Mazak

FG-220 DDL

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[Direct Diode Laser]

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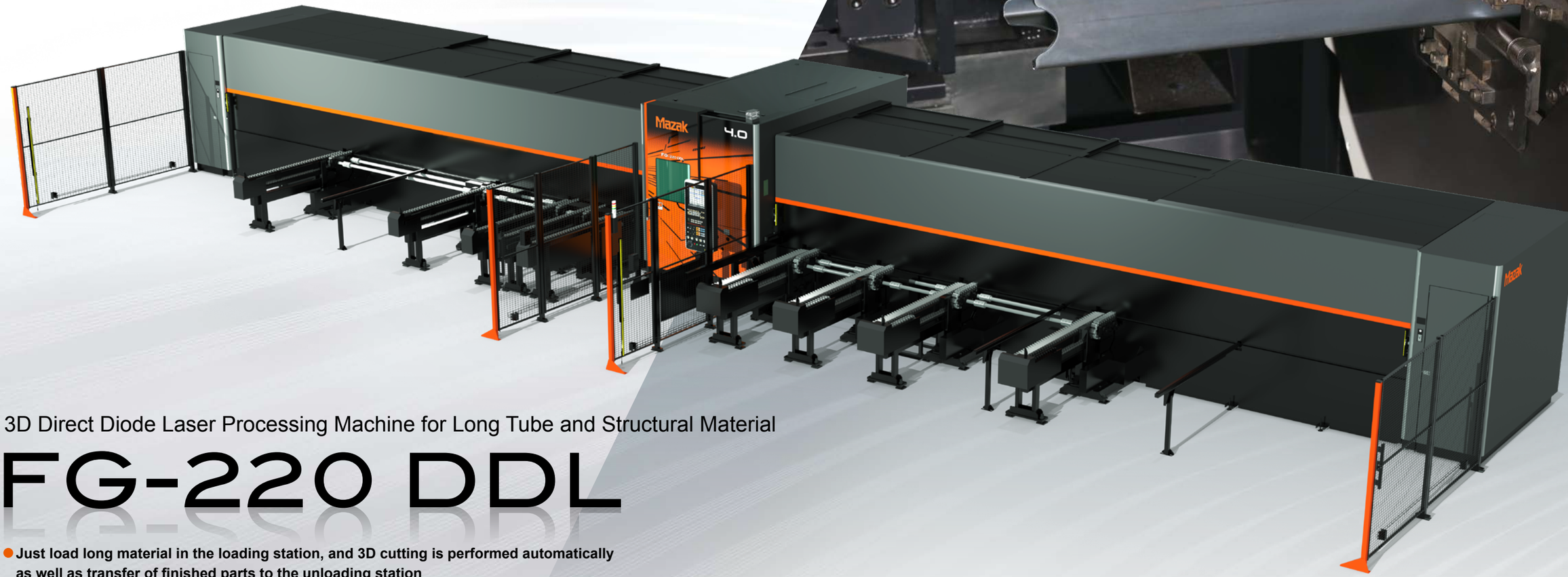
FG-220 DDL 20.08.0 G 99J450618E

Mazak
DIRECT DIODE LASER

Continuing our tradition of utilizing the most advanced technology available -
The newest member of the Mazak DDL series - the FG-220 DDL



