

State-of-the-art Five Axes Technologies

ORION
Fx 5500
EX



**Five Axes Horizontal Machining Center
with integrated Universal Head**



High Performance Five Axes Horizontal Machining Centers

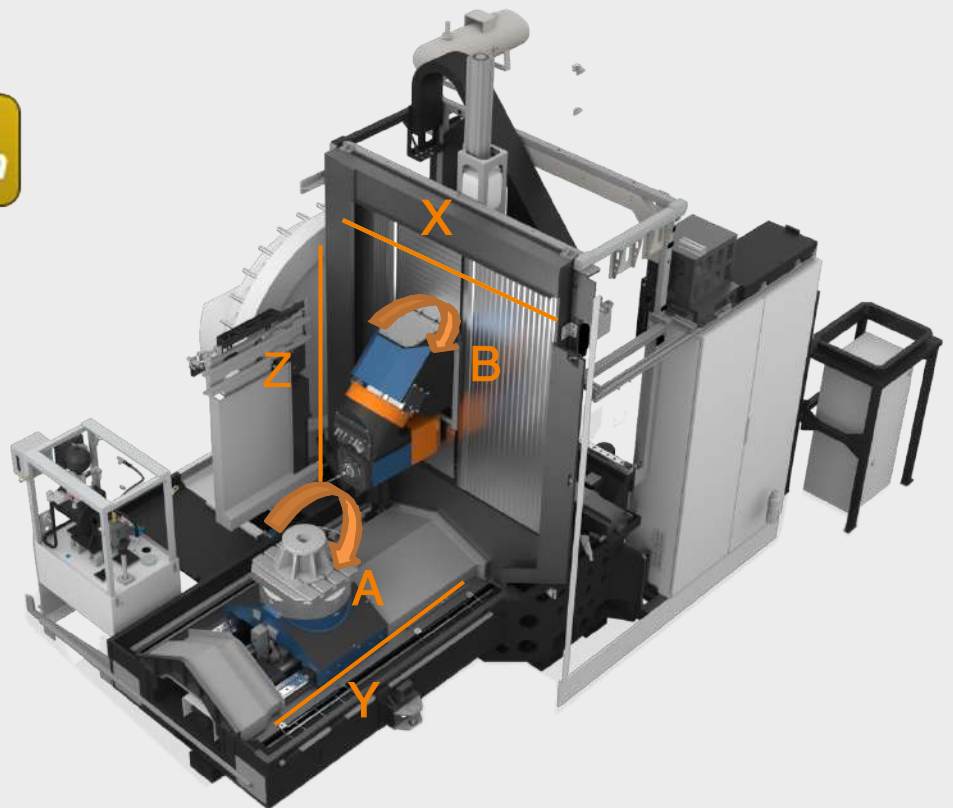
Series: ORION Fx5500 | ORION Fx8000 | ORION Fx10000

FX series has been developed on proven platform of ORION series Horizontal Machining Centres. Innovated to meet the configuration for the Balance of Precision & Speed for Complex Precision Parts Machining. Import Substitution, Introduced to meet the demand for World-class HMCs for the Indian and global market.

ORION Fx series extensively applied to the industries of Aerospace, Automotive, Medical, Energy and further moreé

Axis Configuration

- X** Ballscrew driven with cooling
- Y** Ballscrew driven with cooling
- Z** Ballscrew driven with cooling
- B** +180°/ - 30° (Direct drive+Gearbox)
- C** 360° (Direct Drive)
- U** Servo driven APC
- V** Servo driven ATC
- W** Servo driven Magazine



ORION FX series includes three models covering work envelope range from 0.64 cubic metres to 2.5 cubic metres in pallet sizes 500 to 1000

Model	Fx 5500	Fx 8000	Fx 10000
Pallet size (mm)	500 x 500	630 x 630 (800 x 800)	1000 x 1000
Spindle taper	HSK A 63	HSK A 100	
Axes traverse (X/ Y/ Z)	800/ 1000/ 800	1250/ 1250/ 1000	1600/ 1400/ 1250
B axis	-30 deg to +180 deg		
C axis	360 deg		
Job Swing Dia x Ht (mm) Weight (kg)			

The new generation FX series meets contemporary global benchmarks of specifications & performance.

- Precise & Complex 5 axes geometries
- High rapid feed rates
- Productivity through cycle time reduction
- Advanced manufacturing & eliminates extra setups

