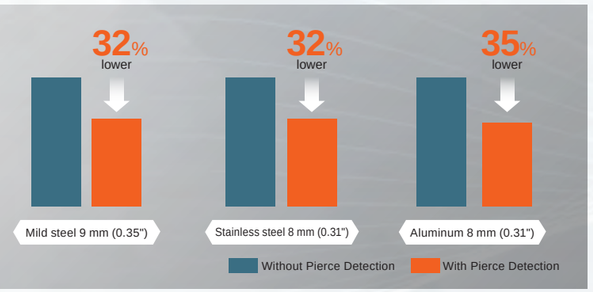
Comparison of cutting time

Machine

OPTIPLEX 3015 DDL

Method

Conduct 100 piercing cycles with Pierce Detection and without Pierce Detection.
(Values are example results and for reference only)



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.

Without Plasma Detection

With Plasma Detection

Burn Detection

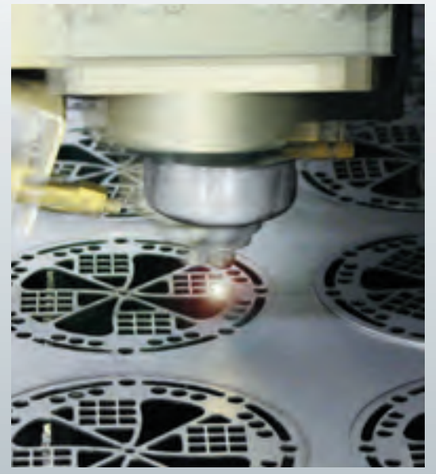
Normally burning generated during the cutting of medium / thick mild steel worksheets often results in cutting failure. The Burn Detection monitors for abnormal burning during processing and automatically stops cutting if any is detected.

Burning

ICF

INTELLIGENT CUTTING FUNCTIONS

Automatic functions incorporating Mazak's expertise accumulated over many years that ensure high quality and high efficiency laser cutting.



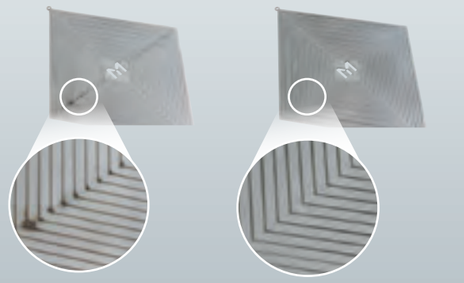
Flash Cut

Cutting method by turning the laser ON / OFF without stopping axis movement. Axis movement and laser ON / OFF are synchronized to reduce cutting time.

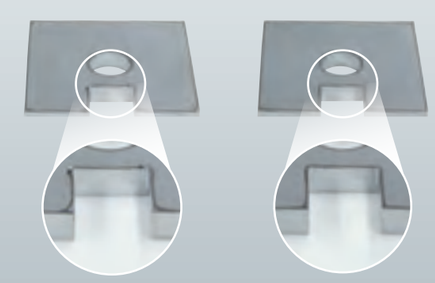
Fine Power Ramping

The Fine Power Ramping function controls laser output and feedrate - optimum cutting conditions are automatically used for high speed straight and corner cutting to prevent dross.

1 mm (0.04") stainless steel (nitrogen assist gas)



4.5 mm (0.18") mild steel (nitrogen assist gas)



