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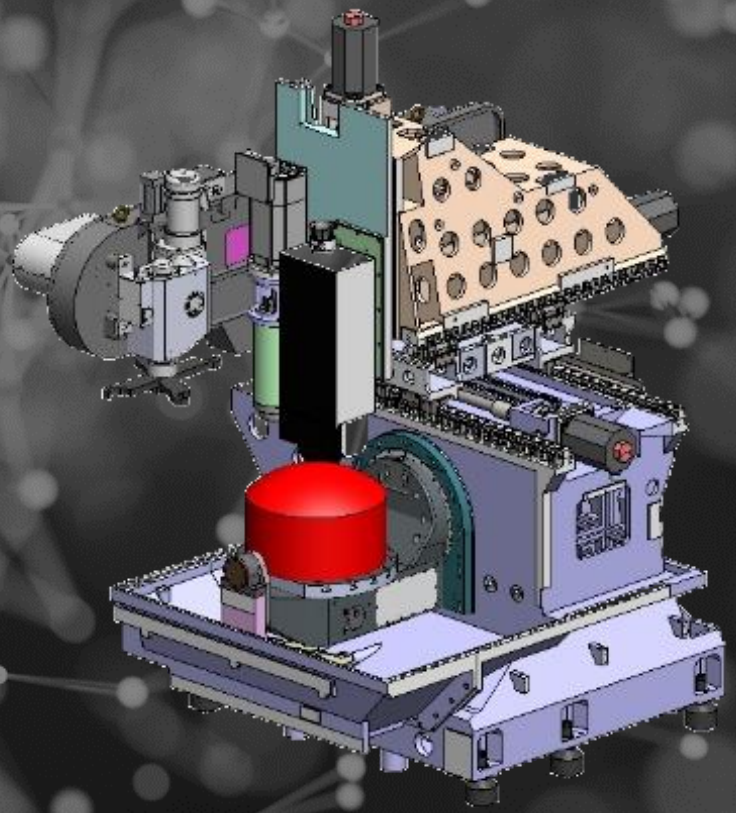

AHB

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Wire-Laser Metal 3D Printing

A disruptive Directed Energy Deposition technology by Meltio.

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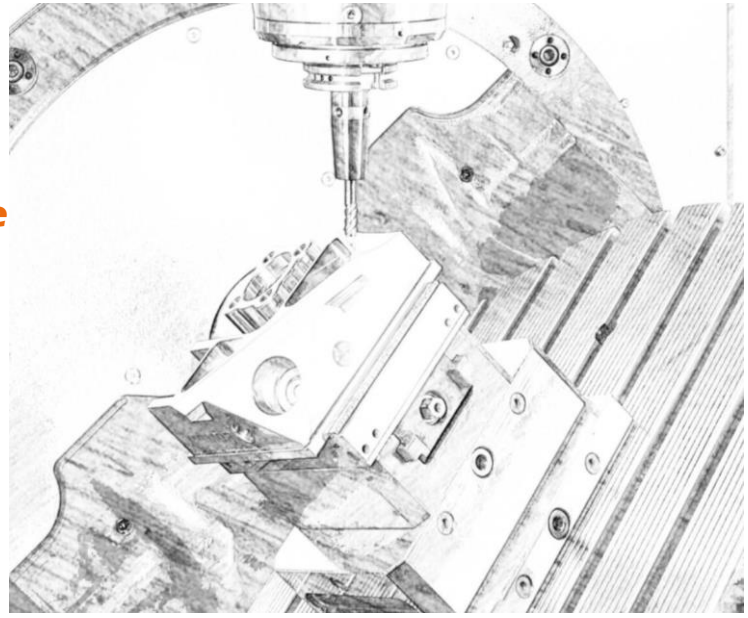
High Performance Bridge 5 AXIS Machining Center

MUX520/ MUX650



MUX520 / MUX 650 5AX Machining Center Bridge Travelling

- MUX 520 5AX bridge travelling 5 Axes machining center features the table size Ø520 mm and max. workpiece size Ø560 x 460 mm;
- MUX 650 5AX bridge travelling 5 Axes machining center features the table size Ø650 mm and max. workpiece size Ø690 x 460 mm applicable for complicated contour and high accuracy machining applications
- Superior machine accuracy and longevity from excellent scrap skill and precision tilt/ rotary table. are applicable to aerospace, medical, mold, automobile and advanced industry.