Gantry Loading



Wide Machining Area

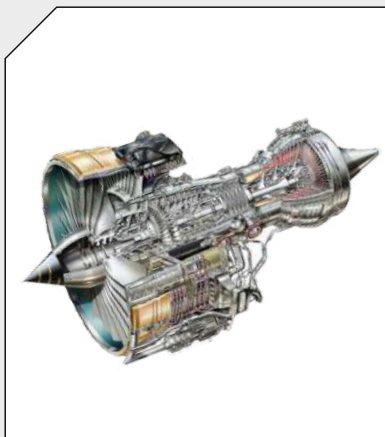


Orion FX engineering philosophy is based on five strong pillars

Productivity | Precision | Ergonomics | IIoT Enabled Sensors

Sectors

Aerospace



Automobile



Energy



Tooling



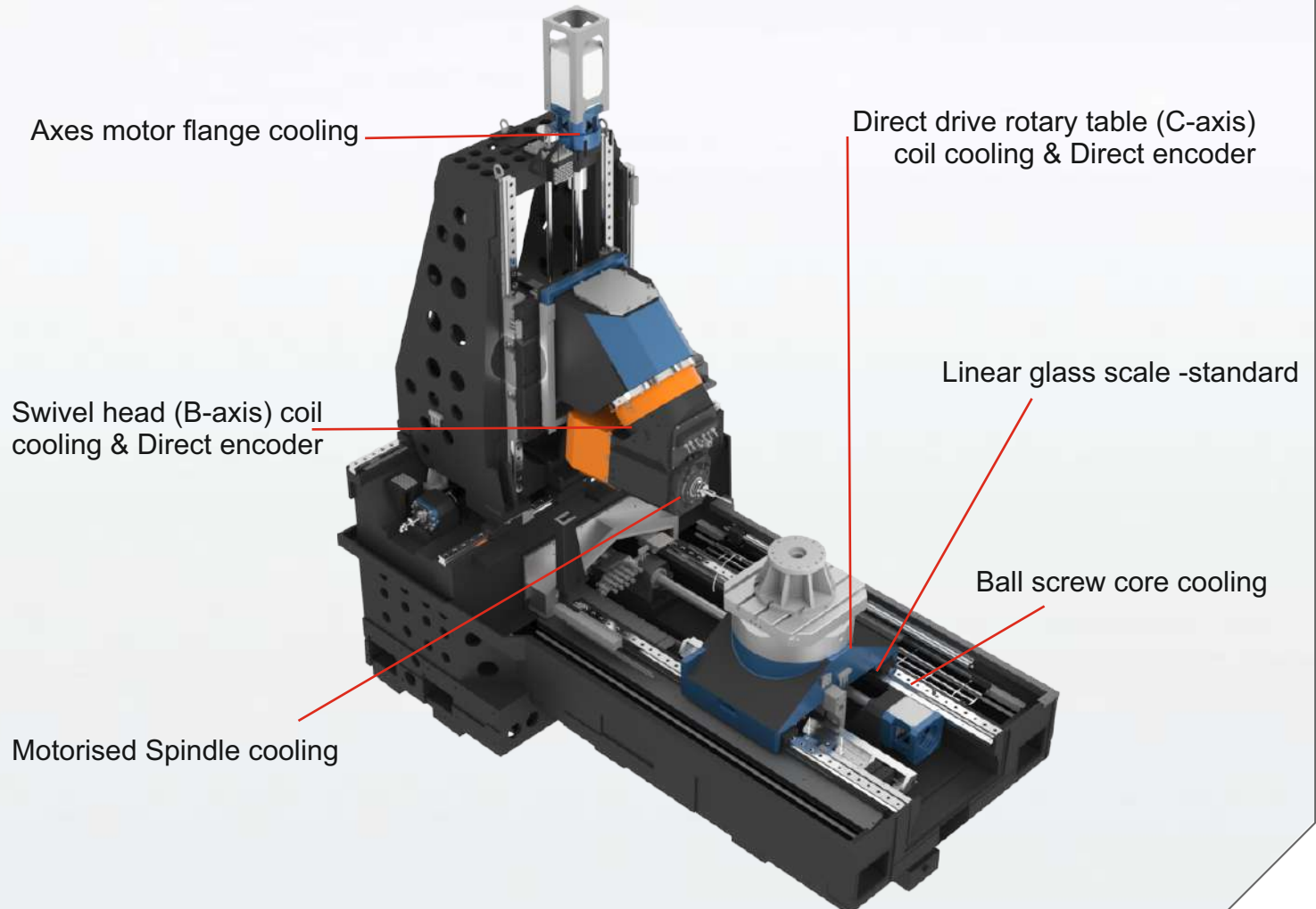
Medical



Mould Making

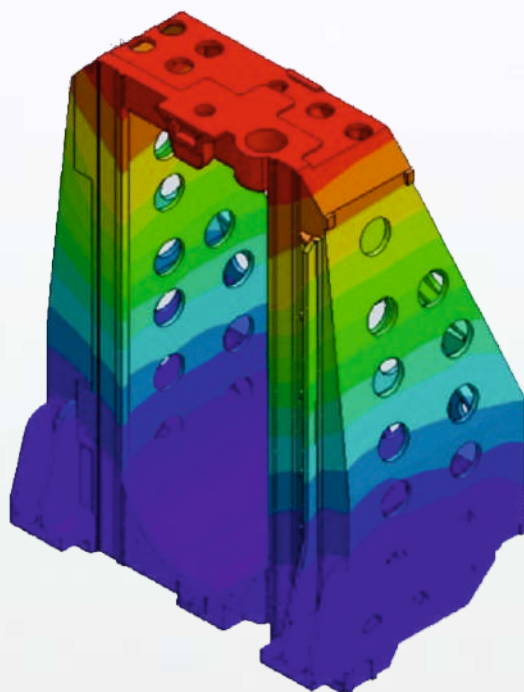
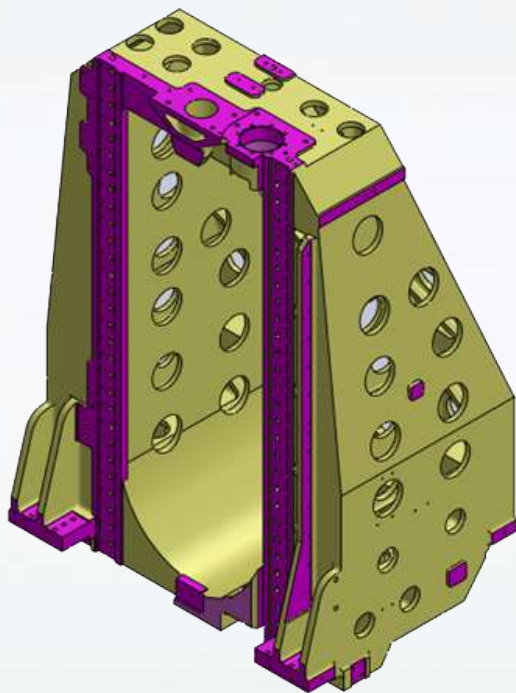
Precision

- Linear glass scale for X,Y,Z axes
- Direct encoder for Swivel head (B axis)
- Direct encoder for Direct Drive Rotary Table (C axis)
- Thermo friendly design
- Thermo symmetric structures
- Spindle bearing and coil cooling
- Ball screw core cooling
- Axes drive flange cooling
- Swivel head (B axis) coil cooling
- Direct Drive Rotary table (C axis) coil cooling
- Bed temperature sensor for PID control of cooling oil temperature

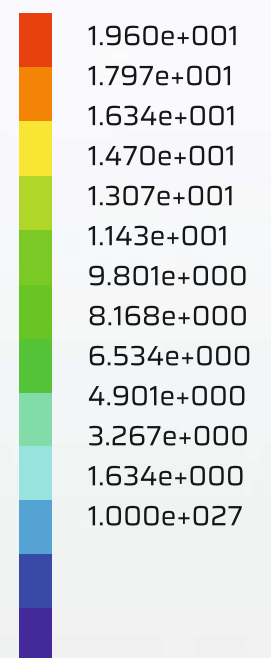


Precision

- Heavily ribbed cast iron structures
- Single piece stepped cast bed for rigidity
- Comprehensive FEM analysis
- Optimum weight and stiffness for enhanced natural frequency
- Higher spindle bearing dia for robust cutting performance
- Roller type precision LM guide-ways
- Double anchored double nut ball-screws
- Reduced spindle overhang for enhanced rigidity
- Static and dynamic compliance validated by AMTTF



URES (micron)



Maximum rigidity with FEM optimized and structural parts for high precision

Orion FX Universal Machining Centers are designed and manufactured to deliver excellent machine precision with use of high precision components Roboust structural parts made of cast iron for high rigidity and damping High precision roller type LM guideways and DIN standard ground ball screws Spindle cooling, Direct drive rotary table cooling, Swivel head cooling, Ballscrew core cooling and motor flange cooling with linear scale for higher precision.

