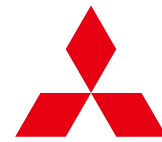




for a greener tomorrow

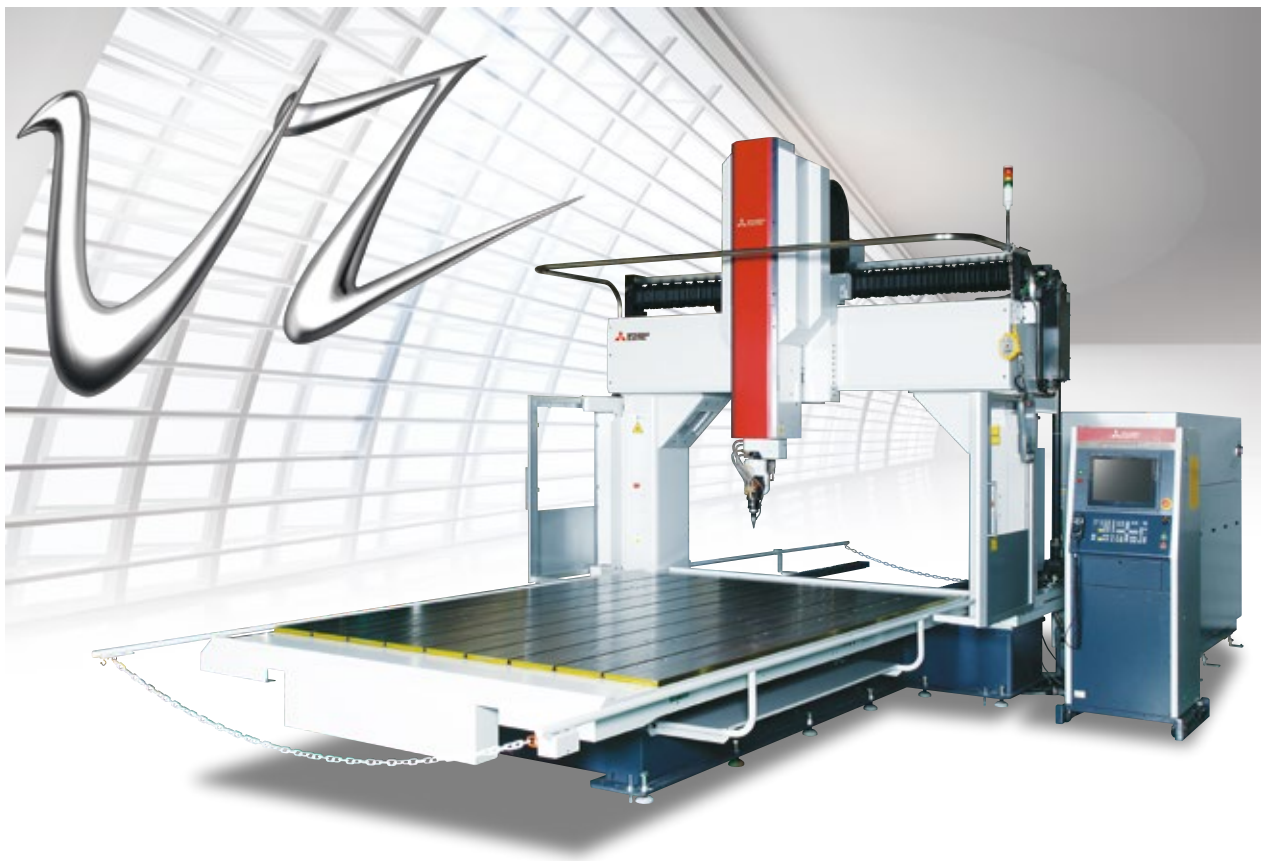


**MITSUBISHI
ELECTRIC**

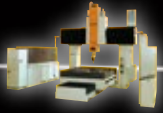
Changes for the Better

FACTORY AUTOMATION

3-Dimensional CO₂ Laser Processing Systems VZ Series



1986



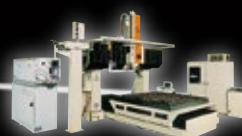
C Series
3D Laser Processing
Machine

1986



G Series
3D Laser Processing
Machine

1988



C2 Series
3D Laser Processing
Machine

1988



G2 Series
3D Laser Processing
Machine

The Latest VZ Series, Delivering the Utmost Performance

Ongoing innovations have further evolved Mitsubishi Electric's VZ Series. Provides high level performance required for all 3D laser applications.

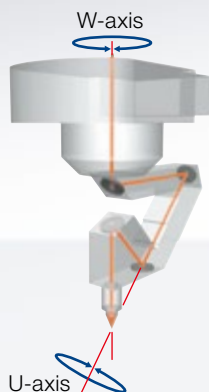
2009



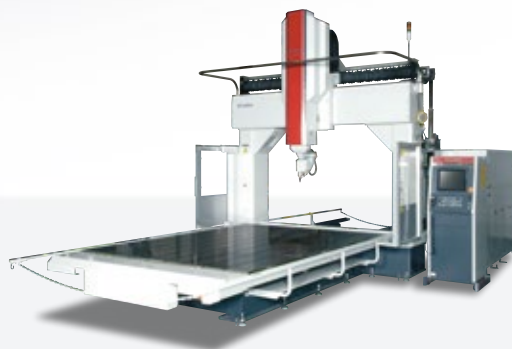
VZ10 Series
3D Laser Processing
Machine

Zero-offset type

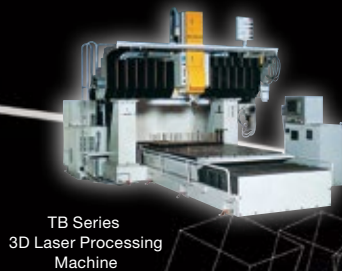
VZ10 Series



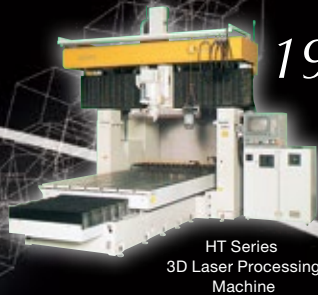
- For existing users of zero-offset lasers
- For those whose main purpose is to cut pre-formed 3D parts
- For those who require shorter processing time
- For those who prioritize a wider processing range



1990



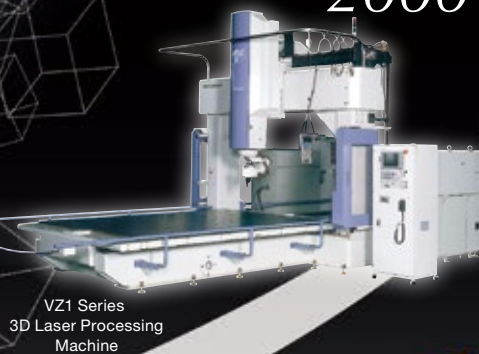
1991



2001



2000

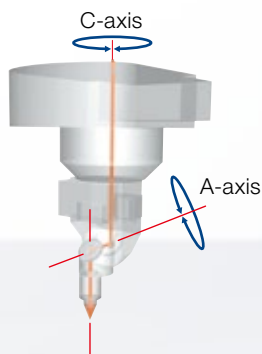


2009



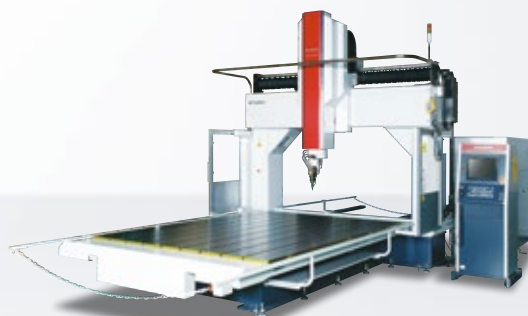
Offset type

VZ20 Series



- For existing users of offset type lasers
- For those who frequently process deep-drawn parts
- For 3D welding applications*¹
- For 2D thick sheet cutting*²

