AXILE
agile smart machining

G8 SERIES

GANTRY TYPE 5-AXIS VERTICAL MACHINING CENTER

WE ARE AXILE

AXILE designs and builds agile smart 5-axis VMCs
with leading automation solutions for manufacturers
of complex parts and components.

“ We believe manufacturers shouldn’t have to choose between high-speed and high-performance 5-axis machines. ”

By combining sheer agility, digitalized intelligent automation, and a new standard of 5-axis machining,
we’ve created an all-new approach:

Agile Smart Machining.

In short, our dedicated team of industry experts brings together ultra-high removal rates, pinpoint precision, and 24/7 automation and reliability within each and every AXILE 5-axis machine.

Our breakthrough design concepts and advanced proprietary technologies serve highly sophisticated manufacturers of complex parts and components for applications in aerospace, die and mold, medical, and general job shop, among others.

The AXILE service and support network spans nearly 50 countries, with more than 70 distributors across Asia, Europe, and the Americas, and a service center in Croatia.

CONTENTS

G8 GANTRY TYPE VMC

The AXILE G8’s powerful gantry design perfectly balances rigidity and precision, ideal for the machining of complex workpieces.

With a maximum loading capacity up to 1,300 kg on a swiveling, rotary table, complemented by high-performance built-in spindles, the G8's agility enables production of a wide range of large parts and tools.

The G8 MT option offers both milling and turning in one machine, greatly increasing operational flexibility. By reducing set-up times and potential clamping errors, the G8 MT can efficiently machine a wider variety of parts, including cylindrical components.

DESIGN CONCEPT

THE STRUCTURE

1

Spindle moved by 3 linear axes	No rotary axis between the tool and the machine body, for better machining rigidity.

2

Perfect U-shape closed gantry design	Same stability in all travels of X and Y axes Excellent accessibility to working area

3

Table moved by swivelling rotary axes	Best accuracy with fixed relative position between 2 rotary axes

4

Massive gantry sliding on 2 symmetric synchronized axes	Best servo response to any milling forces

5

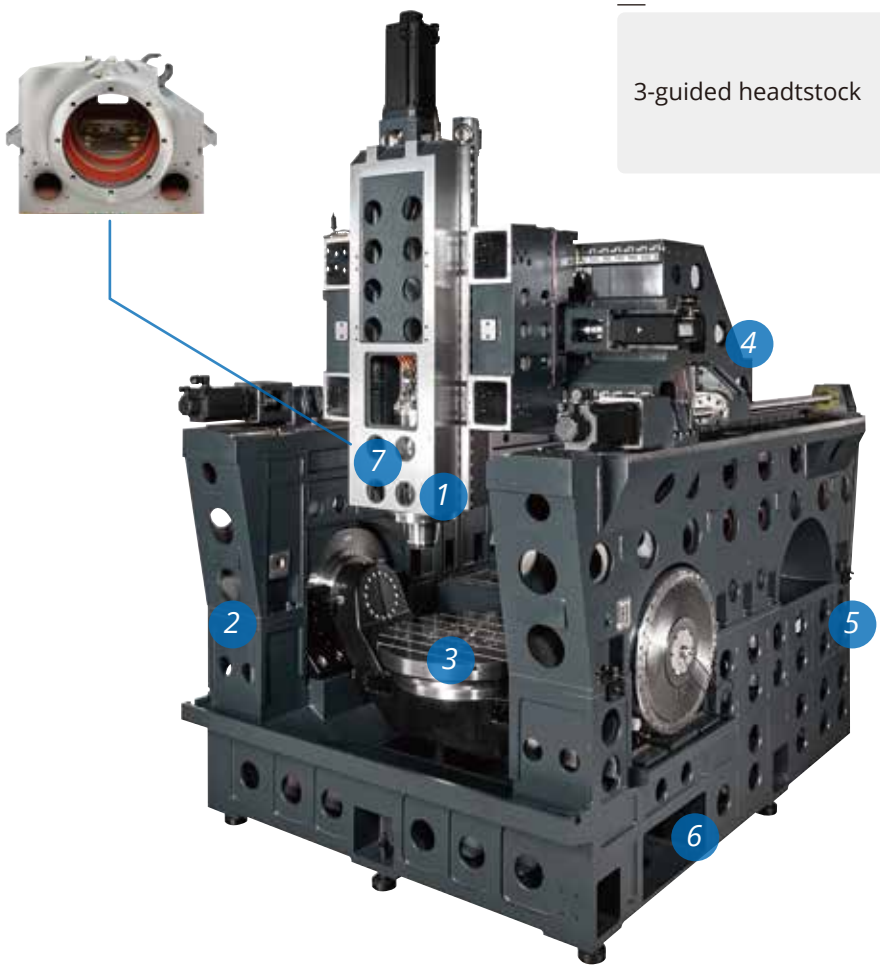
All body made of high-quality casting	Homogeneous thermal behaviour Optimal damping of machining vibrations