3D Direct Diode Laser Processing Machine for Long Tube and Structural Material

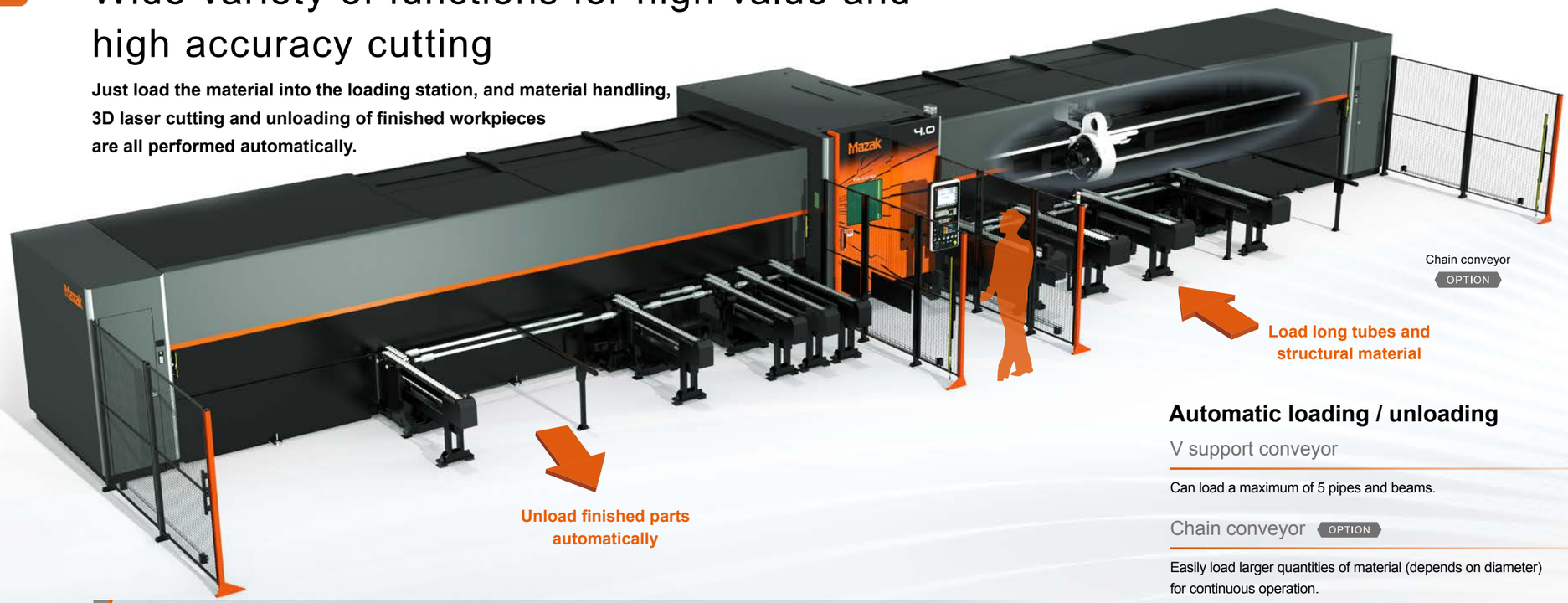
FG-220 DDL

- **Just load long material in the loading station, and 3D cutting is performed automatically as well as transfer of finished parts to the unloading station**
- **Complete all cutting processes from 3D cutting to tapping in just one machine when equipped with the optional tapping unit [Max. M12 (1/2 UNC and UNF)]**
- **Loader / unloader specifications are available to meet your production requirements**

Chain conveyor (option) shown.

Wide variety of functions for high value and high accuracy cutting

Just load the material into the loading station, and material handling, 3D laser cutting and unloading of finished workpieces are all performed automatically.



Safety

The enclosed cover, which covers not only the entire cutting area but also the internal loading / unloading area, protects operators from the laser beam.

Automatic loading / unloading

V support conveyor

Can load a maximum of 5 pipes and beams.

Chain conveyor OPTION

Easily load larger quantities of material (depends on diameter) for continuous operation.

Chain conveyor (option)

High accuracy cutting of long material

Auto centering and clamping of material

Automatically center and clamp different material shapes, such as round, square and rectangular.

Flat support

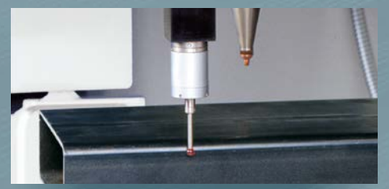
Flat roller follows the shape of material, so that the material will not sag from its own weight.

Workpiece measurement OPTION

Automatically measures material length after loading into machine, eliminating manual measuring for each piece of material.

Horizontal workpiece centering OPTION

Horizontal workpiece centering for long beams and small pipes by roller to prevent material displacement.



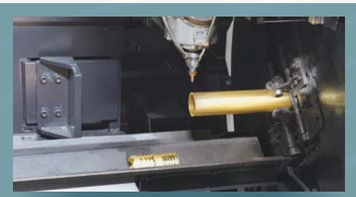
Touch sensor OPTION

Measures the OD of pipe material and automatically compensates for material distortion to ensure high precision positioning.

High value and high quality cutting

Bevel cutting

Improved quality of processed components thanks to unsurpassed 3D laser cutting.



Parts catcher

Can catch a finished part up to 810 mm (31.89") long and remove from machine.