Five Axis Worm Gear or DDM Tilt/ Rotary Table

- High Precision and efficiency wall mounted Tilt/ Rotary Table.
- Tilt and Rotary Table installed with super precision Heidenhain rotary encoder as standard.

- Tilt and Rotary Worm Table with high speed 25/ 25 rpm for operation efficiency on MUX Series.
- Tilt and Rotary DDM Table with high speed 60/ 100 rpm for operation precision on MUX Series.

- Kinematic calibration software is applied for 5 axes and 5 face for better accuracy .
- Simultaneous five axis operation feature with five axis correction tips, high precision contouring capability, tool tip control TCP, RTCP, and TCPM.
- Simultaneous four axes and 1 fixed axis for flexible machining application with cost efficiency.

5AX Machining Center For MEDIUM/ LARGE PARTS MUX 5AX/ 5F MUX 5AX / 5F

MUX520 5F / 5AX

Table Diameter
Ø520mm
Max Part Size
Ø560mm x 460mm
Max Part Weight 0°/90°
250kg
X/ Y/ Z Axis Travel
650/ 520/ 475mm

MUX650 5F / 5AX

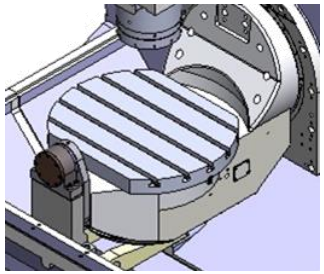
Table Diameter
Ø650 x520mm
Max Part Size
Ø690mm x 460mm
Max Part Weight 0°/90°
300kg
X/ Y/ Z Axis Travel
700/ 5€^ ´ 475mm

One Piece Structure with Coolant Circulation Structure to Have Thermal Stability.
Travelling Axes and Tilt/ Rotary Table; More Precision Application

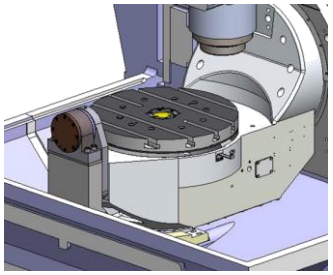
Flexible Model

* Tilt Axis and Rotary Axis with Rotary Encoder	MUX 520 5F	MUX 520 5AX	MUX 650 5F	MUX 650 5AX
	Rotary C Axis	Tilt B Axis	Rotary C Axis	Tilt B Axis
Rotary Table Diameter	Ø520 mm		Ø650 x 520	
Max Part Dia. x Height	Ø560 x 460 mm		Ø690 x 460 mm	
Table Drive Type 1	Worm	Worm	Worm	Worm
Max Part Weight	250	250	300	300
Indexing Accuracy	14 sec 5F (10 sec 5AX))	10 sec *	14 sec (10 sec, Opt.))	10 sec *
Repeatability	6 sec 5F (4 sec 5AX)	4 sec *	6 sec (4 sec, Opt.)	4 sec *
Clamping Torque	2,000 Nm	3,400 Nm	2,000 Nm	3,400 Nm
Table Drive Type II	DDM	DDM	DDM	DDM
Max Part Weight	250	250	300	300
Indexing Accuracy	10 sec *	10 sec *	10 sec *	10 sec *
Repeatability	4 sec *	4 sec *	4 sec *	4 sec *
Clamping Torque	2,500 Nm	4,500 Nm	2,500 Nm	4,500 Nm

Integrated Additive Manufacturing & 5 Axes Machining



Max. table load **300kg**. Table diameter Ø650

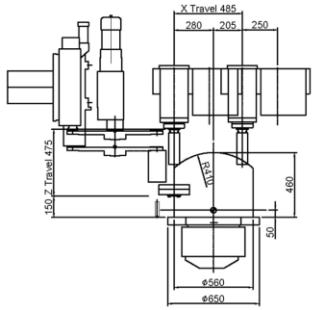


Max. table load **250kg**. Table diameter Ø520

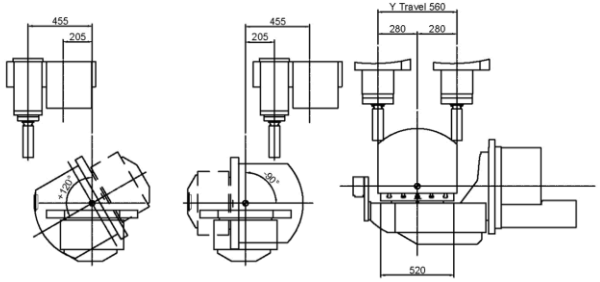
• Hybrid WLAM & 5AX Machining Advantages