6

Integrated chip disposal channel directly under the table	Quick evacuation of chips for high chip volume machining

7

3-guided headtstock	Highest rigidity in roughing processes with high torque in spindle



AGILITY

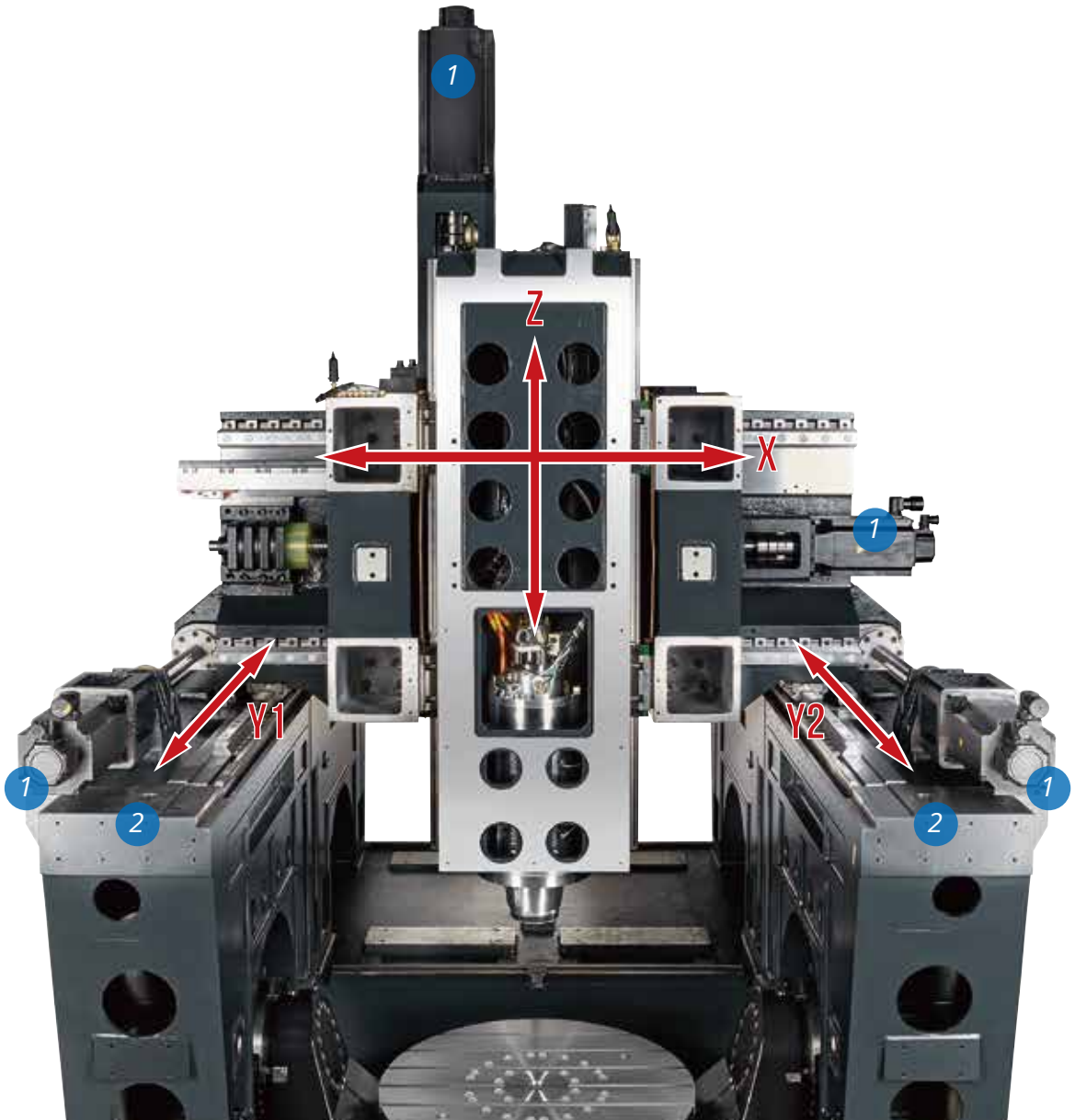
LINEAR AXES

1

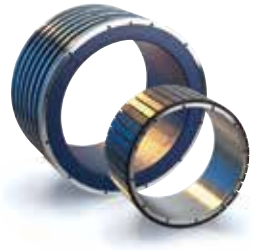
Direct driven servo motors (no belts/gears)	Best dynamic and minimal elasticity in the driving system

2

Double symmetric and synchronized axes (Y1, Y2)	Best dynamic for the gantry no matter the position of the machining force