Tapping unit OPTION

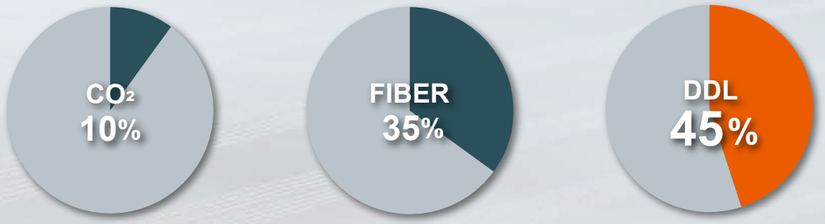
Perform 3D laser cutting, tapped hole preparation and tapping- all in the same machine. The hole to be tapped is cut by the laser and then tapped for shorter production lead time and higher productivity.
[Max. M12 (1/2 UNC and UNF)]

Direct Diode Laser

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

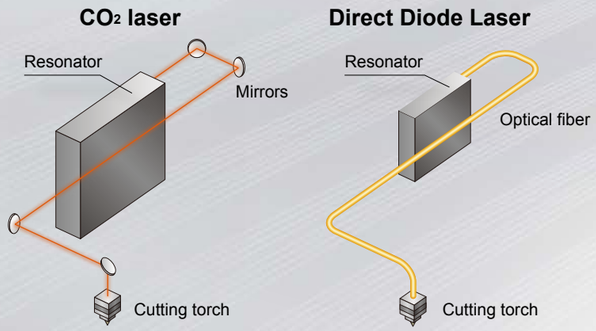
Laser energy conversion efficiency

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



Considerable reduction in maintenance example

For conventional CO_2 laser processing machines, regular maintenance of components such as the resonator and mirrors is required in order to maintain stable cutting performance. The Direct Diode Laser processing machine eliminates the mirrors and other components by using optical fiber to significantly reduce the cost of maintenance.



Applications

H beam
Size : 100 mm (3.94") × 100 mm (3.94")
Assist gas : Oxygen

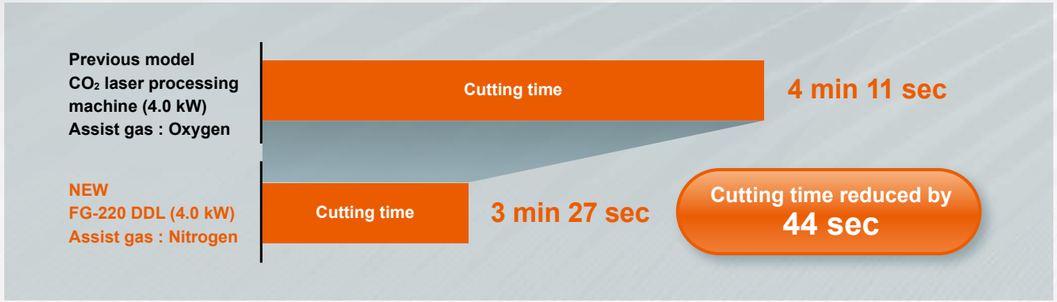
Round pipe
Material : brass
Size : Φ50.8 mm (2.00") × t 1.0 mm (0.04")
Assist gas : Nitrogen

Round pipe
Material : copper
Size : Φ50.8 mm (2.00") × t 1.5 mm (0.06")
Assist gas : Oxygen

High Productivity

The Direct Diode Laser has a shorter wavelength than a CO_2 laser for high speed cutting of mild steel with nitrogen assist gas. The FG-220 DDL improves productivity of cutting thin to mid thickness pipe and other structural material.

Mild steel 125 mm (4.92") × 75 mm (2.95") × t 2.3 mm (0.09")



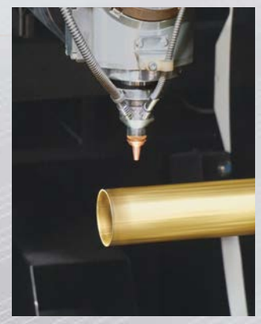
Higher Productivity

Auto profiler calibration and nozzle cleaning

The Auto Profiler Calibration and the Auto Nozzle Cleaning reduces setup time

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.