MAZATROL CNC System

Optimum acceleration / deceleration for the reduction of cutting time

Tolerance control ensures high-speed corner cutting

Advanced hardware

State of the art CPU for unsurpassed operation speed

High-response, high-speed machine motion

Improved laser operation responsiveness

Laser control is improved to generate optimum laser power in the minimum time

Improved performance for Flash Cut and Sharp Edge Cutting

5 process home screens

1. Maintenance

Maintenance items status

2. Programming

Check program cutting shape

3. Tool data

Torch status display

4. Setup

Peripheral equipment ON / OFF, alarm

5. Cutting

Cutting path, work coordinate and axes speed

Unsurpassed ease of operation with touch screen

MAZATROL PREVIEW G

Automatic determination of processing conditions

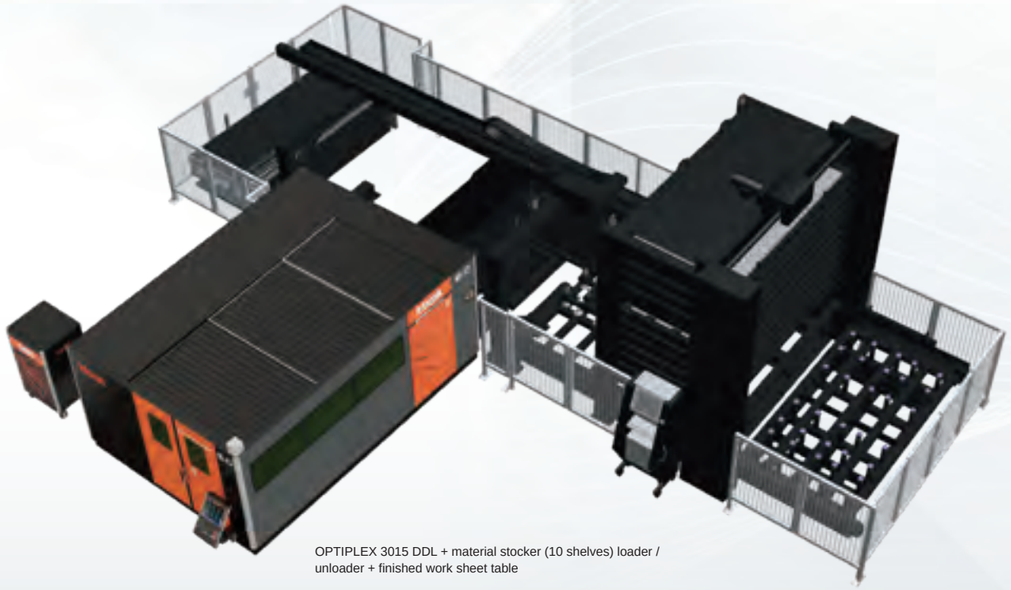
The required lens, nozzle, feedrate and laser output are automatically determined by the CNC for different materials and thicknesses. Cutting conditions can be edited while monitoring operation and registered in the CNC. The next time the same material is processed, the new cutting conditions will automatically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

Automation

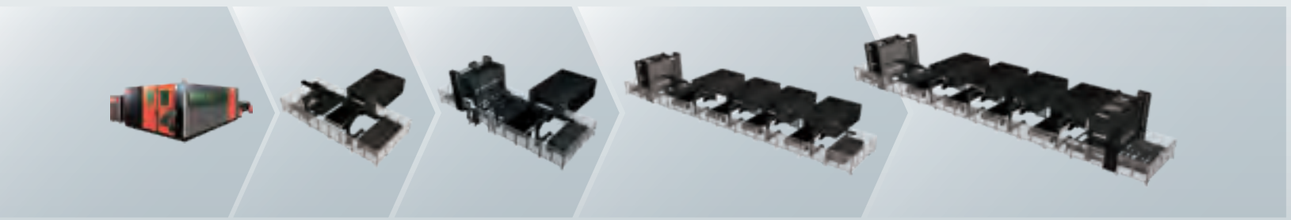
A variety of automation systems available to meet a wide range of production requirements

EXTENSIBLE MANUFACTURING CELL

Designed for convenient system expansion after the initial installation. The material shelf capacity and management controller capability can be expanded as well as the number of machines up to a maximum of 4.



OPTIPLEX 3015 DDL + material stocker (10 shelves) loader / unloader + finished work sheet table



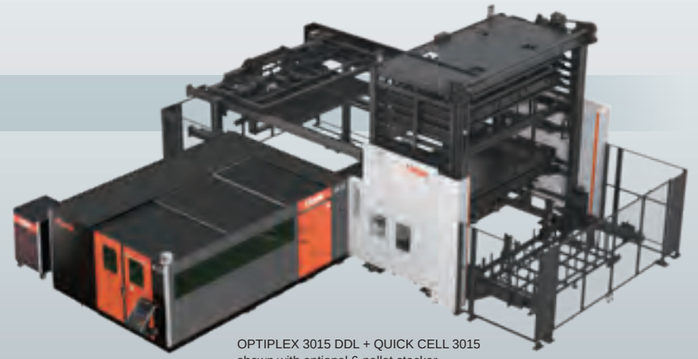
High productivity

- Production control can be managed thanks to scheduled operation
- 25 mm (0.98") worksheet can be transferred for reduced loading / unloading time

FMS line with 2 OPTIPLEX 3015 FIBER II

QUICK CELL 3015

The loader and unloader units each have a separate drive system instead of one used for both. As a result, the operation time of each unit is much faster when compared to a conventional system. By loading and unloading the pallets at the same position, factory floor space is used more efficiently.