Linear scales with 0,1 µm resolution in X, Y1, Y2 and Z axes	Ensures optimal synchronization in Y1 and Y2 axes, and best accuracy for ALL axes
Double roller type linear guideways	Best high-feed movement and vibration damping
Double pre-loaded double-nut ballscrews	Minimized backlash allowing high-feed movements



SWIVELLING-ROTARY AXES

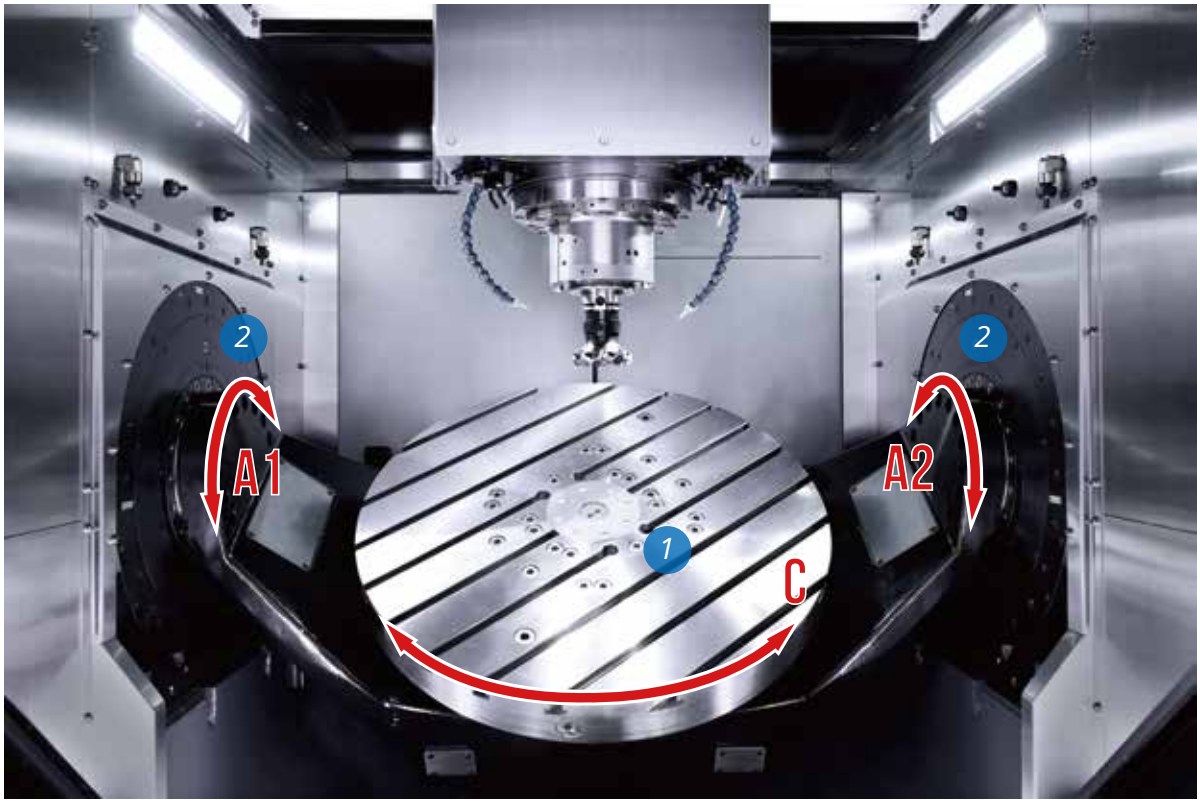


1

Integrated and ready-to-use hydraulic and pneumatic ports	Simplifying parts clamping process