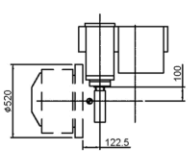
								OP1	OP2	OP3	OP4	OP5	夾具更換	OP6
CNC 5 Axes MC		Fixture 1	Tooling 1	Fixture 2	Tooling 2	Tooling 3	Fixture 4	Tooling 5	Tooling 6	Tooling 7	Tooling 8	Tooling 9	Fixture 5	Tooling 10
3D WLAM & CNC 5AX		OP1	OP2	OP3	OP4	OP5		OP6						
Hybrid 3D Printing WLAM & CNC 5AX	Fixture 1	Tooling 1	Tooling 2	Tooling 3	Tooling 4	Tooling 5	Fixture 2	Tooling 6	Processes Saving					

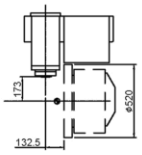
• MUX650 5AX/ 5F Milling



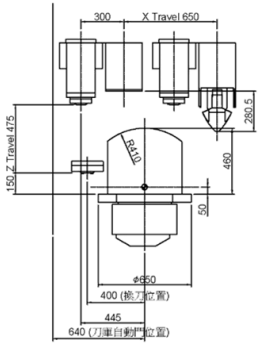
• Up to Ø520mm H 460mm W 300kg



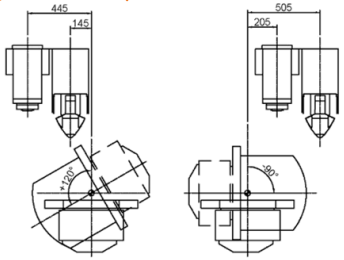


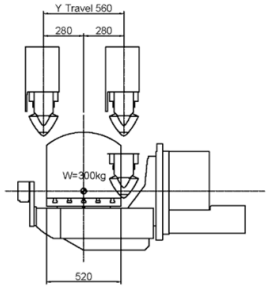


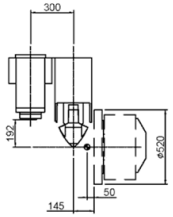
• MUX650 5AX/ 5F 3D Printing



• Up to Ø410mm H 460mm W 300kg



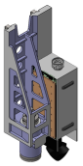


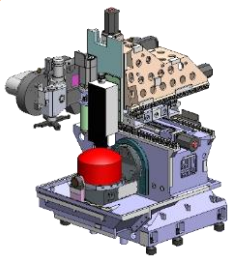


Hybrid 5AX 3D Printing and Machining Center
MUX 5F (4 Axis Simultaneous +1) / 5AX (5 Simultaneous Axis)

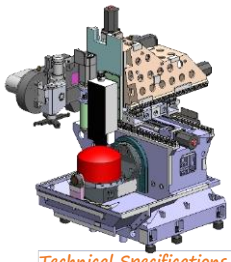
- WLAM (Wire Laser Additive Manufacturing), through high-power laser cladding metal filaments on the substrate board for Additive Manufacturing, controlled laser input and feed rate, High Adaptability to different geometries can make the printing adapt to surface irregularities. Laser spot pointing (half wire / half material based) ensuring a proper jointing, suitable for high precision and high surface roughness; Complex geometry parts. And it will not like DED Powder Additive Manufacturing cause powder pollution to protect the environment and ensure the health and safety of personnel.
- WLAM are manufactured in one piece workpiece, stacked layer by layer. This technology eliminates the need for cumbersome processes such as pattern, molds or raw material preparation, and has no shape limitations, enabling the production of parts with high complexity and high tensile strength, shortening the prototype cycle and making it suitable for low-volume production.
- Five-axis machining includes three linear feed axes X/Y/Z and two rotary axes B/C, which can carry out RTCP synchronous motion function; five-axis simultaneous machining, reduce mold fixture replacement. One-time fixture setting, can complete five-face machining, improve production efficiency, machining accuracy, shorten production cycle and reduce tool wear.
- Hybrid WLAM 3D Printing and CNC Five-Axis Machining technology; to integrate WLAM that directly realizes the 3D digital model into a physical part, also known as "3D printing", which reduces material waste and more efficiently handles complex geometries that are difficult to handle by traditional construction methods All of them can complete five-axis precision machining in one machine, which is suitable for complex and precise parts in aerospace, electronics, automotive, biomedical and mold industries.