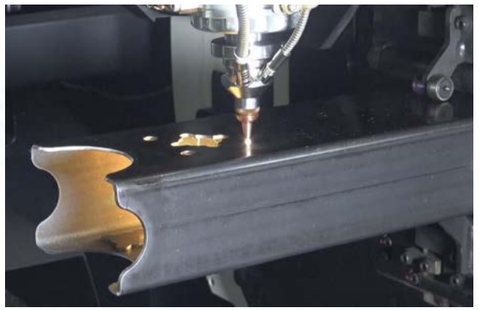
Auto Focus Positioning ensures reduction in setup time and piercing time

Auto Focus Positioning

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.

Reduction in piercing time

Optimum focus positioning determination for considerable reduction of piercing time. Continuous processing thanks to auto focus positioning determination.



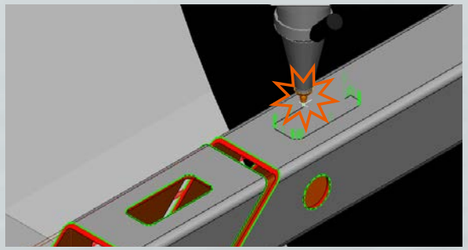
Quick Program Restart Function

When automatic operation is stopped using the reset button due to an interruption created by cutting failure, the Quick Program Restart Function registers the position in its memory and can restart the machine from the point where it stopped.

Without Quick Program Restart Function

When automatic operation is stopped, restarting from the point where cutting stopped is difficult because the interrupted operation point is not registered. Searching the program for the interrupted operation point and confirmation can take considerable time.

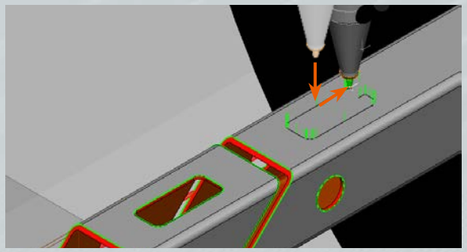
Recovery time: 10 min



With Quick Program Restart Function

When automatic operation is stopped, the Quick Program Restart Function registers the position in memory and can restart machine operation from the point where cutting stopped. Searching for the program location where cutting was interrupted is eliminated.

Recovery time: 2 min



Above values are example results and for reference only

Ease of Programming

Convenient operation of FG-220 DDL from making CNC program to cutting

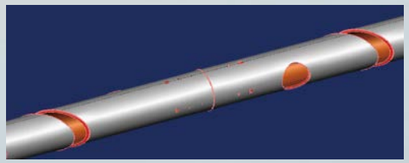
CAD / CAM | CNC program | Setup | Scheduling | Continuous cutting according to production schedule

FX TUBE OPTION

Unique MAZAK CAD / CAM software for pipe cutting. Easy laser cutting programming can be done for any parts created by FX TUBE or importing solid models created by other CAD systems.

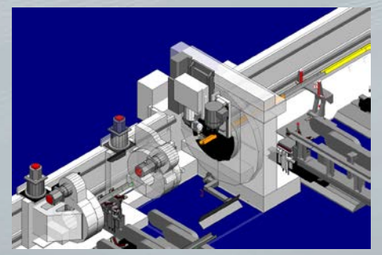
Nesting function

Pipe nesting maximizes material utilization.

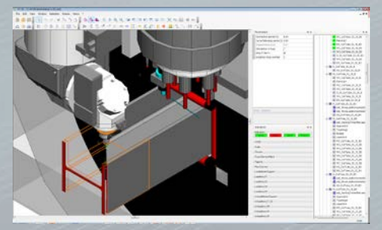


Simulation

Program data can be checked by 3D graphic simulation display.



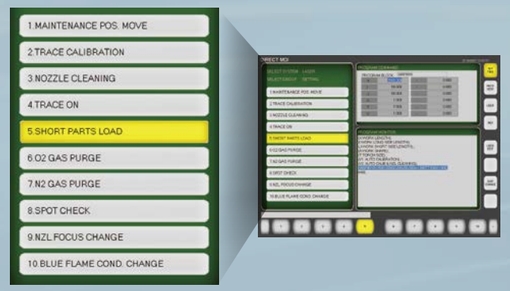
Simulation for loading and unloading



Interference check

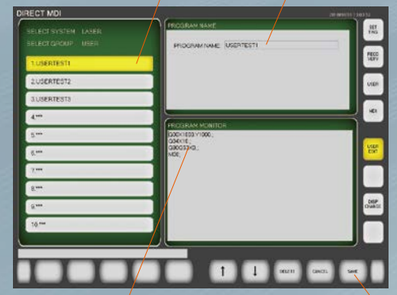
Direct MDI

Some operation can be easily done by selecting items such as trace calibration and short parts load. Operators don't have to create programs for these operations to reduce setup time.