2

Torque motor-driven rotary axis (C)	Highest dynamics
Dual torque motor-driven swivelling axis (A)	Highest accuracy
Brakes in every shaft	High-repeatibility in 5-axis operation when using the brakes
High-resolution, direct absolute rotary measuring system	Zero-backlash and high accuracy



ACCURACY

THE CORNERSTONE OF 5-AXIS MACHINING

Linear axes accuracy

Ballscrew´s thermal growth	0.1µm resolution absolute linear scales in ALL axes

Rotary axes accuracy

Elasticity and backlash of driving system	Direct-driven torque motors with no backlash
Angular error is multiplied by the distance from rotary axis to machining point	+/- 5" accuracy absolute rotary scale feedback

Thermal control

Heat generated by spindle and torque motors	Spindle and torque motors are cooled with a water chiller ±0.2° close-circuit and a cooling unit

Linear-rotary axes relative positioning

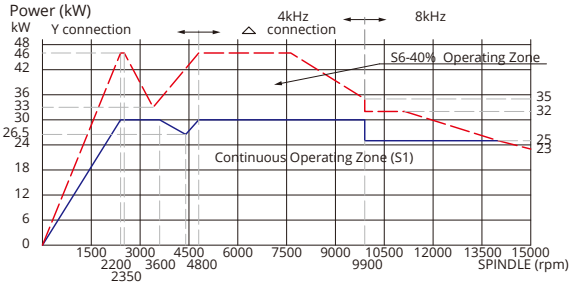
The swivelling-rotary table might shift its relative position to the 3 linear axes by many reasons generating an increasing error in the part	CNC embedded compensating functions like Kinematics (Heidenhain), Kinematic chain (Siemens) and Tilted working plane indexing (Fanuc)

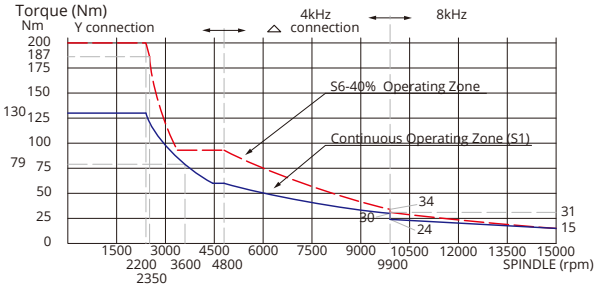
SPINDLE

HIGH-PERFORMANCE BUILT-IN SPINDLE SELECTION

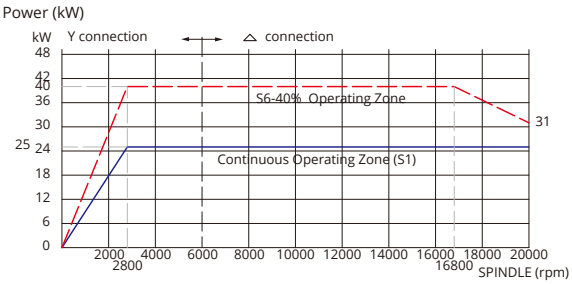
Spindle A

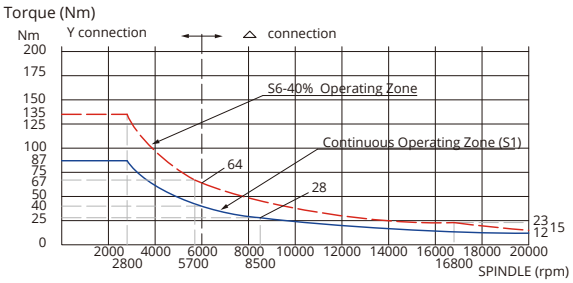
> 15.000 rpm
> HSK A63
> 130/200 Nm S1/S6-40%
> 30/46 kW S1/S6-40%
> Double coil asynchronous motor