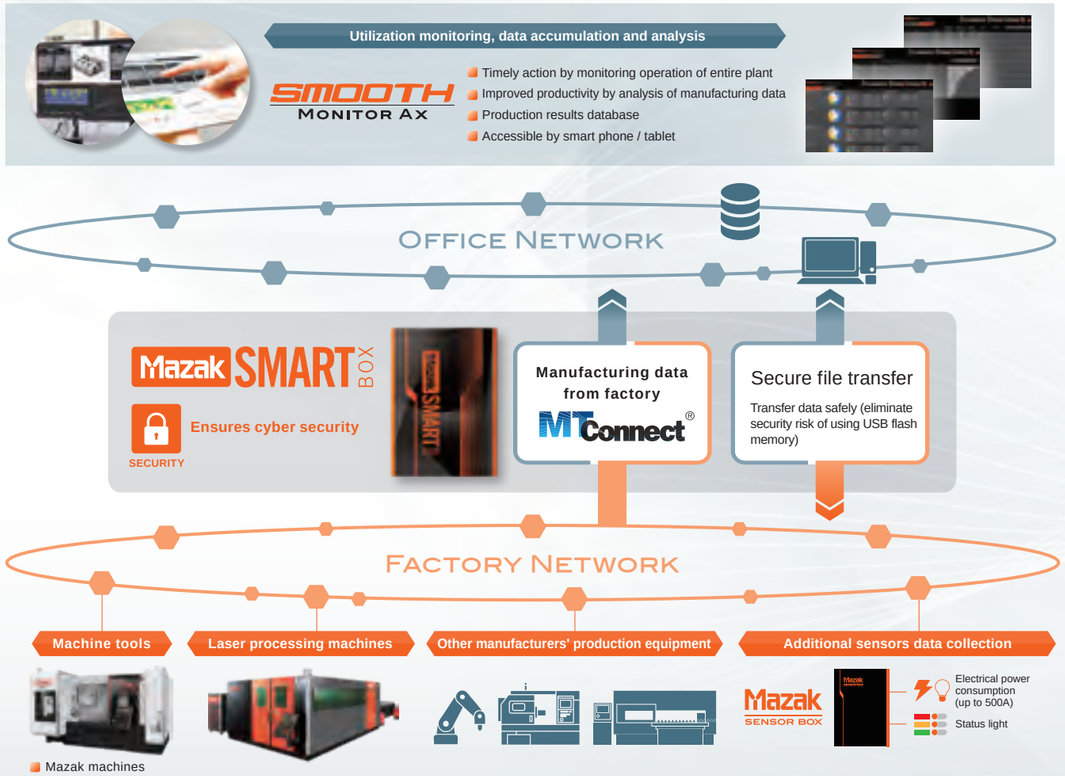


OPTIPLEX 3015 DDL + QUICK CELL 3015 shown with optional 6-pallet stocker

Smart Factory

By incorporating all production equipment in a network that utilizes the MTConnect® communication protocol, comprehensive monitoring can be performed in real time and production results can be thoroughly analyzed to realize higher productivity and efficiency.

Not only Mazak laser processing machines and machine tools but also other manufacturers' production equipment can be connected to the Mazak SMARTBOX™ to ensure cyber security.



(MTConnect adapter software required for all production equipment)

QR code reader OPTION

The MAZAK SMART SYSTEM can print out a QR code that contains a cutting program name. When this QR code is scanned at the CNC, the program will be automatically called up from CNC memory and by pressing the cycle start button, cutting will start. This function can reduce the time spent searching for cutting programs as well as preventing operator error.

Step1 Select scanning button

Step2 Read QR code

Step3 Start cutting by pressing cycle start

(QR code is a registered trademark of DENSO WAVE INCORPORATED.)

Machine specifications

		OPTIPLEX 3015 DDL	OPTIPLEX 4020 DDL
Max. workpiece size		1525 mm × 3050 mm (60.04" × 120.08")	2000 mm × 4000 mm (78.74" × 157.48")
Axis travel	X-axis	3110 mm (122.4")	4085 mm (160.83")
	Y-axis	1595 mm (62.80")	2070 mm (81.50")
	Z-axis	110 mm (4.33")	
Rapid traverse rate	X-axis	120 m/min (4724 IPM)	
	Y-axis	120 m/min (4724 IPM)	
	Z-axis	60 m/min (2362 IPM)	
	XY (Vectorial)	170 m/min (6693 IPM)	
Positioning accuracy	X-axis	±0.05 mm / 500 mm (±0.002" / 19.69")	
	Y-axis	±0.05 mm / 500 mm (±0.002" / 19.69")	
	Z-axis	±0.01 mm / 100 mm (±0.0004" / 3.94")	
Repeatability	X-axis	±0.03 mm (±0.001")	
	Y-axis	±0.03 mm (±0.001")	
	Z-axis	±0.03 mm (±0.001")	
Machine weight (including chiller, transformer, resonator and 2-pallet changer)	4.0 kW	16500 kg (36376 lbs)	21500 kg (47399 lbs)
	6.0 kW	16800 kg (37038 lbs)	21900 kg (48281 lbs)
Electrical power requirement*1	4.0 kW	50 kVA	52 kVA
	6.0 kW	59 kVA	61 kVA
Electrical power consumption*1	Max. electrical power consumption (4.0 kW)	21 kW/h	21 kW/h
	Consumption at stand-by (4.0 kW)	6 kW/h	9 kW/h
Sound*2		Less than 80 dB	