*1, *2: Requires optional attachments

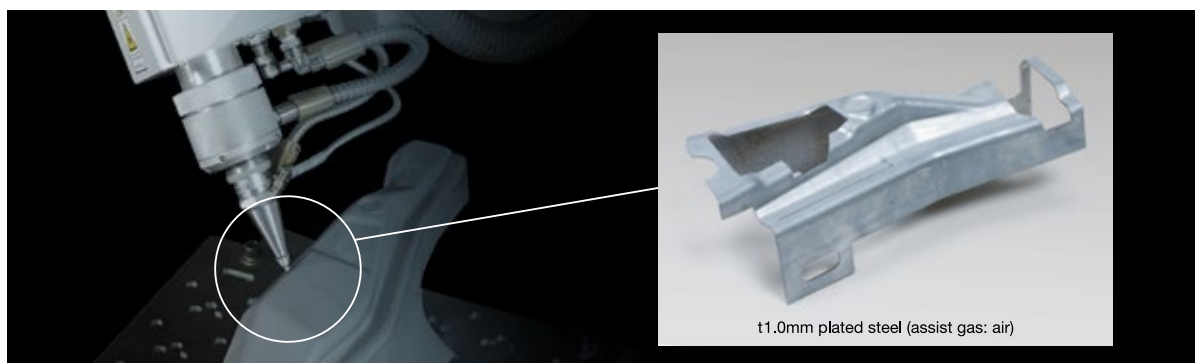


High productivity Processing performance

VZ10 High Productivity and Performance

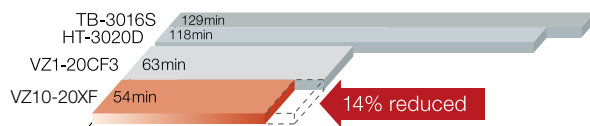
High productivity

Delivers greatly improved productivity, shorter processing time and lower running cost utilizing the latest control technologies, in addition to faster axial movement and higher processing speed

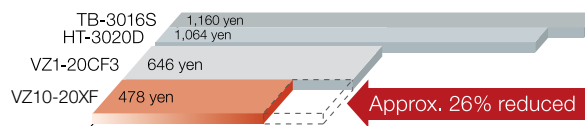


■ Comparison when cutting 100 of the work piece shown above

Processing time



Operating cost



Test conditions

Electricity	Laser gas	Assist gas
20 yen/kWh	8.94 yen/ℓ	0 yen/ℓ

Technologies Supporting High Productivity

Faster axial movement

Faster axial movement and latest control technology offers fast cutting speeds at corners, two times faster than the predecessor model

	Max. cutting speed [m/min.]	Rotation speed [°/sec]
Zero-offset VZ10	Currently: 25 ⇒ New: 35	Currently: 180 ⇒ New: 360



Independent height control axis

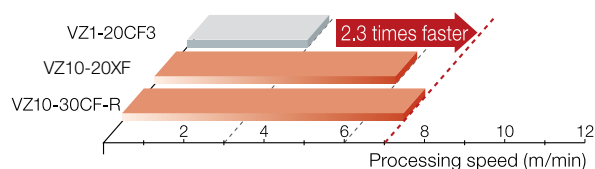
Height calibration using the independent height control axis allows for faster cutting speeds.



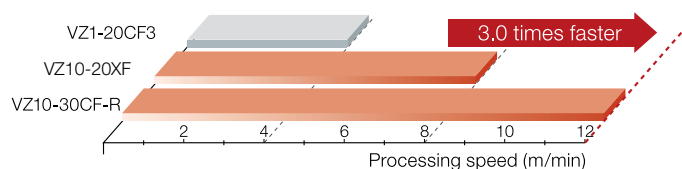
Faster processing speeds

NC control of high-pressure gas, assist gas optimization technology, and 3kW oscillators deliver faster cutting speeds.

■ Stainless-steel (SUS304),
Thickness: t1.0mm, Assist gas: nitrogen



■ Aluminum alloy (A5052),
Thickness: t1.0mm, Assist gas: air



Unparalleled speed and accuracy

High-speed thin sheet cutting

Equipped with DR (dross reduction) control as standard, delivering fast and high-quality cutting with less dross at corner sections.



t1.0mm aluminum alloy (assist gas: air)



t0.5mm plated steel (assist gas: air)



t1.0mm steel (assist gas: oxygen)

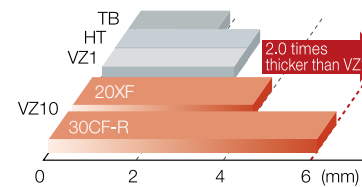
2D parts

Capable of cutting thicker stainless and aluminum sheets due to NC control of high-pressure gas and assist gas optimization technology.

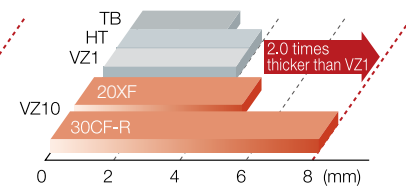


Left: t6mm stainless (assist gas: nitrogen)
Right: t8mm aluminum (assist gas: air)

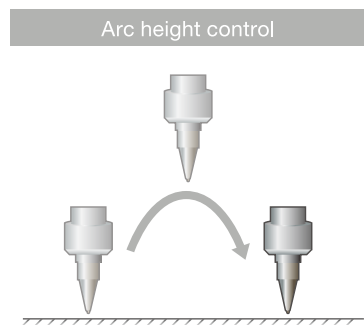
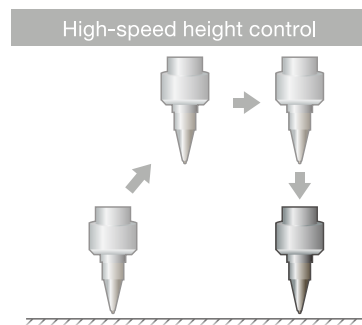
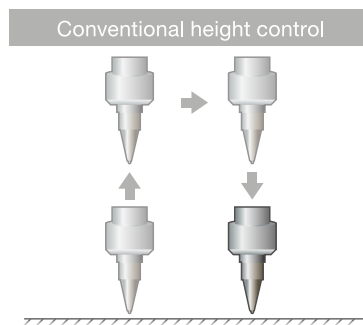
■ Material: Stainless (SUS304),
Assist gas: Nitrogen



■ Material: Aluminum alloy (A5052),
Assist gas: Air



3 types of height control to choose from, depending on the desired cutting time and stability (only for 2D programs, head pointing down)



Laser tube cutting

Six-axis simultaneously controlled NC turn table allows for all types of tubes to be cut