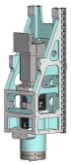
• Hybrid WLAM & 5AX Machining



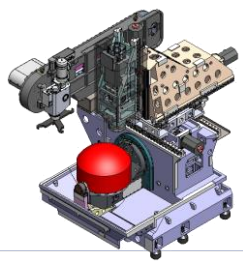


• WLAM





• 5AX Machining



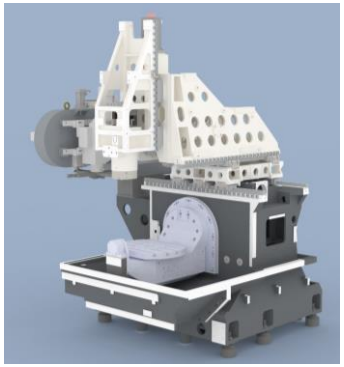
Technical Specifications

Meltio Engine	Metal 3D printing
Dimensions (WxDxH):	390 x 700 x 1025 mm
Print Envelope(WxDxH):	Depending on the integration
System Weight:	142 kg
Laser Type:	6 x 200 W direct diode lasers
Laser Wavelength:	976 nm
Total Laser Power:	1200 W
Power Input:	208/230 V single phase or 400 V three phase
Power Consumption:	2 - 5 kW peak depending on selected options
Process Control:	Closed-loop, laser and wire modulation
Enclosure:	Laser-safe, sealed, controlled atmosphere
Cooling:	Active water-cooled chiller included
Wire Feedstock Diameter:	0.8 - 1.2 mm
Wire Feedstock Spool:	BS300 or Wire drums
Wire Material	
Stainless Steels:	Excellent strength and corrosion resistance.
Mild Steels:	Cheap and ductile, unparalleled machinability and weldability.
Carbon Steels:	High impact strength, retain hardness at high temperatures.
Titanium Alloys:	Highest strength to weight ratio and corrosion resistance.
Nickel Alloys:	High versatility, outstanding heat and corrosion resistance.
Printhead Information	Sealed enclosure storage.
Printhead Size (WxDxH):	202 x 297 x 784mm
Printhead Weight:	15.5kg
Printhead Weight:	46.5 kg
Key Integration	
Servo motors handling	Ability to add a NO relays to the feed hold
Deployment mechanism	Ability to add feed resume/start buttons
5 - 8 digital input ports	Laser safety windows can be mounted
1 - 7 digital output ports	Possibility to add safety integration
Upgrades and Accessories	
Dual Wire:	This option allows quick wire switches.
Laser Alignment System:	This option allows to align head

5AX Machining Center Bridge Travelling MUX 5Axis

1 One Piece High Rigidity Structure

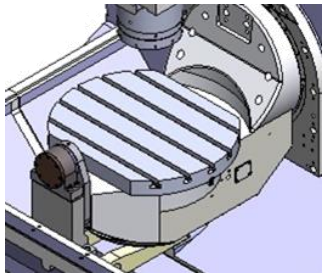
- Travelling column on X, Y and Z axis, and fixed tilt/ rotary table provide the optimum rigidity and superior accuracy.
- Wider column span, heavy duty , high precision roller linear guide #45 and pretension C2 class Ø45mm ball screws provide better transmission rigidity, accuracy and stability.
- Machine structure features precision hand scraped joints for maximum stiffness and precision.
- Cooling structure to have thermal stability for better accuracy.