Custom MDI

When a required operation is not included in the Direct MDI, after programing the required operation, it can be registered as a new program in the Direct MDI. By doing so, it can be conveniently called up the next time it is required to reduce mistakes and setup time.



Scheduler function

Production schedule can be created by utilizing nesting programs generated by Mazak software.
Scheduling is done for material supply, cutting and removing finished workpieces.

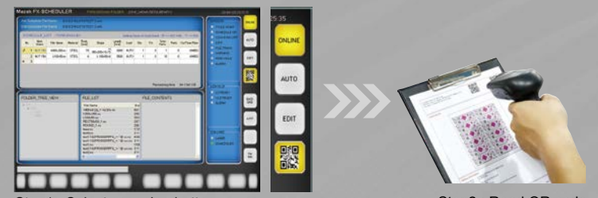
SCHEDULE_LIST - FOREGROUND - Setting Value of WorkCheck : "0" --> NOT FIN, "1" --> FIN

No.	Work Check	File Name	Material	Thick. [mm]	Shape	Length [mm]	Load	Qty	Fin	Total Parts	Parts	CutTime/Pipe
1	NOT FIN	H300x300.nc	STEEL	15	H 300x300x10x15	8000	AUTO	1	0	1	0	6M35S
2	NOT FIN	L100x50.nc	STEEL	6	L 100x50x6	5500	AUTO	1	0	10	0	6M35S
3												

Production schedule

QR code reader OPTION

The FX TUBE software 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 the 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

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

Cutting conditions database

Optimum cutting conditions including cutting speed, laser output and assist gas pressure can be set according to the type of material and thickness to be cut.

Smart Factory

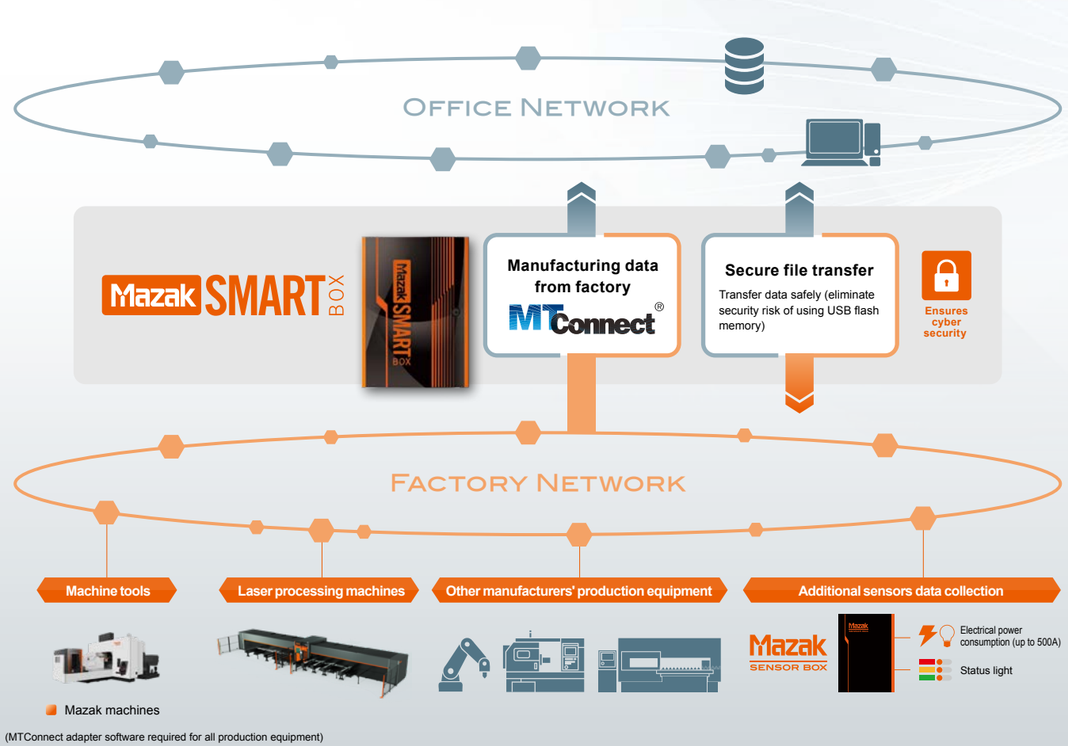
By incorporating all production equipment in a network that utilizes the MTConnect® communication protocol, comprehensive monitoring can be performed in real time and production results can be thoroughly analyzed to realize higher productivity and efficiency.