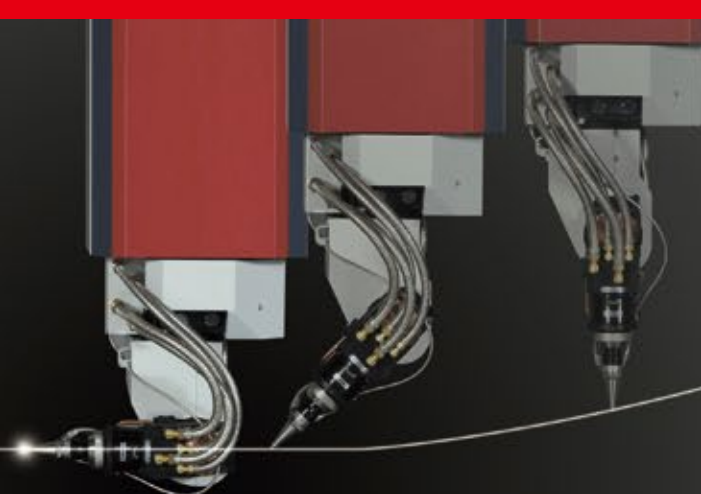
t2mm stainless (assist gas: nitrogen)



t1.6mm mild steel (assist gas: oxygen)

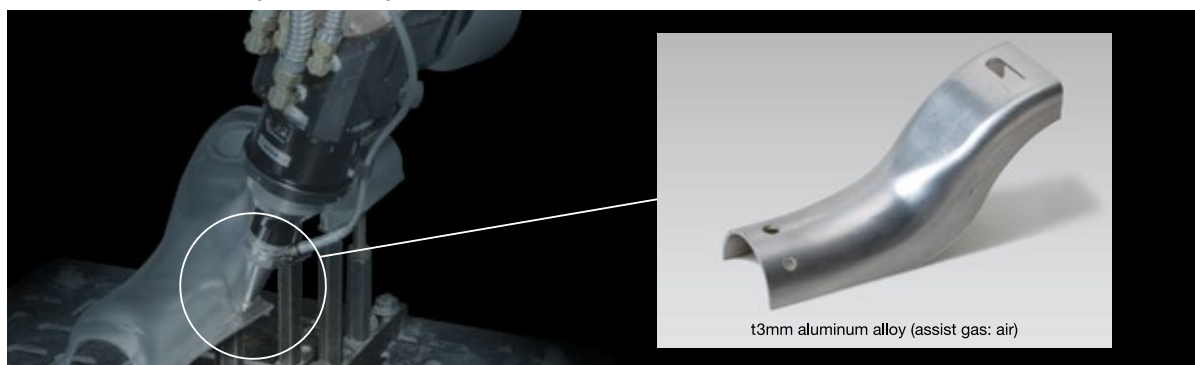
High productivity Processing performance

VZ20 High Productivity and Performance



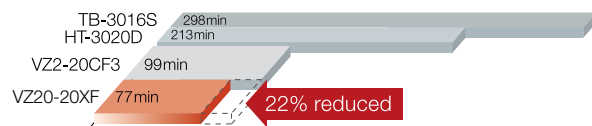
High productivity

Delivers greatly improved productivity, shorter processing time and lower running cost utilizing the latest control technologies, in addition to faster axial movement and higher processing speed

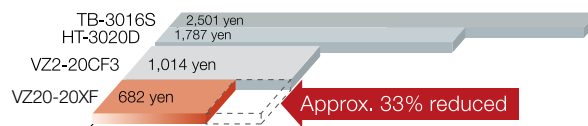


■ Comparison when cutting 100 of the work piece shown above

Processing time



Operating cost



Test conditions

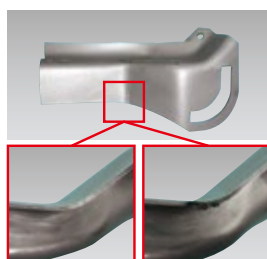
Electricity	Laser gas	Assist gas
20 yen/kWh	8.94 yen/ℓ	0 yen/ℓ

Technologies Supporting High Productivity

High-speed, highly accurate control

Achieves shorter cutting time due to 2 times faster axial movement compared to the predecessor model and the same HP control of the processing head as the zero-offset type.

	Max. cutting speed [m/min.]	Rotation speed [°/sec]
Offset VZ20	Currently: 20 ⇒ New: 35	Currently: 180 ⇒ New: 360



With DR control Without DR control

Independent height control axis (optional)

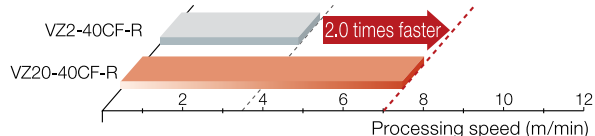
The independent height control axis delivers high-speed cutting while following the surface irregularities.



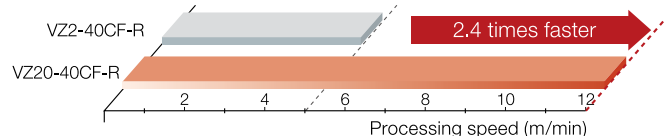
Faster cutting speed

NC control of high-pressure gas and assist gas optimization technology delivers much faster cutting speeds on stainless and aluminum sheets.

■ Stainless (SUS304),
Thickness: t1.0mm, Assist gas: nitrogen



■ Aluminum alloy (A5052),
Thickness: t1.0mm, Assist gas: air



Unlimited Versatility and Possibilities

Laser cutting on deep-draw parts

Slim offset head with advanced work accessibility reduces interference with deep-draw parts



t3.0mm aluminum alloy (assist gas: air)



t1.6mm high-tensile steel (assist gas: oxygen)



t1.0mm mild steel (assist gas: oxygen)

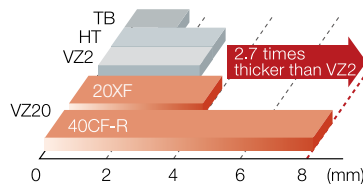
2D parts

Capable of cutting thicker stainless and aluminum sheets due to NC control of high-pressure gas and assist gas optimization technology.

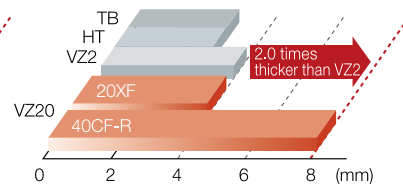


Left: t8.0mm stainless (assist gas: nitrogen)
Right: t8.0mm aluminum alloy (assist gas: air)

■ Material: Stainless (SUS304),
Assist gas: Nitrogen



■ Material: Aluminum alloy (A5052),
Assist gas: Air



Processing Using Various Options

■ NC turn table

6-axis simultaneous control delivers precise cutting of various types of parts including beveling.



■ Thick sheet cutting head

High-quality cutting of mild steel up to t16.0 mm thick, using a 2D processing nozzle attachment



■ Welding head

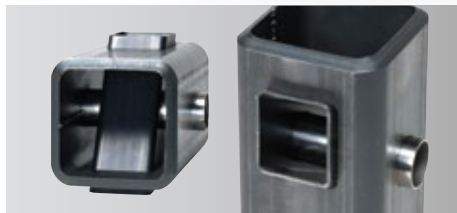
It may be used for laser welding applications by changing the processing head. Applicable to tubes and pipes when used in combination with an NC turn table.

■ Thick mild steel cutting



t16.0mm mild steel
(assist gas: oxygen)

■ Laser tube cutting using the NC turn table



t2.0 and t9.0mm mild steel tube (assist gas: oxygen)
t2.0 mm stainless tube (assist gas: nitrogen)

■ Laser tube welding using the welding head



Stainless tube, thickness: t2.0mm
Coated tube, thickness: t2.0mm
Butt weld (assist gas: argon)

Easy to Use Operability



GUI Interface

The GUI-based 15-inch TFT touch panel offers easy operation with Help screens for new users.