This has resulted in high static and dynamic accuracies of Orion FX series.

(GA tests, values as per ISO, BFW) Machine geometrical accuracies within 25% to 50% of ISO 10791-1 values

Machine geometrical accuracies within 25% to 50% of ISO 10791 - 1 Values

As per ISO 230-1	ISO Value (mm)	ORION STD (mm)
Straightness	0.020	0.005
Squareness	0.020	0.010
Spindle run out @300 mm	0.015	0.006

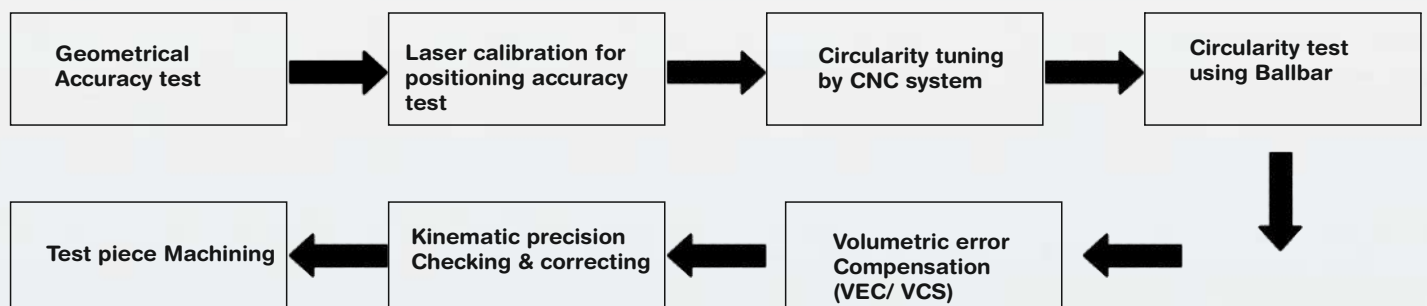
Linear axes Bi directional positioning accuracy 0.008 mm and repeatability 0.005 mm as per ISO 230-2 (Example FX8000)

As per ISO 230-2	ISO Value (mm)	ORION STD (mm)
Bi directional positioning accuracy A	0.032	0.008
Bi directional repeatability R	0.018	0.005

Rotary axes Bi directional positioning accuracy 0.010 arc sec. and repeatability 0.007 arc sec. as per ISO 230-2 (B & C axis)

As per ISO 230-2	ISO Value (mm)	ORION STD (mm)
Bi directional positioning accuracy A	0.028	0.010
Bi directional repeatability R	0.016	0.007

ORION Fx undergoes rigorous testing as below to ensure best performance



Productivity

Machines are available with Automatic Pallet Changer and without Automatic Pallet Changer

Rotary type automatic pallet changer for quick and smooth work piece change irrespective of load. APC arm up/ down movement is guided on LM Guides

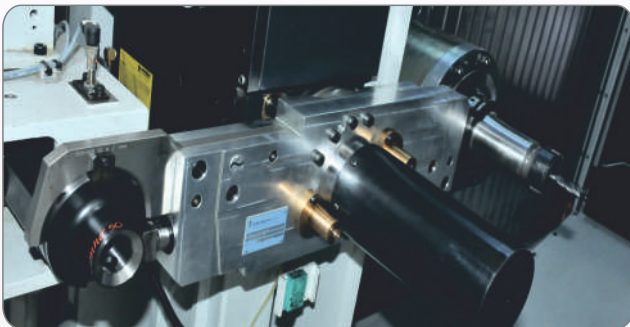


Tool Magazine

Servo driven tool magazine with 40/ 60/ 80 tool magazine can be offered for larger capacity Tool loading and unloading possible while machining. Touch screen HMI is available as option for easy tool management. Option of tool breakage sensor on magazine side available



Automatic Tool Changer



Servo driven high speed ATC for fast tool change can handle tool weights upto 30 kg. ATC are provided with special tool locking mechanism for smooth and reliable tool change is provided as an optional feature.

Chip Conveyor



Efficient chip disposal with chip conveyor inside bed. Direct chip disposal from stocker side.

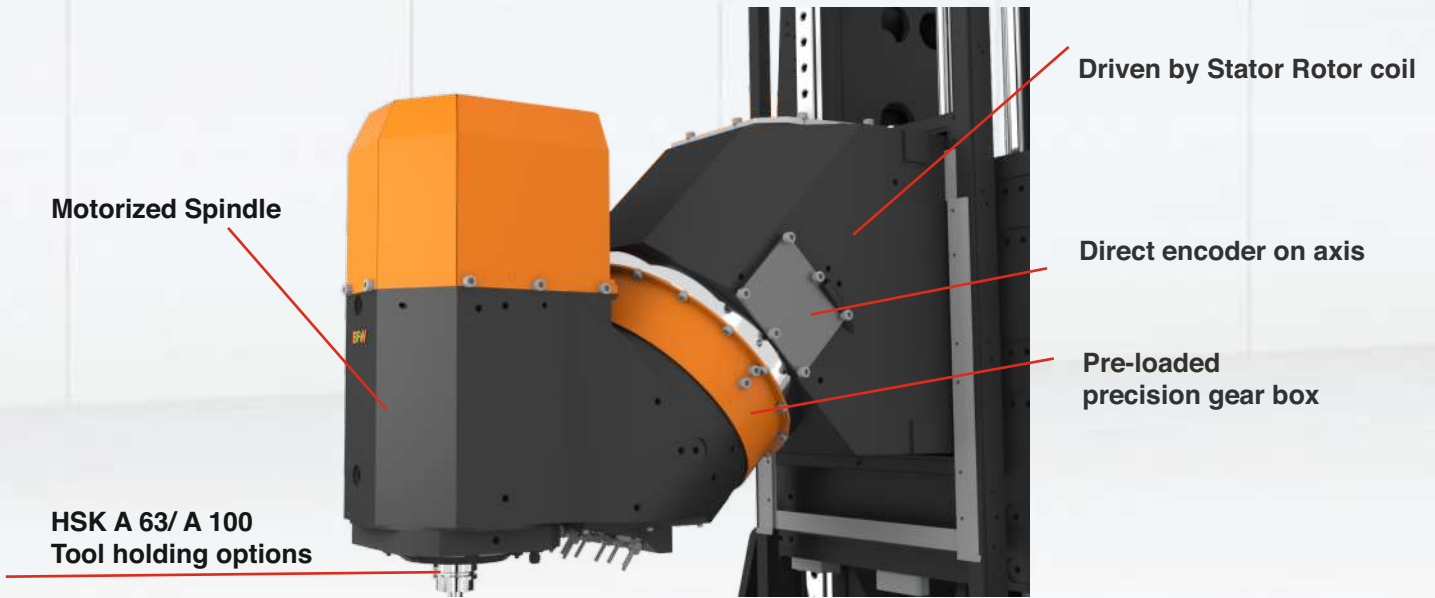
Rear side chip disposal Ample shower wash facility to avoid chip accumulation 16/ 40/ 70 bar coolant thru pressure with drum and cyclone filtration system