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

SMOOTH MONITOR AX

- Timely action by monitoring operation of entire plant
- Improved productivity by analysis of manufacturing data
- Production results database
- Accessible by smart phone / tablet

Utilization monitoring, data accumulation and analysis



(MTConnect adapter software required for all production equipment)

Machine Specifications

		FG-220 DDL			
Model*1		3 m (9.8') (option·unloader only)	6 m (19.6') (option)	8 m (26.2')	12 m (39.4') (option)
Workpiece shape		Round, square, L / H / I beam and channel			
Workpiece material		Mild steel / stainless steel / copper / brass / aluminum			
Workpiece diameter*2	Round pipe	Φ20 mm ~ Φ220 mm (Φ0.79" ~ Φ8.66")			
	Square pipe	20 mm × 20 mm ~ 152.4 mm × 152.4 mm (0.79" × 0.79" ~ 6.0" × 6.0")*3			
	L beam				
	H / I beam				
	Channel				
Max. material length for loading		–	6250 mm (246.06")	8150 mm (320.87")	12350 mm (486.22")
Min. material length for loading		–	2500 mm (98.43")	3450 mm (135.83")	3650 mm (143.7")
Min. material length for loading (option)		–	1700 mm (66.93")	2200 mm (86.61")	2200 mm (86.61")
Max. material length for unloading		3000 mm (118.11")	6100 mm (240.16")	8000 mm (314.96")	12200 mm (480.31")
Max. workpiece weight*4 (Must not exceed)		135 kg (298 lbs)	270 kg (595 lbs)	360 kg (794 lbs)	510 kg (1124 lbs)
		45 kg/m (30 lbs/ft)			
Stroke	X Chuck left / right	–	7155 mm (281.69")	9055 mm (356.50")	13255 mm (521.85")
	U Chuck left / right	3989 mm (157.05")	7089 mm (279.09")	8989 mm (353.90")	13189 mm (519.25")
	V Chuck left / right	1915 mm (75.39")	2315 mm (91.14")		
	Y Head back / forth	985 mm (38.78")			
	Z Head up / down	400 mm (15.75")			
	A Head rotation	±99999.999 deg			
	B Head swing	±135 deg			
Max. traverse rate	X, U, V	100 m/min (3937 IPM)			
	Y	36 m/min (1417 IPM)			
	Z	30 m/min (1181 IPM)			
	A, B	9600 deg/min			
	C (Chuck rotation)	20000 deg/min			
Machine weight*5		–	31600 kg (69665 lbs)	33600 kg (74074 lbs)	40800 kg (89947 lbs)
Electrical requirement		53 kVA			
Sound*6		Less than 80 dB (A)			

*1 Workpiece length for loading and unloading can be different length
*2 Jaws are changed according to material diameter
*3 Workpiece can be cut under the following condition : long side under 203.2 mm (8"), and diameter of the circumscribed circle on the cross section under Φ227mm (Φ8.94") ex : 200mm×100mm (7.87"×3.94")
*4 Requires to meet maximum workpiece weight and maximum workpiece weight per 1 meter
*5 When workpiece length for loading and unloading is the same length
*6 Equivalent continuous sound pressure level at operator position (dependent on equipment options)

Loader / Unloader Specifications

		FG-220 DDL	
		V support	Chain (option)
Max. quantity of material loaded	Φ220 mm (Φ8.66")	5	7
	Φ150 mm (Φ5.91")		9
	Φ50 mm (Φ1.97")		18
	Φ20 mm (Φ0.79")		37
Max. total weight capacity of loader / unloader		2550 kg (5622 lbs)	3600 kg (7937 lbs)
Transfer speed		5.3 m/min*1 (209 IPM)	2.5 m/min (98 IPM)