Processing conditions screen



Editing screen



Processing Help screen

Self-check Function

Checks the main parts of the machine on a regular basis and notifies the result. Preventive maintenance supports long-term stable operation.



Counter Function

Equipped with a counter function which keeps a count and records the number of times a program has been executed on the control unit.



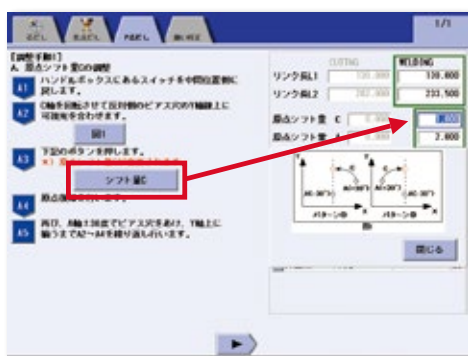
Condition adjustment screen

Counter Log screen

Shorter Setup Times

P point setting

Automatically calculates the link length and shift volume by following the procedures on the screen and pressing the set button (VZ20).



Focus adjustment

Focal point may be adjusted by turning the focus adjustment dial without having to remove the head. (VZ20)

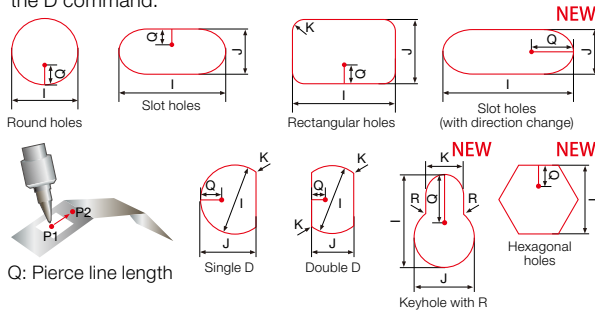


Seamless Human-Machine Interface

Teaching Function

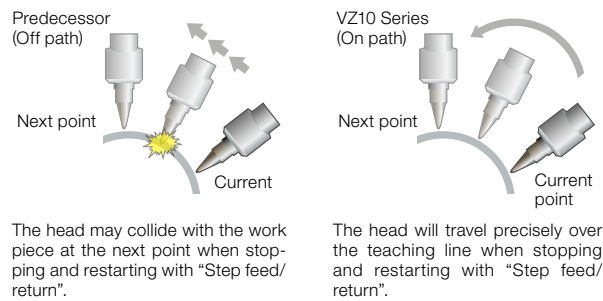
Upgraded hole cutting functions

Additional cutting functions of keyholes with radius, hexagonal holes and horizontal slot holes. Compatible with beam offset using the D command.



On-path Control

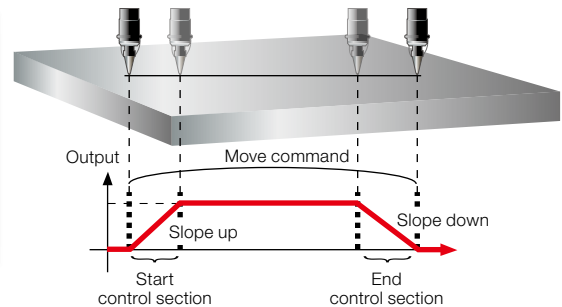
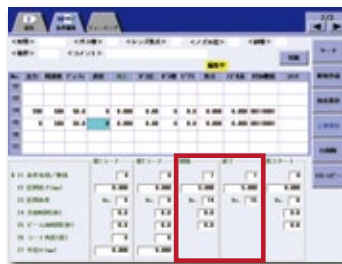
Avoids collision between head and work piece during step feed/return (circular interpolation).



Welding Function

Slope up/down function

Slope up/down commands using the start and end conditions will reduce the number of teaching points.

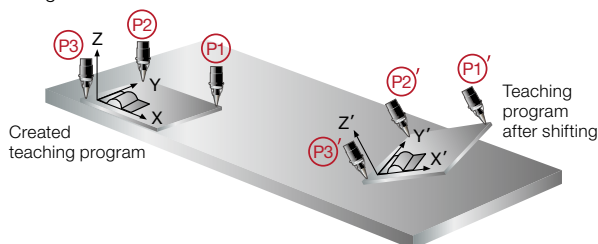


Offline conversion

Enhanced functions related to off-line teaching.

Space shifting

Reference points P1, P2 and P3 created by offline teaching are automatically input by pressing a button. The point shift function using a fixed rotation axis has been added.



Spring-type Damage Reduction

Reduces the damage in case of a collision between the nozzle and work piece caused by a teaching error.

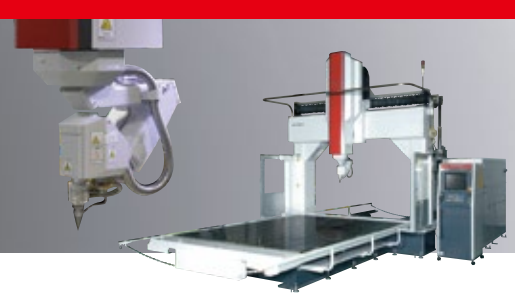


Spring-type shock reduction with one-touch head removal and recovery. The shear-pin damage control system absorbs severe damage to sensitive parts.

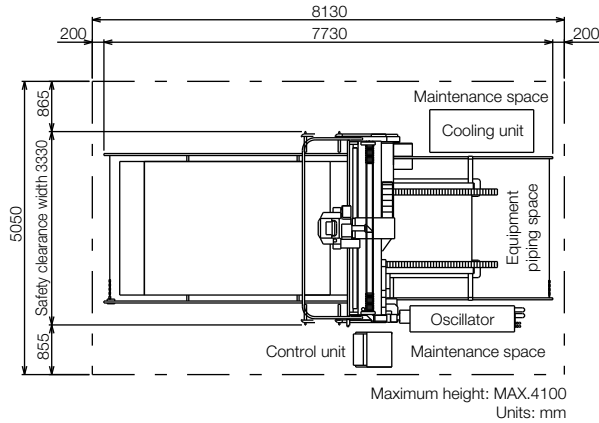
Enhanced 2D cutting functions

Equipped with cutting functions available on Mitsubishi's control unit LC30B for 2D laser machines, such as "Retry", "Slope/Arc retraction", "PG control", "End joint" and "Automatic gas purge". Delivers improved cutting quality and stability (only for 2D programs, head pointing down).