Oil skimmer to remove oil content and improve coolant life

Productivity

Swivel Head (B axis)

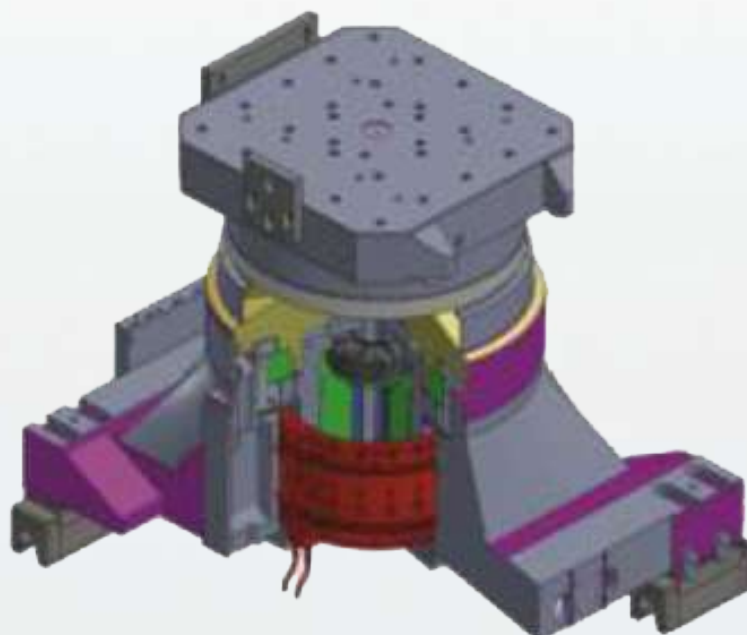
Swivel head considered to be vital subassembly for any 5 axis machines.
The pre-loaded precision gear box ensures best-in-class B axis torques and accuracy



Direct Drive Rotary Table (C axis)

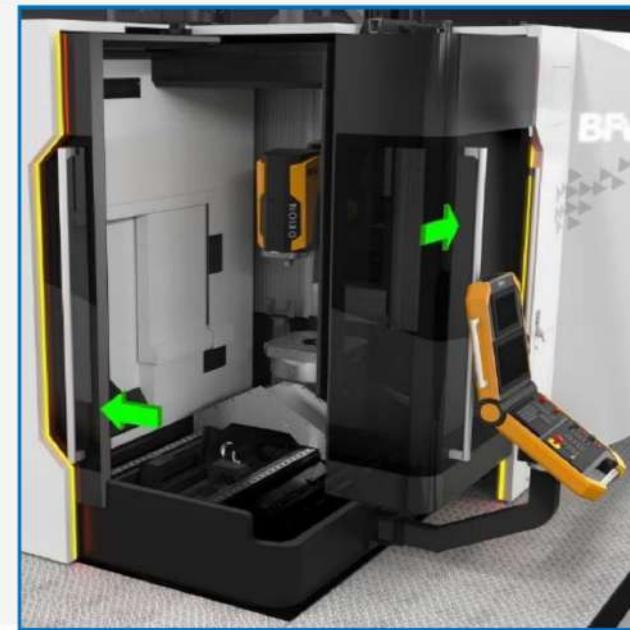
DDRT

The state of the art direct drive rotary table for highest positioning accuracy, reliability and speed

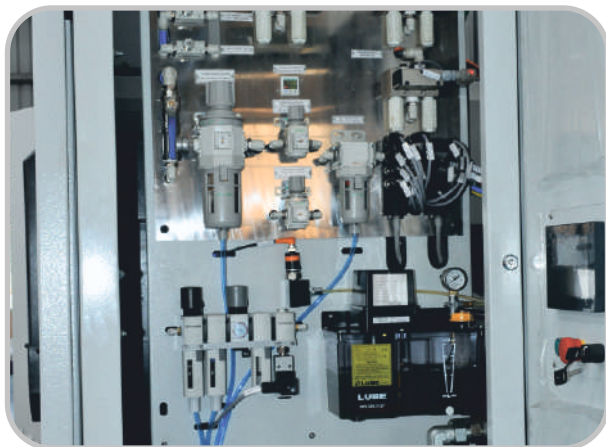


Ergonomics

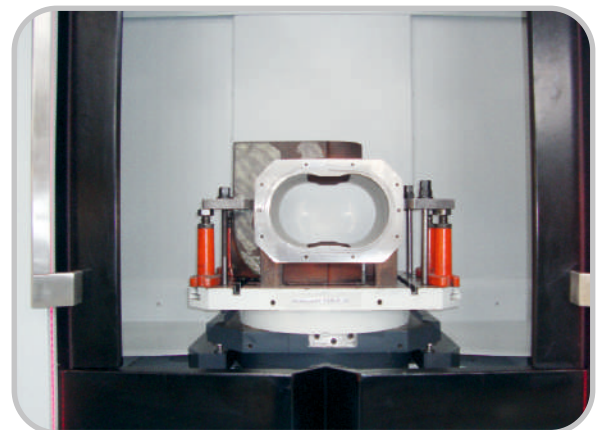
Wider operator door with large window for easy access & visibility swivel type operator panel for easy operation



Easily accessible maintenance panel



Wide APC door for easy access to work piece convenient loading height of 1100 mm



LED lamps for APC loading, Tool loading, machining area.