*1 Total electrical power requirement does not include optional equipment.
*2 Equivalent continuous sound pressure level at operator position (depends on equipment options)

Specifications of laser resonator

Laser power	4.0 kW, 6.0 kW
Wave length	975 nm (Center wave)

CNC standard specifications

CNC	MAZATROL PreviewG
CPU	64 bit
Control method	Preview control
Minimum program increment unit	0.001 mm (0.0001")
Programming method	EIA / ISO
Display	19" color LCD (TFT)

Standard and optional equipment

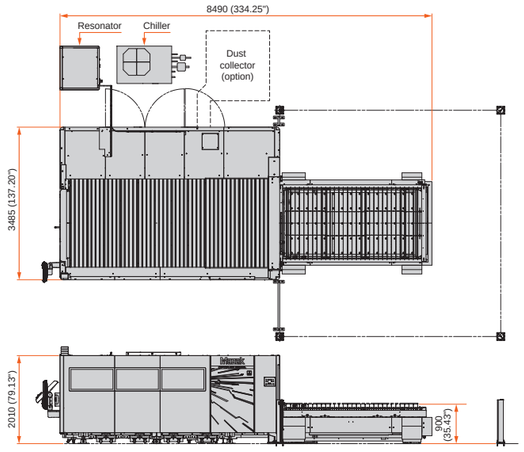
● : Standard ○ : Option - : N/A

		OPTIPLEX 3015 DDL	OPTIPLEX 4020 DDL
Machine	Work lifter	○	○
	Knife-edge (100 mm (3.94") pitch)	●	●
	Additional knife-edge (50 mm (1.97") pitch)	○	○
	Side air blast	●	●
	Non-contact profiler with retry	●	●
	Manual worksheet clamps (2 clamps per pallet)	●	●
	Work light	●	●
	Resonator status indicator light	●	●
	Chiller unit (DDL)	●	●
Torch	Multi-Control Torch HP-D (1, DDL)	●	●
	Additional protection window	○	○
	Additional protection window cartridge	○	○
	Nozzle cooling function	●	●
Nozzle	Mazak pencil nozzle (single) Φ2.0, 2.5, 3.0, 3.5, 4.0 mm (1 each)	●	●
	Mazak pencil nozzle (single) Φ1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 mm (1 set of 3 of same size)	○	○
	Mazak pencil nozzle (dual) Φ1.5-1.5, 2.0-1.5, 2.5-1.8, 3.0-1.8, 3.5-1.8, 4.0-1.8, 4.5-1.2, 5.0-1.2, 5.5-2.0, 7.0-1.8 mm (1 set of 3 of same size)	○	○
	Mazak pencil nozzle HP (single) Φ1.0 mm (1 each)	●	●
	Mazak pencil nozzle HP (single) Φ1.0, 1.2, 1.5 mm (1 set of 3 of same size)	○	○
	Mazak pencil nozzle HP (dual) Φ1.5-1.5 mm (1 set of 3 of same size)	○	○
	Mazak divergent nozzle (dual) Φ9.5-1.8 mm (1 set of 3 of same size)	○	○
Assist gas	3rd assist gas piping (supply : 3.0 MPa (435 PSI))	●	●
	4th assist gas piping (supply : 3.0 MPa (435 PSI))	○	○
	Assist gas changer	●	●
	Assist gas pressure NC control (setup pressure : 0.02 ~ 2.5 MPa (3 ~ 363 PSI))	●	●
Factory automation	2-pallet changer	●	●
	Auto power off	●	●
	QUICK CELL 3015 preparation	○	-
	FMS preparation	○	○
	Scrap conveyor	○	○
	Scrap conveyor (for aluminum)	○	○
Working environment	Preparation for dust collector	●	●
	Chip pan	●	●
CNC	Auto nozzle changer (holders : 8)	●	●
	Auto profiler calibration	●	●
	Auto nozzle cleaning	●	●
	Focus Detection	●	●
	Auto Focus Positioning	●	●
	Beam diameter control	●	●
	Pierce Detection	●	●
	Burn Detection	●	●
	Plasma Detection	●	●
	Protective window sensor	●	●
	Automatic cutting conditions determination	●	●
	Fine Power Ramping	●	●
	Flash Cut	●	●
	Work edge detection / coordinate rotation	●	●
	EtherNet I/F	●	●
	USB I/F	●	●
	NC retry function	●	●
	Laser monitor	●	●
	Data guard	●	●
	Cutting conditions sharing over network	●	●
	Program network nesting	●	●
	Simple monitor	●	●
	MTConnect adapter	○	○
	Robot open interface	○	○
	QR code reader	○	○
	Remote manual pulse generator	○	○
Others	1 set of manuals	●	●
	Additional set of manuals	○	○

Floor Space

Unit : mm (inch)

OPTIPLEX 3015 DDL



OPTIPLEX 4020 DDL