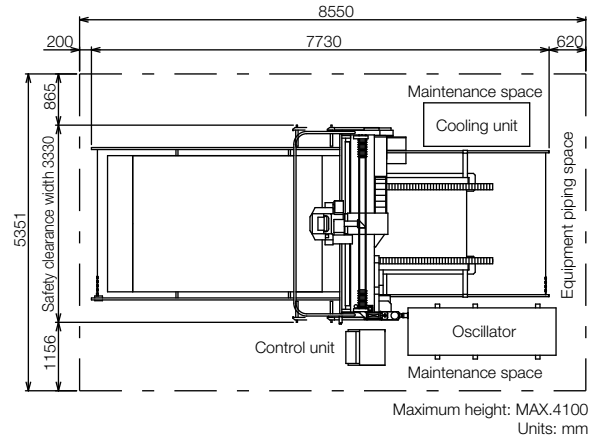
Layout and Specifications VZ10



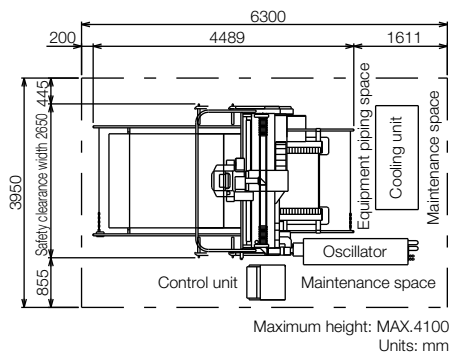
ML3122VZ10-20XF (water-cooled)



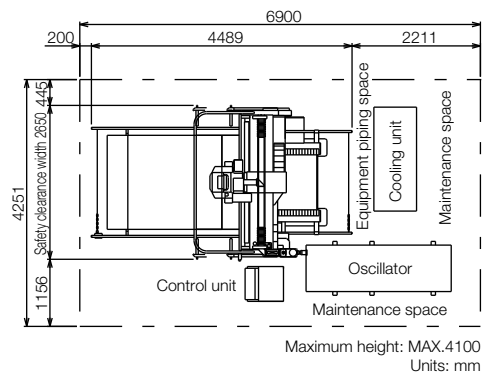
ML3122VZ10-30CF-R (water-cooled)



ML1515VZ10-20XF (water-cooled)



ML1515VZ10-30CF-R (water-cooled)



Specifications

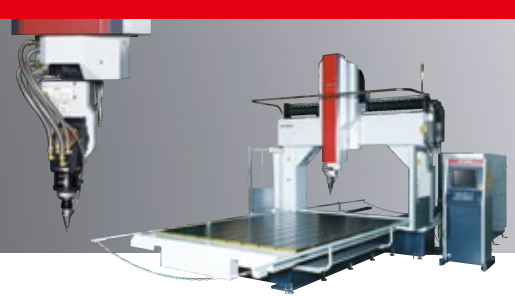
Model	ML1515VZ10	ML3122VZ10
Operation type	Hybrid	
Processing head structure	Zero offset	
Focal length of collimator lens	f127mm (f5")	
Control axes	X-Y-Z-W-U 5-axis, simultaneous control	
Work piece dimensions	1520×1520×850	3100×2200×850
Maximum 2D work piece size (C-axis 90° fixed)	1520×1520	3100×2200
Stroke	[X,Y,Z] (mm)	1520×1520×850
	[W, U] (°)	W: ±360 U: ±90
Maximum feed	[X,Y,Z] (m/min.)	X, Y: 45 / Z: 35
	[W, U] (°/s)	360
Maximum cutting speed	[X,Y,Z] (m/min.)	35
	[W, U] (°/s)	360
Repeatability (mm)	±0.015	
Height control methods (mm)	Independent height axis control, 3-axis NC height control (enter M code in program)	
Table weight (kg)	700	2000
Passline (mm)	650	
External dimensions (W×D×H) (mm)	2732×4870×4100	3412×7805×4100
Weight (kg)	Approx. 6000	Approx. 8000
Oscillators	ML20XF, ML30CF-R	

Processing performance table

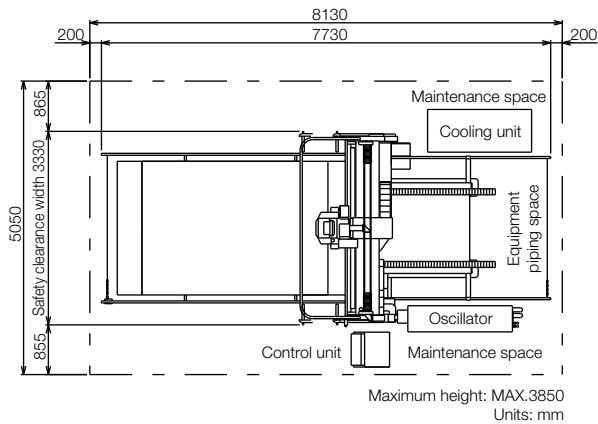
Oscillator	Material	Assist gas	Maximum thickness (mm)									
			2	4	6	8	10	12	14	16		
ML30CF-R	Mild steel (SS400)	Oxygen	[Bar chart showing max thickness ~16mm]									
		Standard air	[Bar chart showing max thickness ~2mm]									
		High-pressure air*	[Bar chart showing max thickness ~4mm]									
	Stainless (SUS304)	Oxygen	[Bar chart showing max thickness ~10mm]									
		Standard nitrogen	[Bar chart showing max thickness ~6mm]									
	Aluminum alloy (A5052)	High-pressure nitrogen*	[Bar chart showing max thickness ~8mm]									
ML20XF	Mild steel (SS400)	Standard air	[Bar chart showing max thickness ~2mm]									
		High-pressure air*	[Bar chart showing max thickness ~4mm]									
		Oxygen	[Bar chart showing max thickness ~10mm]									
	Stainless (SUS304)	Standard nitrogen	[Bar chart showing max thickness ~6mm]									
		High-pressure nitrogen*	[Bar chart showing max thickness ~8mm]									
	Aluminum alloy (A5052)	Standard air	[Bar chart showing max thickness ~2mm]									
		High-pressure air*	[Bar chart showing max thickness ~4mm]									
		High-pressure nitrogen*	[Bar chart showing max thickness ~8mm]									

- The values in the above processing performance table are based on the conditions described in the specifications.
- The processing performance and quality may vary depending on the surface condition, material components, etc., even if the material complies with the same standards.
- The processing performance and quality may vary according to the cut shape.
- * Option.

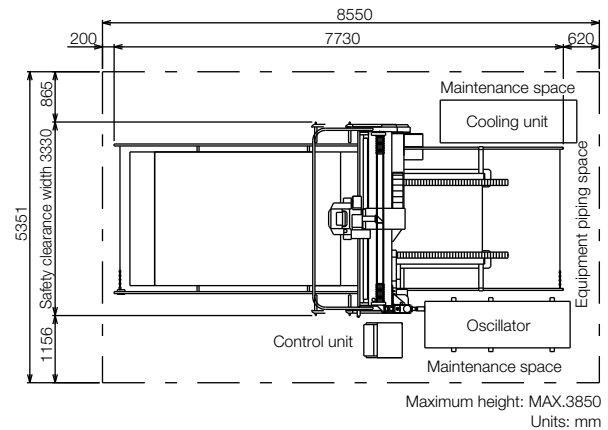
Layout and Specifications VZ20



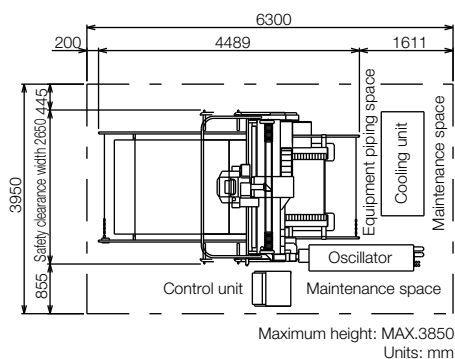
ML3122VZ20-20XF (water-cooled)