HMI at tool loading station (optional)



Foot switch at tool loading station

IloT Enabled Smart Sensors & User Screens



IloT enabled smart sensors & User screens

- Spindle bearing temperature, Tool clamp/declamp positions
- Chiller oil flow & temperatures for Spindle, Ballscrew, DDRT, Swivel Head cooling
- Hydraulic oil pressures, temperatures, levels
- Coolant levels/volume in litres, flow, temperature
- Main air pressure

SPINDLE TEMPERATURE			
	SET VALUE	ACTUAL VALUE	STATUS
SP FRONT BEARING TEMP (DEG.C) (PREWARN)	55.00	26.40	OK
SP FRONT BEARING TEMP (DEG.C) (WARN)	60.00		OK
SP REAR BEARING TEMP (DEG.C) (PREWARN)	55.00	22.80	OK
SP REAR BEARING TEMP (DEG.C) (WARN)	60.00		OK

TOOL CLAMP_DECLAMP			
	SET VALUE	STATUS	
CLAMP WITHOUT TOOL-A1 (V) S1 ON WHEN ACTUAL VALUE BELOW A1	0.70	S1	
CLAMP WITH MAX TOOL-A2 (V) S2 ON WHEN ACTUAL VALUE BETWEEN A2 & A3	1.00	S2	
CLAMP WITH MIN TOOL-A3 (V) S2 ON WHEN ACTUAL VALUE BETWEEN A2 & A3	3.00		
TOOL UNCLAMP-A4 (V) S3 IS ON WHEN ACTUAL VALUE IS ABOVE A4	9.00		
ACTUAL VALUE (V)	2.39		

HYDRAULIC			
	SET VALUE	ACTUAL VALUE	STATUS
DDRT TABLE CLAMP PRE [bar]	65.00	76.20	OK
DDRT TABLE UNCLAMP PRE [bar]	68.00	0.60	ERR
PALLET CLAMP ON DDRT PRE [bar]	68.00	81.60	OK
PALLET UNCLAMP ON DDRT PRE [bar]	68.00	0.00	ERR
HYD.OIL LEVEL LOW-PREWARN [Litres]	75.00	87.32	OK
HYD.OIL LEVEL LOW-WARN [Litres]	65.00	87.32	OK
HYDRAULIC OIL TEMP LOW [DEG.C]	10.00	30.20	OK
HYDRAULIC OIL TEMP HIGH [DEG.C]	55.00	30.20	OK

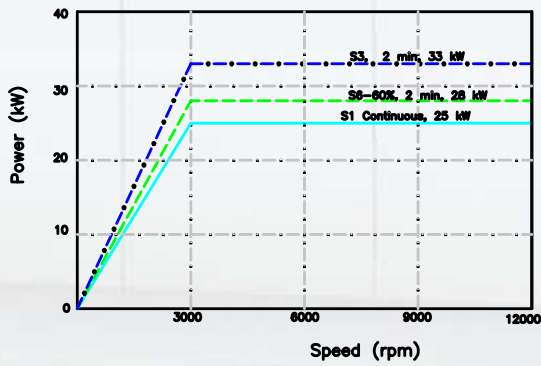
COOLANT			
	SET VALUE	ACTUAL VALUE	STATUS
MAIN TANK COOLANT LEVEL LOW [Litres]	5.00	330.49	OK
MAIN TANK COOLANT LEVEL HIGH [Litres]	20.00		OK
CLEAN TANK COOLANT LEVEL LOW [Litres]	5.00	451.26	OK
CLEAN TANK COOLANT LEVEL HIGH [Litres]	20.00		OK
MAIN TANK CLNT TEMP LOW [DEG.C]	5.00	23.80	OK
MAIN TANK CLNT TEMP HIGH [DEG.C]	50.00		OK
CLEAN TANK CLNT TEMP LOW [DEG.C]	5.00	23.90	OK
CLEAN TANK CLNT TEMP HIGH [DEG.C]	50.00		OK
THRO TOOL CLNT FLOW [L/MIN]	0.00	0.00	OK
THRO TOOL CLNT TEMP [DEG.C]	0.00	0.00	OK

PNEUMATIC			
	SET VALUE	ACTUAL VALUE	STATUS
MAIN AIR PRE [bar]	5.00	6.25	OK
LUBE OIL PRESSURE [bar]	5.00	0.50	ERR
BALL SCREW CHILLER OIL FLOW [L/MIN]	8.00	10.30	OK
BALL SCREW CHILLER OIL TEMP [DEG.C]	35.00	20.90	OK
SPINDLE-HEAD-DDRT TABLE CHILLER WATER FLOW [L/MIN]	4.00	4.80	OK
SPINDLE-HEAD-DDRT TABLE CHILLER WATER TEMP [DEG.C]	35.00	26.20	OK

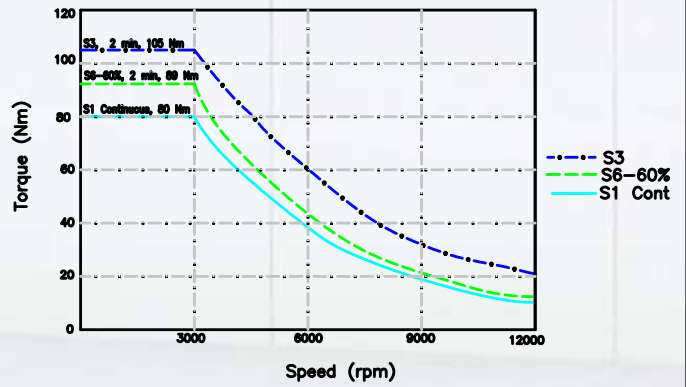
Load meter			
LOAD DISPLAY			
AXIS	ACTUAL MOTOR CURRENT (A)	TEMP(C)	MAX.TEMP(C)
X	-0.412	21.9	75
Y	0.616	22.3	75
Z	12.506	56.3	75
B	-0.525	48.8	75
U	-0.530	28.8	75
V	0.000	22.7	75
W	-0.001	21.2	75
SPINDLE	0.000	25.9	55