One piece structure with coolant circulating.
X/Y/Z travels 700/ 560/ 475mm

2 Thermal Constant Structure (Opt.)

- Thermal stability, the cooling circuit in the X/ Y transmission guide structure to keep the thermal stability for getting the better precision.
- Thermal stability system, hollow ball screw oil cooling and thermal stability system, coolant cooling for consistency machining accuracy.



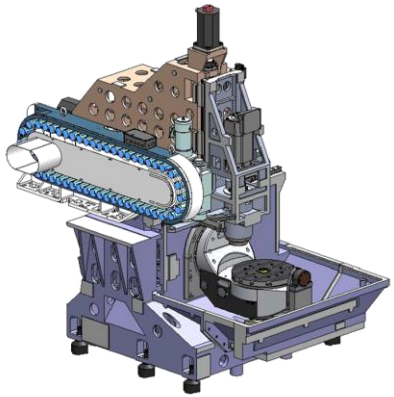
Max. table load **300kg.**
Table diameter Ø650 **mm.**

3 More Precision and Power

- Direct drive spindle and Big Plus nose feature least noise and vibrations for better roughness and heavy duty cutting.
- Standard 15,000rpm spindle ceramic bearings layout provide cutting stability and rigidity. Optional spindle speed motor spindle 24000rpm.
- Spindle nose run out 0.0015 mm and 0.006 mm at measuring length 300 mm of test mandrel.

4 High Precision B/C Table

- Default Heidenhain rotary encoder on B axis tilting and C axis rotating for better accuracy
- Worktable center sphere calibration with kinematic and compensate ensure 5 axis simultaneous or four simultaneous Plus 1 fixed axis with precision machining.
- Special worm gear alloy material of B and C axis feature better accuracy and less wear; option DDM motor driven as optional.



Max. table load **300kg .**
Table diameter Ø650 **mm**

Complete Engineering Analysis

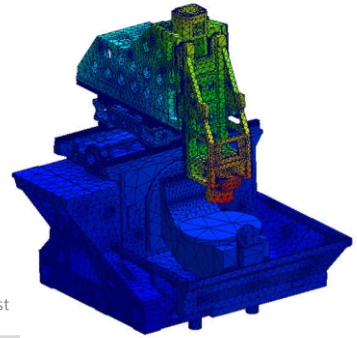
Complete engineering FEA analysis features higher machine stiffness rather than usual stiffness 2.5 kgf/um. FEA techniques used to analyze the structure deformation, stress and assure excellent and optimum structure.

One piece structure with wall mounted rotary table hiding the tilt axis ender the column for rigidity; and Kinematic calibration, and sphere ball calibration for better accuracy.

Heavy load carriage support on the feed transmission for better rigidity.

Rigid Trunnion Table with Stiffness Test

	Standard	Actual
Tilt Axis 0 Degree	0.025 mm	0.016 mm
Tilt Axis 90 Degree	0.025 mm	0.003 mm



5.83kgf/um

Experienced FEA technology FEA

Unique tool changer support construction provides excellent solid and less vibration and no bending moment on column and headstock.

Low gravity center base, 7 leveling screws and 3 points leveling assure machining stability.

Wide spaced guide ways for higher overall stiffness with less overhangs and better distribution of cutting forces.

MUX High Accuracy and Efficiency Solution

Precision Parts
C2 Class Ball Screw
P Class Roller Linear Guide
Spindle Circulating Cooling
Thermal Control
Spindle Motor Plate Cooling

Available options for precision machining
Large Cooling Capacity Chiller
Headstock Circulation Cooling
Spindle Motor Cooling
Hollow ball screw cooling
Coolant Cooling

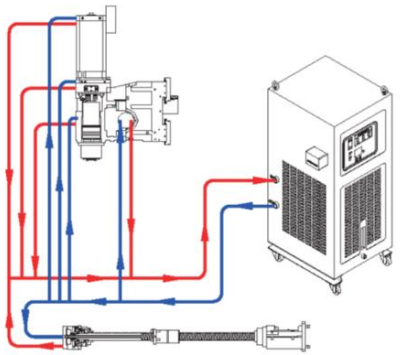
Linear Scale

Rotary axis positioning accuracy
ISO 230-2/JIS B6201
Positioning accuracy
10"
Repeat accuracy
4"

Actual measurement accuracy
A-axis positioning accuracy 6"
Repeatability accuracy 0.8"
*Standard linear scale