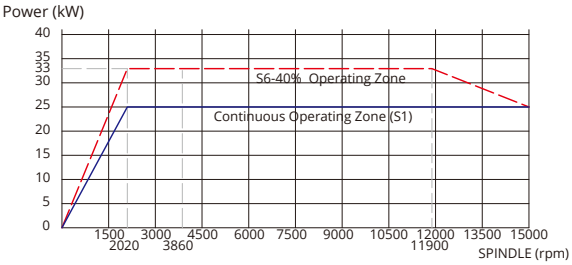
> 20.000 rpm
> HSK A63
> 87/135 Nm S1/S6-40%
> 25/40 kW S1/S6-40%
> Double coil asynchronous motor

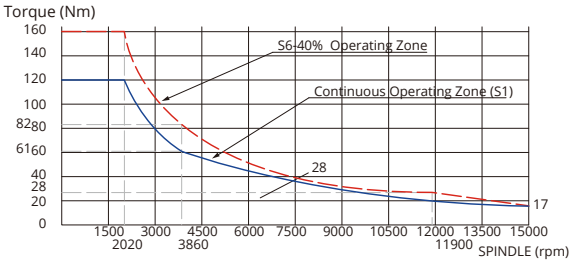




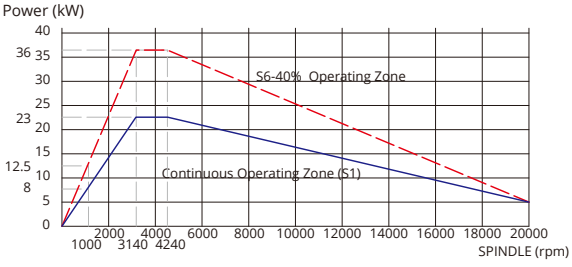
Spindle B

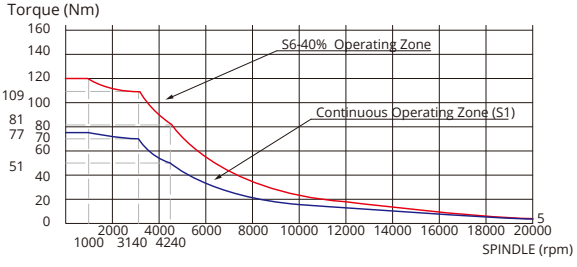
> 15.000 rpm
> HSK A63
> 120/160 Nm S1/S6-40%
> 25/33 kW S1/S6-40%
> Double coil asynchronous motor





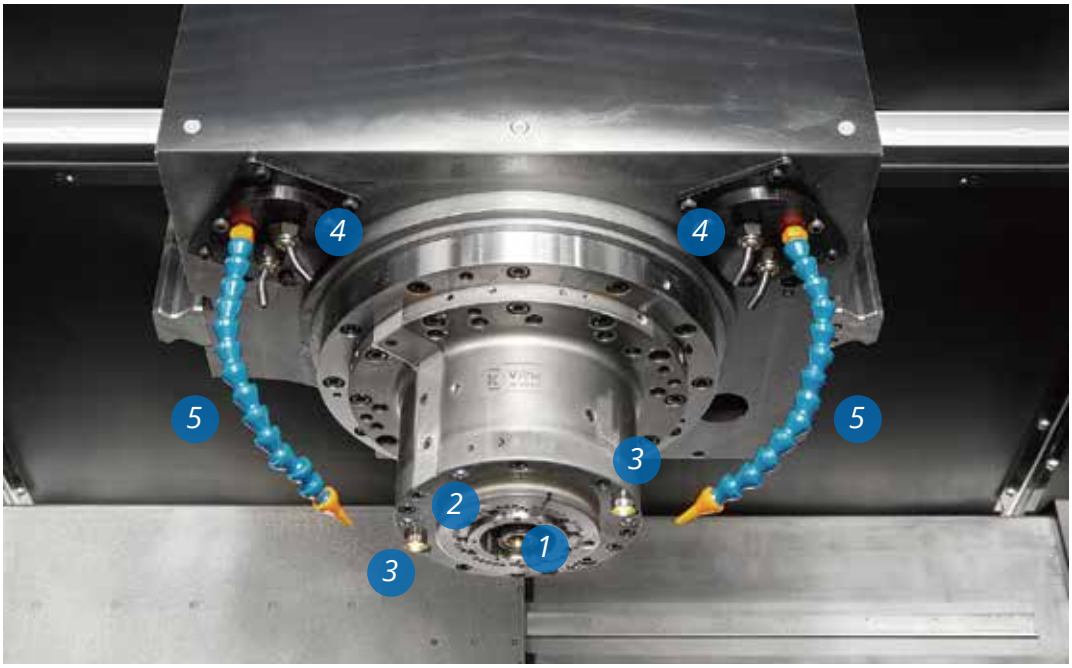
> 20.000 rpm
> HSK A63
> 77/120 Nm S1/S6-40%
> 23/36 kW S1/S6-40%
> Double coil asynchronous motor