Spindle Characteristics

12000 rpm standard spindle

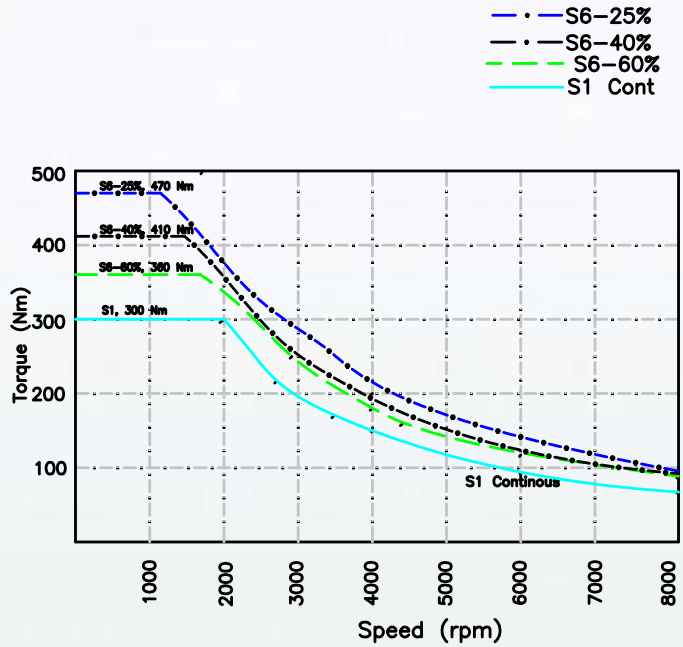
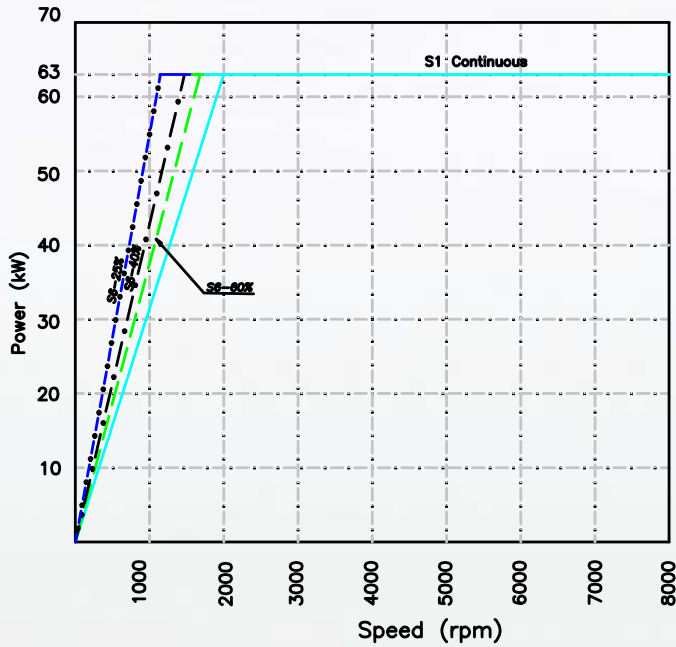