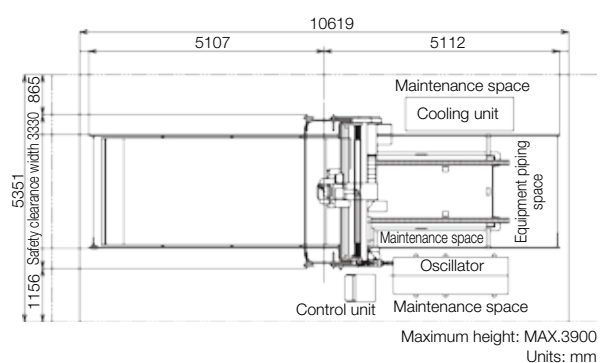
ML3122VZ20-40CF-R (water-cooled)



ML1515VZ20-20XF (water-cooled)





















ML4322VZ20-40CF-R (water-cooled)



Specifications

Model	ML1515VZ20	ML3122VZ20
Operation type	Hybrid	
Processing head structure	Offset	
Focal length of collimator lens	f190.5mm (f7.5")	
Control axes	X-Y-Z-C-A 5-axis, simultaneous control	
Work piece dimensions	920×920×550	2500×1600×550
Maximum 2D work piece size (C-axis 90° fixed)	1520×1320	3100×2000
Stroke	[X,Y,Z] (mm)	1520×1520×850
	[C, A] (°)	C: ±360 A: ±90
Maximum feed	[X,Y,Z] (m/min.)	X, Y: 45 / Z: 35
	[C, A] (°/s)	360
Maximum cutting speed	[X,Y,Z] (m/min.)	35
	[C, A] (°/s)	360
Repeatability (mm)	±0.015	
Height control methods (mm)	Independent height axis control (optional), 3-axis NC height control (enter M code in program)	
Table weight (kg)	700	2000
Passline (mm)	650	
External dimensions (W×D×H) (mm)	2732×4870×3850	3412×7805×3850
Weight (kg)	Approx. 6000	Approx. 8000
Oscillators	ML20XF, ML40CF-R	

Processing performance table

Oscillator	Material	Assist gas	Maximum thickness (mm)																
			2	4	6	8	10	12	14	16	18	20							
ML40CF-R	Mild steel (SS400)	Oxygen																	*2
		Standard air																	
		High-pressure air*1																	
	Stainless (SUS304)	Oxygen																	
		Standard nitrogen																	
		High-pressure nitrogen*1																	
	Aluminum alloy (A5052)	Standard air																	
		High-pressure air*1																	
		High-pressure nitrogen*1																	
ML20XF	Mild steel (SS400)	Oxygen																	
		Standard air																	
		High-pressure air*1																	
	Stainless (SUS304)	Oxygen																	
		Standard nitrogen																	
		High-pressure nitrogen*1																	
	Aluminum alloy (A5052)	Standard air																	
		High-pressure air*1																	
		High-pressure nitrogen*1																	

- The values in the above processing performance table are based on the conditions described in the specifications.
- The processing performance and quality may vary depending on the surface condition, material components, etc., even if the material complies with the same standards.
- The processing performance and quality may vary according to the cut shape.
- *1 Option.
- *2 When using the flat, thick-plate cutting head option.

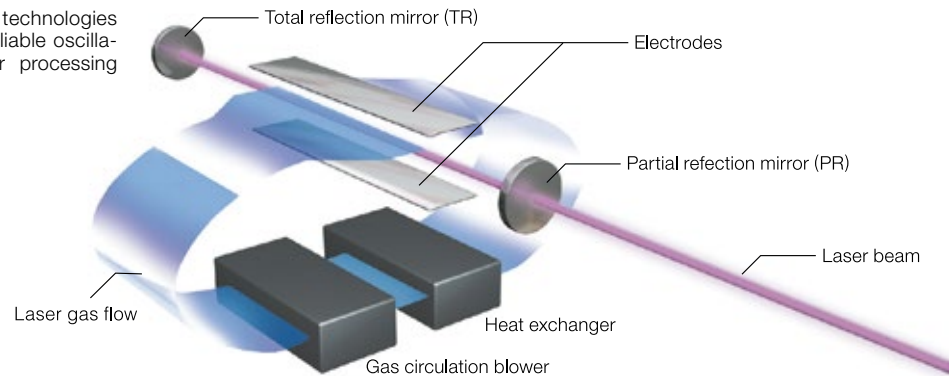
Oscillator

3-axis cross flow SD (silent discharge) excited oscillator



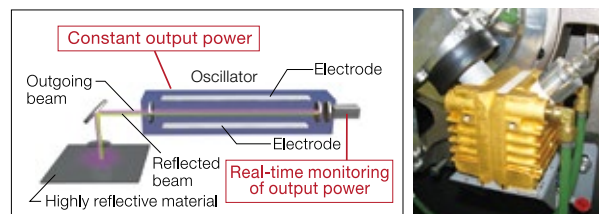
Unique Technologies Supporting High Reliability

Mitsubishi Electric's unique technologies are the basis of our highly reliable oscillators which provide superior processing and stability.



High-speed power sensor

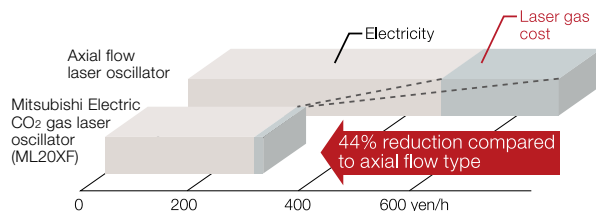
Equipped with Mitsubishi's unique "high-speed power sensor" which monitors the laser output in real time. Strictly maintains the specified power, and the power stability is less than $\pm 1\%$. Able to cut highly reflective materials such as aluminum and copper.



Patent No. 1836228 Ta tegongping 4-56479 Ta

Gas-sealed operation

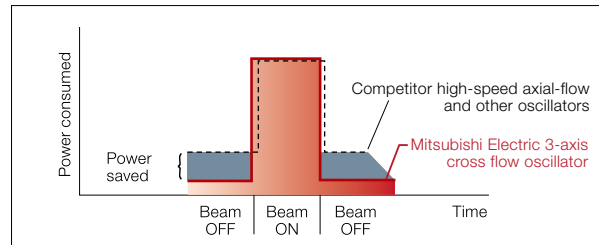
The gas-sealed mechanism cuts back on laser gas consumption to about one cylinder per year (2400 annual operating hours on ML20XF). Ensures operation at rated power for 24 hours continuously without having to refill mixed gas. Leads to drastic reduction in running cost and eliminates the need for frequent gas change.



* Comparison on t1.2mm thick SPCC, 50% operation rate (oscillator only, processing machine not included)

Just-On-Time Discharge

The Just-On-Time discharge method drastically cuts down on electricity cost by reducing power consumption when beam is OFF and supplying power instantly while the beam is ON.