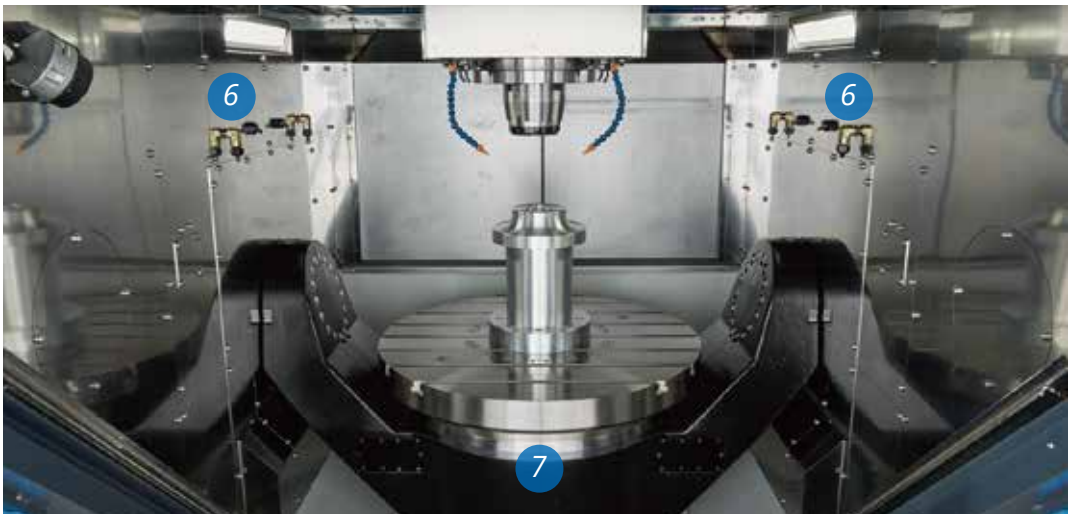
CHIP MANAGEMENT

FLUSHING CHIPS AWAY



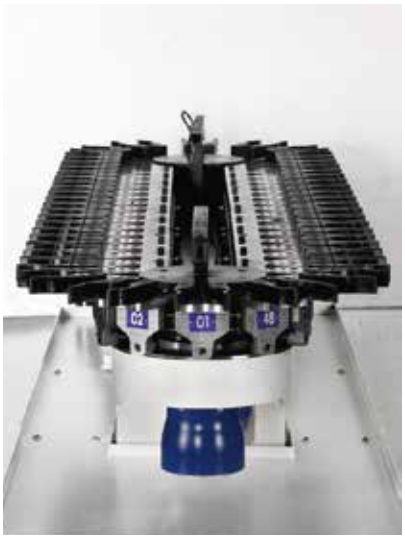
High-quality stainless steel working area	Long-lasting clean operation
Sharp walls and no-corner design	Easier to flush away chips by shower
2 x led lights spindle nose	For optimal illumination of the tool cutting

1 Coolant through spindle
2 4x coolant at spindle nose
3 2x led lights
4 Coolant flushing
5 Air flushing
6 Chip wash down
7 Chip conveyor