FX5500

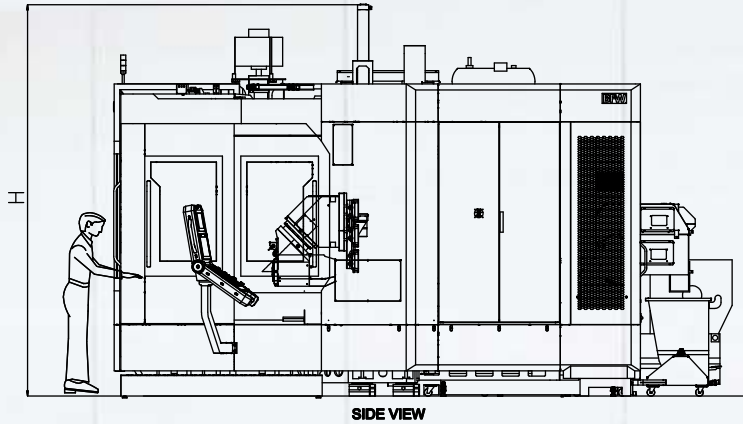


8000 rpm standard spindle

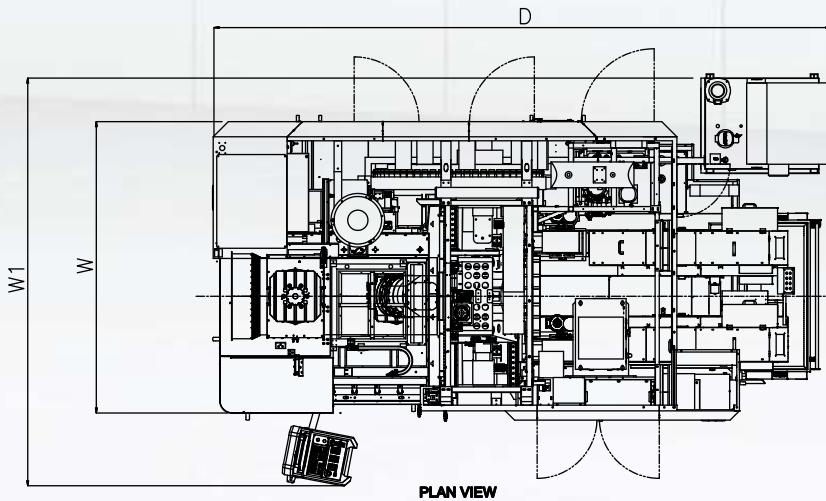
FX8000, FX10000



Machine Dimensions



SIDE VIEW



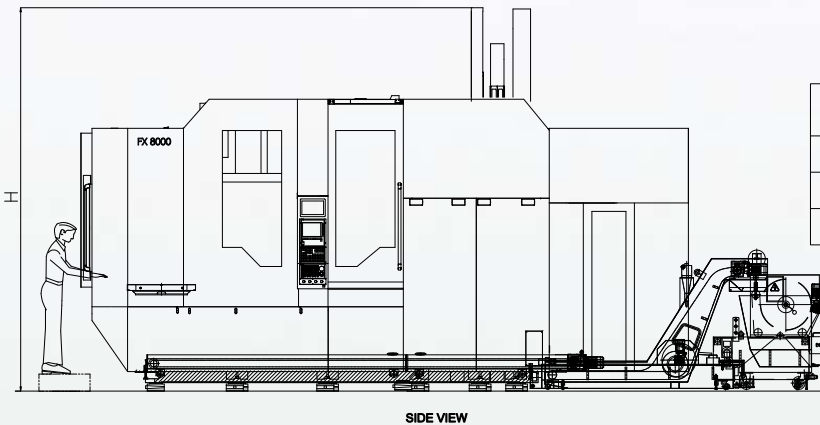
PLAN VIEW

Floor Plan Without Automatic Pallet Changer

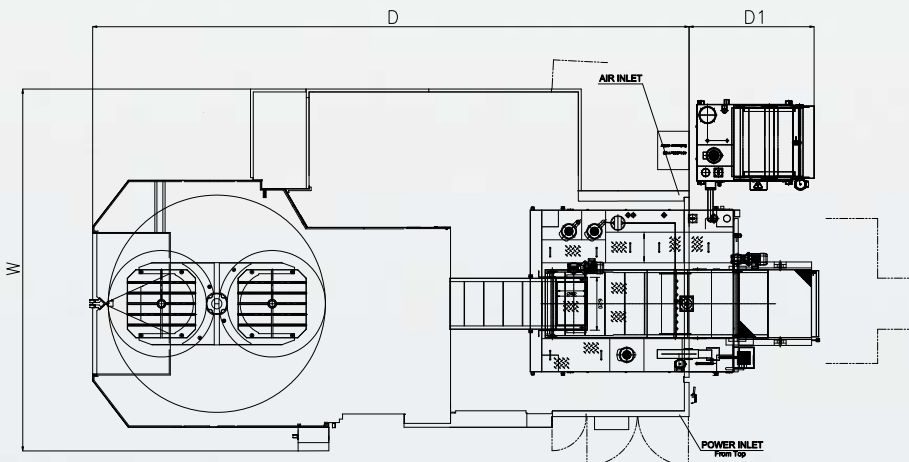
Model	Width		Depth	Height
	W	W1	D (Drum filter + Paperband filter)	H
FX5500	2900	4000	6100	3900
FX8000	4000	4750	7500	4500
FX10000	4200	4950	9000	4500

Floor Plan With Automatic Pallet Changer

Model	Width	Depth		Height
	W	D (Drum filter + Paperband filter)	D1	H
FX5500	3200	5800	1600	3900
FX8000	4250	7000	1600	4500
FX10000	4500	9500	1600	4500



SIDE VIEW



CNC Features



M Dynamics - Siemens 840 D SL

- Advanced surface
- Spline interpolation
- Automatic measuring cycles
- Measure kinematics
- Simultaneous recording of 3D simulation
- Shop mill machining STEP programming
- Residual material detection
- User memory on user CF card

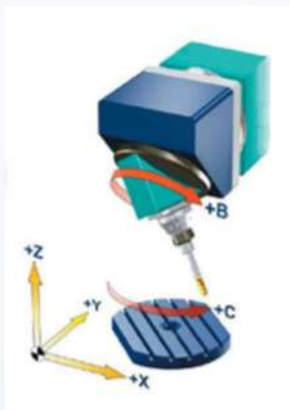
5 axis Head Table Kinematics Ready



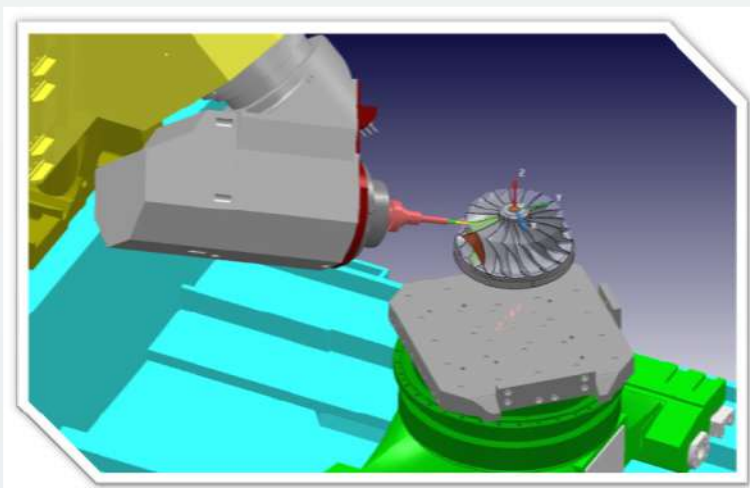
Siemens 828D for 4+1 Application

Siemens 840D SL for simultaneous 5 axis ^+ & M Dynamics

- 5 axis features
- TCPM - Tool enter path management
- Plane transformation
- TRIORI, TRANS, CYCLE 800
- 3D compensation
- Shortest angular traverse
- Tool path linearization
- Tool vector input
- Automatic tool repositioning
- Tool vector retract
- Tool vector canned cycles



Machine simulation and postprocessor



Standard Features

- HSK spindle taper
- Motorised (Integral) spindle
- Spindle cooling B & C axis cooling system
- Ball-screw cooling system
- AC servo drives for all axes
- Linear scale feedback
- Continuous Direct Drive rotary table (0.001 deg x 360,000)
- Continuous swivel axis 0.001 deg
- Pneumatic counterbalance for vertical axis
- Lamella cover for X and Z axes
- Single sheet covers for Z axis/ Telescopic cover
- Automatic centralised oil lubrication system
- Air blst for spindle taper cleaning
- 60 tools, servo-driven tool magazine & tool changer
- Slat Chip conveyor inside the machine, in the cutting area
- Overhead shower wash
- Basic coolant system with Scraper chip conveyor with drum filter
- High pressure coolnat thru spindle system 40 bar with paper band filtration system
- Coolant gun, Air gun, Ooil skimmer
- Hydraulic powerpack with air blast oil cooler
- Operator door safety interlock
- 3 tier signal lamp, machine lamp
- AC for electrical cabinet
- USB interface
- Energy saving function
- Machine alarm diagnostics
- 10.4" color LCD disply