*1 Transfer speed may vary depending on region

CNC Standard Specifications

Model	MAZAK FX
CPU	64 bit
Controlled axes	Max. 32
Minimum program increment	0.001 mm (0.0001")
Programming method	EIA / ISO
Monitor	15" color LCD

Specification of Laser Resonator

Resonator	4.0 kW
Wave length	975 nm (Center wave)

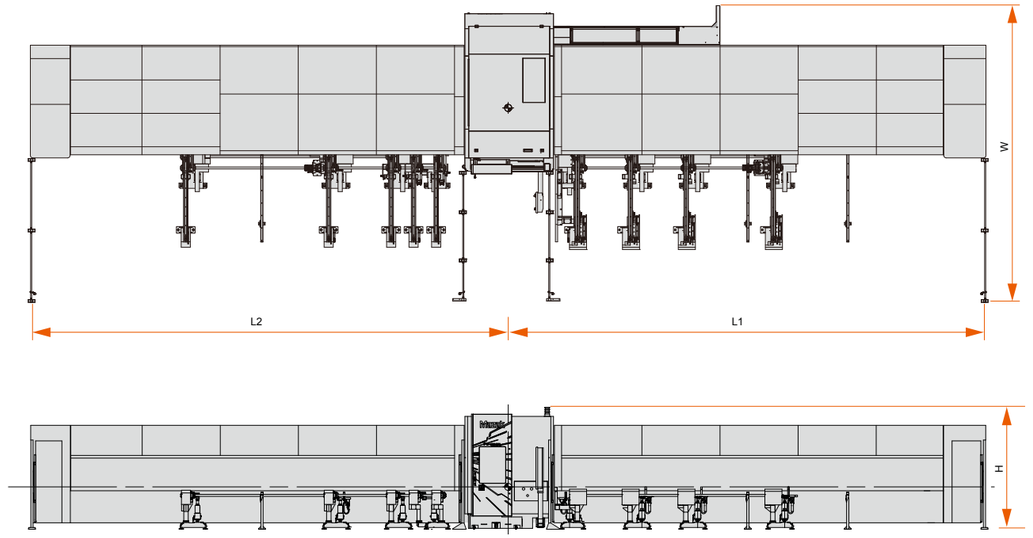
Standard and Optional Equipment

● : Standard ○ : Option

		FG-220 DDL
Machine	Work light	●
	Resonator status indicator light	●
	Chiller unit	●
	8 m loading equipment	●
	8 m unloading equipment	●
	6 m / 12 m loading equipment	○
	3 m / 6 m / 12 m unloading equipment	○
	Additional loader	○
	V support type conveyor	●
	Chain type conveyor	○
	Safety fence, light curtain	●
	Material support function (flat support, fixed support and round pipe support)	●
	Workpiece mesurement function	○
	Short material carrying function	○
	Horizontal workpiece centering	○
	Support for small diameter work (C2 chuck)	○
	Parts catcher	●
	Auto power off	●
Cutting head	Additional protection window	○
	Nozzle pointer	●
	Profiling retry function	●
	Auto profiler calibration	●
	Auto nozzle cleaning	●
	Auto focus positioning	●
	Beam diameter change function	●
	Touch sensor (X-axis end measurement, rechucking and twist compensation)	○
	Seam detector	○
	Tapping unit	○
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 (O_2, air and 3rd gas)	●
	Assist gas pressure NC control	●
Environment	Scrap bucket	●
CNC	Scheduler function	●
	Cutting condition automatic setting	●
	Corner power control	●
	Laser monitor function	●
	Machining condition network sharing	●
	MTConnect adapter	○
	QR code reader	○
Others	1 set of manuals	●

Floor Space

Unit : mm (inch)



Shown with 8 m loading and unloading unit and optional chain conveyor.
Oscillatar, chiller unit, transformer and dust collector not included.

		FG-220 DDL			
Model		3 m (option·unloader only)	6 m (option)	8 m	12 m (option)
Length	L1	–	8850 mm (348.43")	10750 mm (423.23")	14950 mm (588.58")
	L2	5750 mm (226.38")	8850 mm (348.43")	10750 mm (423.23")	14950 mm (588.58")
	W (V support)	6148 mm (242.05")			
	W (chain (option))	6648 mm (261.73")			
	H	2732 mm (107.56")			