C-axis positioning accuracy
3.7"
Repeatability accuracy
2.3"

Dynamic CW/CCW Ball Bar
X-Y plane 6.5 um
X-Z plane 5.3 um
Y-Z plane 5.5 um



Thermal Stability Arrangement

X-Y/X-Z/Y-Z 6.5 um

X-Y/X-Z/Y-Z space plane
Sphericity 6.5 um

- High Precision Machining 0.7G Acceleration, Rapid Feed Rate 36 m/min.
  High precision machining and rapid feed rate 36 m/min

Advantage of 5 Axis Machining Center
One Time Complete Complex & Five Faces Machining

Five-axis Simultaneous Machining Feature

Reduction of fixtures and loading and unloading time
Better machining accuracy and stability, better surface finish, Longer tool life
Reduce production time, simplify process and management Reduce the footprint

3 Axes MC	Fixture 1	OP1	Fixture 2	OP2	Fixture 3	OP3	Fixture 4	OP4	Fixture 5	OP5	Fixture 6	OP6
4 Axes MC	Fixture 1	OP1	OP2	OP3	Fixture 2	OP4	OP5	Fixture 3	OP6	Sequences Saving		
5 Axes MC	Fixture 1	OP1	OP2	OP3	OP4	OP5	Fixture 2	OP6	Sequences Saving			

ITEM	5 Axes MC	4 Axes MC	3 Axes MC
Feed Axes	3 Axis X/Y/Z 1 Tilt / 1 Rotary	3 Axis Axes X/Y/Z 1 Tilt	3 Axes X/Y/Z
Work Piece	One positioning can complete five faces complex surfaces	One positioning can complete three faces rectangular surfaces	One positioning can complete one simple face
Process OP1/2/3/4/5/6	8 Sequences Reduces OP process and reduces the reference conversion	9 Sequences	12 Sequences
Fixture	2 Fixture Less Fixtures	3 Fixtures	6 Fixtures
Load/ Unload	2 Times Less Load/ Unload	3 Times	6 Times
Machining Accuracy	Better Accuracy, Roughness and Stability Better Tool Life	Medium/ High Precision	Medium/ High Precision
Efficiency	High Efficiency	Medium/ High Efficiency	Medium/ High Efficiency
Floor Space	Smallest Space	Medium Space	Larger Space

Chip Swarf Management

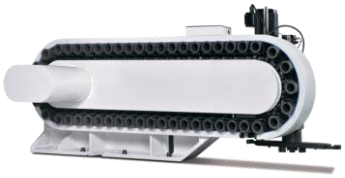
Complete engineering FEA analysis features higher machine stiffness rather than usual stiffness 2.5 kgf/um. FEA techniques used to analyze the structure deformation, stress and etc. assure excellent and optimum structure.

- The tool magazine provide 30 tools as standard and up to 90 tools. The magazine with swing arm type is integrated in the machine structure feature quick tool exchange.
- Tool magazine 48, 60, 90, 120 tools feature chain and swing arm type provide fast and consistent revolving; assure reliable tool exchange for more versatile applications.
- Tool exchange with servo motor to ensure smooth and less vibration, tool changing; clamp, unclamp and tool selection activated simultaneous with spindle positioning reduce the tool change time.

High Performance Solution
Larger Tool Capacity and Fast ATC

- The tool magazine provide 30 tools as standard and up to 90 tools. The magazine with swing arm type is integrated in the machine structure feature quick tool exchange.
- Tool magazine 48, 60, 90, 120 tools feature chain and swing arm type provide fast and consistent revolving; assure reliable tool exchange for more versatile applications.
- Tool exchange with servo motor to ensure smooth and less vibration, tool changing; clamp, unclamp and tool selection activated simultaneous with spindle positioning reduce the tool change time.

Standard 30 tool Drum Type ATC

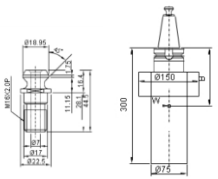


Optional 48 Chain Type ATC

Optional 60 Chain Type ATC

Optional 90 Chain Type ATC

Optional 120 Chain Type ATC



Rigid Wall Type Tilt / Rotary Table with Stiffness Test