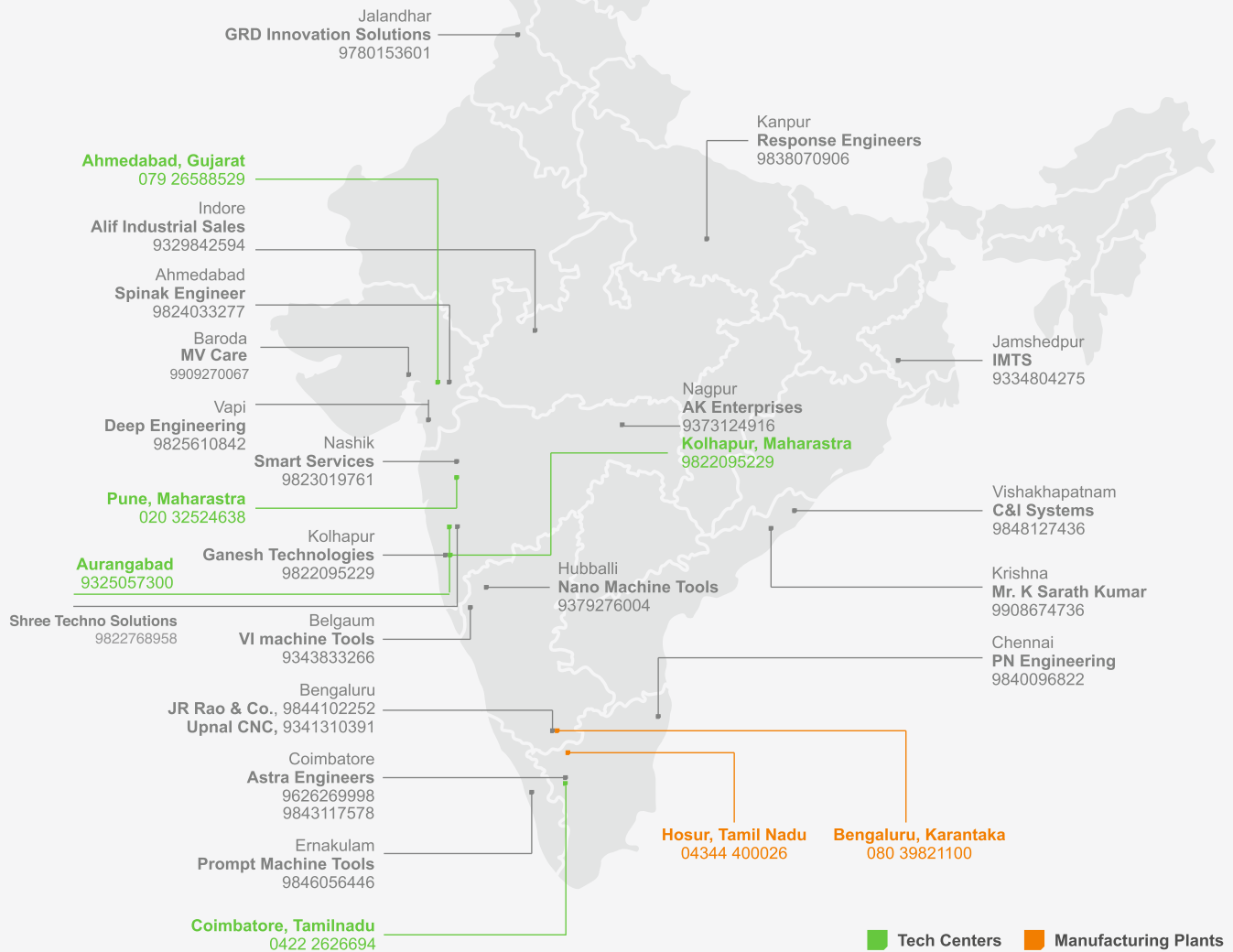
Optional Features

- Automatic pallet changer (Servo-driven, Rotary type)
- High torque spindle for Fx8000 & Fx10000
- High pressure coolnt thru spindle system 60 bar
- Hydraulic connections through pallet with auto couplers (Fx5500 & Fx8000)
- ATC side tool breakage sensor
- Part probing
- Laser measuring system for tool offset & tool breakage
- Mist collector
- Coolant chiller
- Customer specified machine colours
- 15" color LCD Display
- Milling and Turning table, Dia 630, 700 rpm for Fx8000
- Milling and Turning table, Dia 800, 500 rpm for Fx8000
- Automation and SMED compatible
- Visiport
- Automatic centralised grease lubrication system
- Machine Collision monitoring
- Spindle growth compensation
- Tool kit for checking & correcting kinamatic precision
- Cad model post porcessor
- IloT 4.0

Technical Specifications

Specifications	Unit	Fx5500	Fx8000	Fx10000
Axes				
X axis	mm	800	1250	1600
Y axis (Table)	mm	1000	1250	1400
Z axis (Spindle)	mm	800	1000	1250
Work volume XYZ	m ³	0.64	1.25	2.50
Rapid traverse	m/ min	60	40	40
Acceleration	m/ S ²	6	4	4
Table				
Rotary table - Direct Drive	posn	360,000 x 0.001deg	360,000 x 0.001deg	360,000 x 0.001deg
Table speed	rpm	40	20	10
Pallet size	mm	500 x 500	630 x 630 (800 x 800)	1000 x 1000
Load capacity	kg	700	1500	3000
Max. Job swing dia x swing height	mm	800 x 1000	1250 x 1200	1600 x 1400
Spindle				
Spindle taper std.		HSK A63	HSK A100	HSK A100
Spindle power Ed40% std.	kW	28	63	63
Spindle speed std.	Nm	12000	8000	8000
Max spindle torque std.	Nm	105	470	470
Spindle taper (high speed opt)		-	HSK A63	HSK A63
Spindle power ED40% (high speed opt)	kW	-	28	28
Spindle speed (high speed opt.)	rpm	-	12000	12000
Max spindle torque (high speed opt)	Nm	-	105	105
Swivelling Milling Head				
Rotating speed Cont./ 50% ED	mm	10	10	10
Axis torque	mm	3,000	5,000	5,000
Resolution	deg	0.001	0.001	0.001
Automatic tool changer				
Number of tools std		60	60	60
Number of tools opt		80	80-120	80-120
Max tool diameter all places	mm	80	125	125
Max tool diameter max	mm	165	250 (315)	250 (315)
Max tool length	mm	430	600	600
Max tool weight	kg	12	30	30
Chip to chip time (min)	s	4	7.5	8.7
Pallet changer				
Type		180 deg swing type		
Pallet change time	s	10	25	60
Accuracy as per ISO 230-2				
Positioning A - with Linear scale	mm	0.008	0.008	0.009
Repeatability R - with Linear scale	mm	0.005	0.005	0.007
B & C axis index accuracy	arcsec	10	10	12
Machine Installation Data (With Pallet Changer)				
Basic machine weight	kg	14000	24000	30000
Floor area W x D	mm	3200x5800	4250x7000	4500x9500
Compressed Air	bar	5-6	5-6	5-6
Total connected load-cont/ 30 min	kVA	60	90	100
Power supply		3ph, 415 V, 50 Hz		
CNC system		Siemens Sinumerik 1(Simultaniuos 5 axis)		

Network



International Network

- Bangladesh • Bahrain • China • France • Germany • Iran • Kuwait • Netherlands • Oman • Poland
- Qatar • Russia • Saudi Arabia • Sri Lanka • South Africa • Thailand • Turkey • UAE



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We are continuously working on the development of our products, the information contained in this brochure is subject to modification. While all efforts have been made to ensure that this publication carries the correct information, the reader is advised to consult an authorised representative of Bharat Fritz Werner to ascertain latest details.

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