Oscillator Specifications

Model		ML20XF	ML30CF-R	ML40CF-R
Excitation Method		Three-axis cross flow SD excitation		
Laser output Specifications	Rated output (W)	2,000	3,000	4,000
	Beam mode	Low level (TEM ₀₁ * Main Component)		
	Output stability (%)	< ±1% at output control (vs rated output)		
	Output variation range (%)	0–100		
Laser gas mixture		CO ₂ : CO : N ₂ : He = 8 : 4 : 60 : 28		
Laser gas consumption (ℓ/h)		Approx. 1	Approx. 3	Approx. 3
Power supply (oscillator only) (kVA)		33	60	63
External dimensions (mm)		2,040×450×1,620	2,500×800×1,810	2,500×800×1,810
Weight (oscillator only) (kg)		Approx. 1,200	Approx. 2,200	
Optional functions		Beam Shutter, Visible Laser, High-speed Power Sensor		

Cooling unit Specifications

Item		Specification		
Oscillator model		ML20XF	ML30CF-R	ML40CF-R
Water-cooled	Model	LCU10WIX	LCU12WIX	LCU20WIX
	Power supply (cooling unit only) (kVA)	18	20	32
	External dimensions (mm)	1,790×735×1,722	1,790×735×1,720	2,350×735×1,720
	Weight (cooling unit only) (kg)	Approx. 800	Approx. 800	Approx. 1,000
	Model	LCU10AIX	LCU20AIX	LCU20AIX
Air-cooled	Power supply (cooling unit only) (kVA)	20	40	40
	External dimensions (mm)	1,970×1,010×2,027	2,980×1,010×2,027	2,980×1,010×2,027
	Weight (cooling unit only) (kg)	Approx. 800	Approx. 1,100	Approx. 1,100

Equipment Main Components/Options



✓ **Cutting head with independent height control axis (H axis)**
Provides faster height control and cutting speed at corners.



✓ **Welding Head**
Equipped with a beam collimator unit applicable to welding applications.



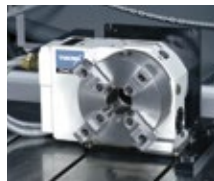
✓ **2D thick sheet cutting head**
Cuts thick 2-dimensional sheets with higher performance and stability.



✓ **Non-electrostatic slim head**
Slim cutting head with utmost accessibility to various work pieces.



✓ **Welding Gas Supply Unit**
This unit adjusts the flow rate of shield-gas for welding.



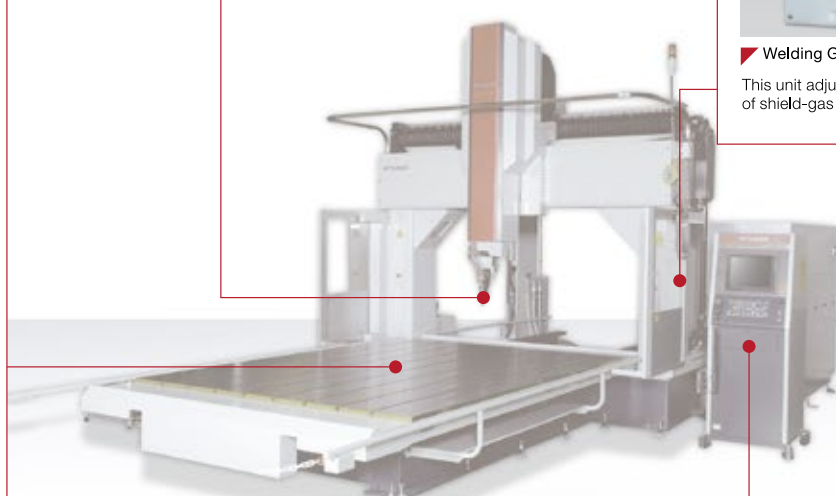
✓ **NC Turntable**
The six-axis simultaneously controlled turntable supports tube cutting.



✓ **2D sheet processing pallet**
Equipped with manual clamps and scrap drawer.



✓ **Work Support Pins and Clamps**
Supports 2D work pieces.



✓ **Teaching Sensor**
Used to teach points automatically by pressing the tip pin against the work piece.



✓ **Teaching Panel with Joystick**
The joystick allows for intuitive axial movement.



✓ **Manual Operation Controller**
This remote operation box starts and stops the program at remote locations away from the main program controller.

Options

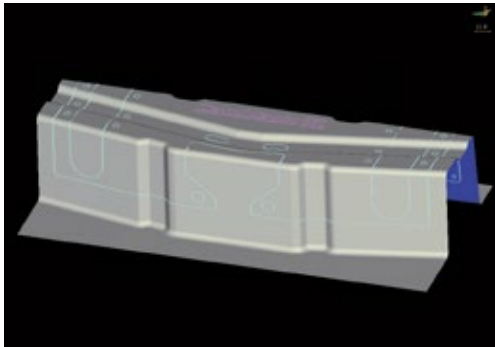
Item		Model	
		VZ10	VZ20
Processing Head	Electrostatic cutting head with independent height control axis (H-axis)	Standard	○
	Electrostatic Cutting Head	—	Standard
	Non-Electrostatic Slim Head Unit	—	Standard
	Welding Head	—	○
	2D Thick Sheet Cutting Head	—	○
	Teaching Sensor	○	—
Processing Machine	NC Turntable	○	○
	2D Sheet Processing Pallet	○	○
	Lens Monitoring Function	○	○
	Work piece Support Pins	○	○
	Work piece Clamp	○	○
	Table Cover	○	○
Assist Gas	High-pressure Gas NC control	○	○
	High-pressure Air NC control	○	○
	Welding Gas Supply Unit	—	○
	Teaching Box with Joystick	Standard	Standard
Control Systems	Manual Operation Controller	○	○
	Network Interface Unit	Standard	Standard
	Network Download Function	○	○
	External I/O	○	○
Solution	Offline Teaching	○	○

○: Option

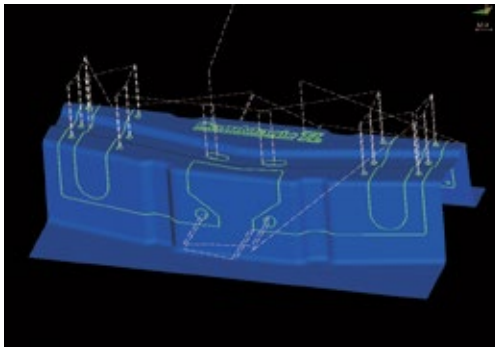
Off line teaching

Offline Teaching System

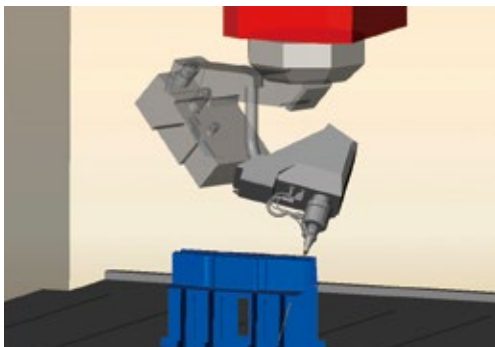
Offline teach functions available on computers maximize productivity



Reading model



Creating cutting path



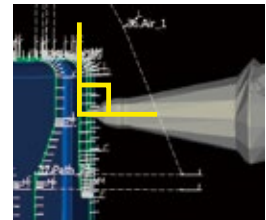
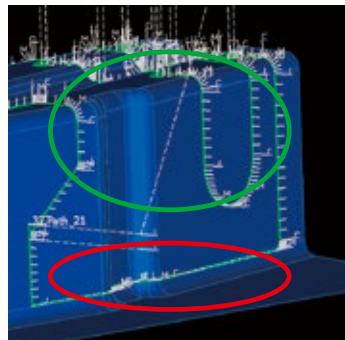
Checking path



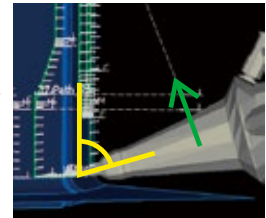
Creating NC data

Nozzle Angle Data Output

The new VZ10/20 delivers higher cut quality at sections where the nozzle is not perpendicular to the surface of the work piece by automatically setting the optimum cutting speed according to the tilt angle. The nozzle tilt data from TL-II series will further reduce the time for speed correction and the number of cutting defects.