TOOL MANAGEMENT

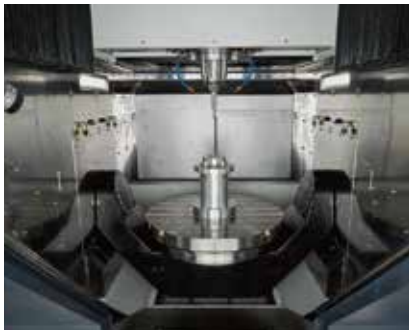
FLEXIBLE CAPACITY FOR EVERY APPLICATION

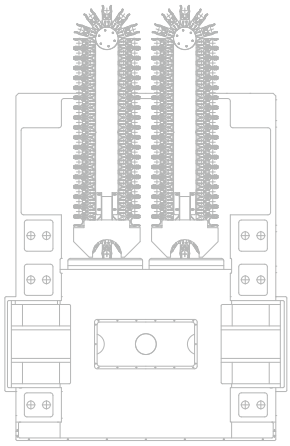


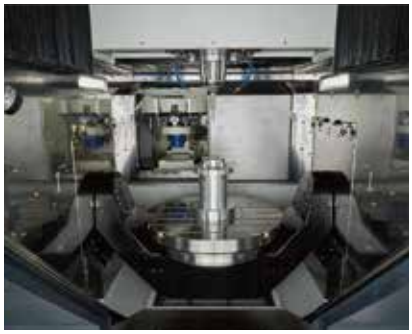
Single or twin carrousels of 32, 48 or 60 tools can be selected and capacity doubled to 64, 96 or 120 tools. Up to 96 tools machine layout is not modified.

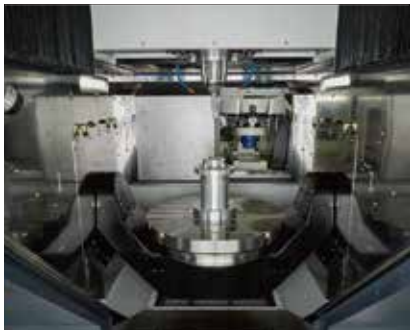
Sister tools, complex parts and unmanned operation can be executed with no worries on the tool magazine capacity.

Carrousel-type magazine with 32 to 120 tools capacity









ERGONOMICS

ACCESSIBILITY TO WORKING AREA

Large front door opening	Comfortable access to working area for workpiece preparation and supervision
Short distance from operator to table	Ergonomic loading and unloding of small parts
Automatic roof to open ceiling working area	Easy loading and unloading of heavy and bulky workpieces by over-head crane

AUTOMATIC ROOF

For overhead crane loading and unloading

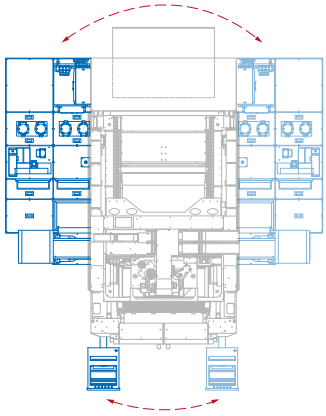
Roof closed

Automatic sliding of roof

Fold-up the roof

Easy access to table center

EASIER TOOLING MANAGEMENT AND MAINTENANCE



Tools are accessible from back of the machine and stored vertically.	Tools can be easily changed during automatic operation.
All necessary consumables are located together in the back of the machine.	Easier maintenace routine for operator.
Smart tool: interface panel is used to select the tool. When finished, the system checks whether all tool holders are in the right position.	Avoid human failures when automatically change tool to spindle, protecting spindle and reducing down-time.
The accessories and control panel can be customized in either sides of machine.	Optimized layout and ergonomic operation

CONTROL UNIT

A CONTROLLER FOR EVERY USER

Heidenhain TNC 640

> Kinematics
> Dynamic Collision Monitoring
> Tool Center Point Management
> Tilted the Working Plane