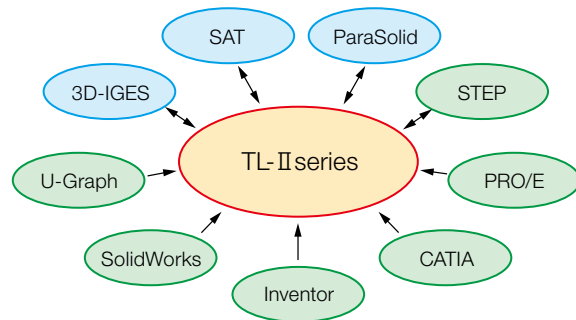
Cuts at normal speed if nozzle is perpendicular to the work piece



Slows down cutting speed if nozzle is not perpendicular to the work piece

Compatible with various CAD data

The converters in blue are provided as standard; the converters in green are optional.



CATIA is a registered trademark of Dassault Systems SA; PRO/E is a registered trademark of Parametric Technology Corporation; U-Graph is a registered trademark of Unigraphics Solutions Inc.; Inventor is a registered trademark of Autodesk; SolidWorks is a registered trademark of SolidWorks Corp.

Compatible models

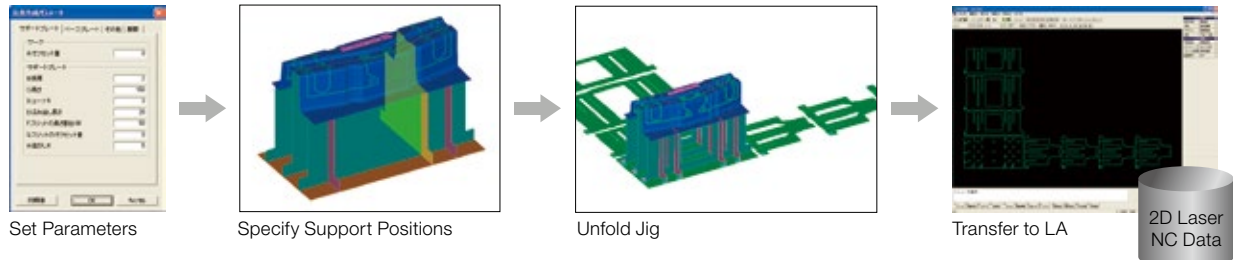
- | | | |
|--------------|--------------|--------------|
| • ML1515VZ10 | • ML3122VZ10 | • ML4322VZ10 |
| • ML1515VZ20 | • ML3122VZ20 | • ML4322VZ20 |
| • ML2015VZ1 | • ML3122VZ1 | |
| • ML2015VZ2 | • ML3122VZ2 | |
| • ML2012HT | • ML3020HT | |

TL- II series

*This software is not a standard feature of the laser processing system.
Please purchase separately.

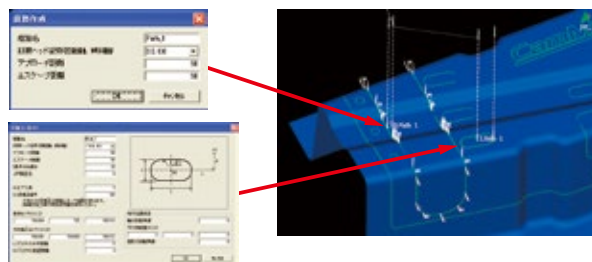
Creating Jigs

Capable of creating jigs simply by setting parameters and specifying the support positions of the jig. Drastically reduces production time. 2D NC data may also be created when used in combination with LA series.



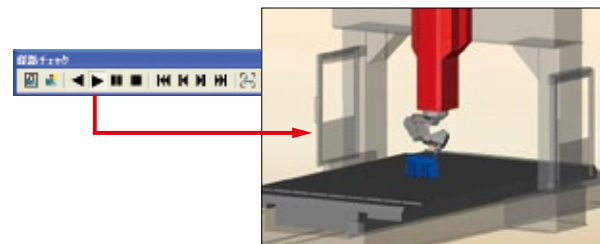
Creating the Cut Path

Creates cut paths with the nozzle perpendicular to the surface of the work piece by setting the pierce and cutting direction. Automatically identifies openings on flat surfaces and enables simple setting of macro programs.



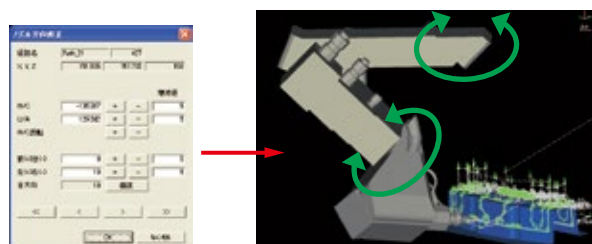
Checking the Cut Path

Checks for stroke overruns and possible collisions between the processing head and work piece. Also checks the changes in axis angle and tilt of the head against the surface of work piece to avoid any cutting defects that may occur.



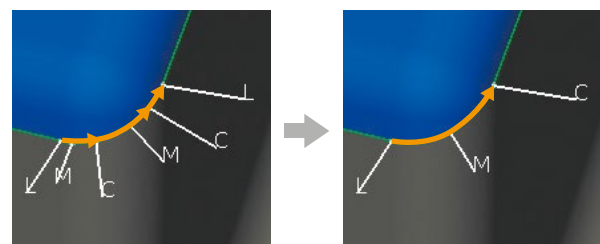
Adjusting the Nozzle Direction

Adjusts the nozzle direction to prevent interference with the work piece. Also corrects the movement of the head to achieve a smoother cut surface.



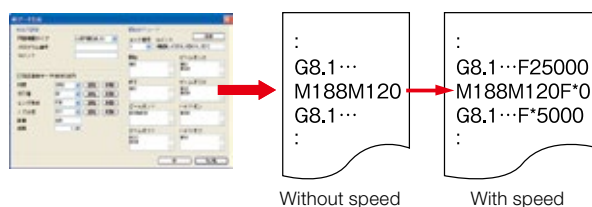
Adjusting Teaching Points

Teaching points are created automatically, but positions and types may not always be as intended. In this case, teaching points may be added, changed and deleted as you wish.



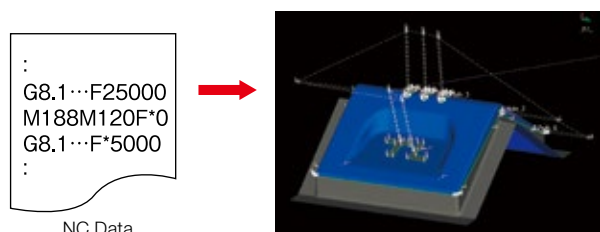
Creating NC Data and Setting the Speed

Modify start and end codes, beam ON/OFF codes, etc. as you wish. Cutting speed may be set according to the created NC data. (Same function available on the processing machine)



NC Reverse Conversion

NC data modified on the processing machine may be re-converted to path data where new data may be added and nozzle direction may be corrected.





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HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI, 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

- * Not all the models are supported in all the countries and regions.
- * The machine specifications differ according to the countries and regions. Please check with your dealer.
- * The processing data provided in this brochure is for reference only.