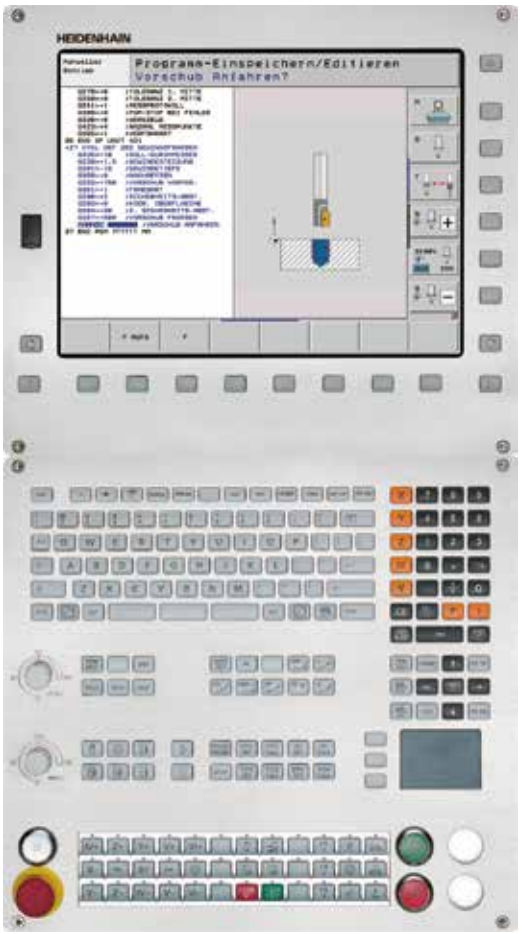
SINUMERIK ONE

> Kinematics chain
> Collision Avoidance
> 5-axis transformation with tool orientation
> Swivel the Coordinate System

Fanuc 31i-B5 plus

> 3D Interference Check
> High Speed Smooth TCP
> Tilted Working Plane indexing

Heidenhain TNC 640



Sinumerik ONE

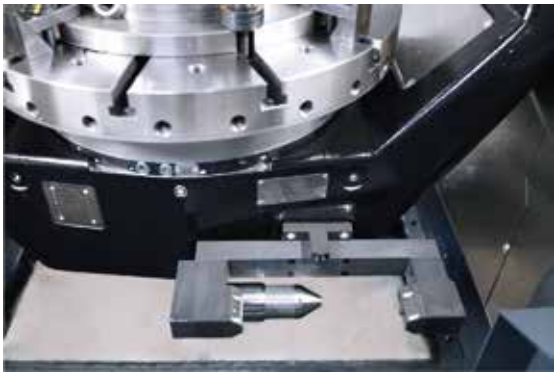
Fanuc 31i-B5 plus

MILL-TURN

The mill-turn function is for those who are looking for maximum integration of metal-cutting processes in a single step and to reduce the complex operations and minimize the clamping errors.

There is cooling system for the C-axis motor, inner and outer bearing of C-axis when in the turning function to ensure the accuracy and long-lasting life.

Table diameter: 800 mm, 31.5 in
Max turning speed: 1000 rpm
Max table load in turning: 850 kg, 1873 lbs
Max table load in milling: 1200 kg, 2645 lbs



For accurate tool measurement in length, radius and shape

For in-process tool measurement at working conditions
(spindle running at thermal stable conditions)

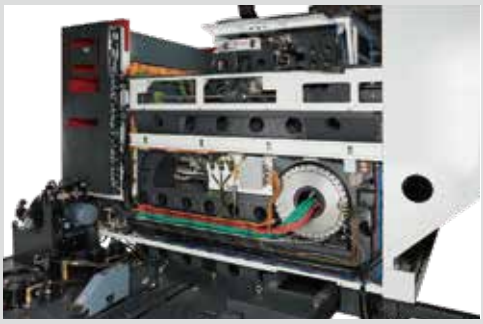
Integrated balancing system that can be monitored from the additional screen located on top of the panel, with the help of a sensor located in the A-axis

STANDARD & OPTIONAL EQUIPMENT

Optimized design and well organized of electrical connectors and cables.

Easier maintenance

High-speed and twisting stress cycles



Major heat generating electrical components like transformer and line filters are kept in a separate cabinet for easier temperature control.

Electrical cabinet is maintained at stable temperature using an air conditioner

Optional Chain-type chip conveyor with chip bucket, oil skimmer and built-in 40 bar through spindle coolant pump are provided for selection.

They can be positioned either side of the machine for layout customization

Standard in G8 / Optional in G8 MT

Integrated and ready-to-use 3 hydraulic and 1 pneumatic port. Clamping and unclamping functions by softkeys in the control panel and/or by M-function.

Optional

> Integrated and ready-to-use 8x hydraulic (80 bar) or pneumatic (6 bar) ports

> 4x vacuum port

Simplifies 5X workpiece clamping.

Automatic workpiece measurement (with probe, receiver and reference ball)

Automatic compensation of the linear-rotary axis relative positioning:
Kinematics (Heidenhain), Kinematic chain (Siemens) and Tilted working plane indexing (Fanuc)

For accurate workpiece positioning or in-process measuring of some machining features.

U-type embedded in the table (for highest accuracy).
Laser tool measurement.

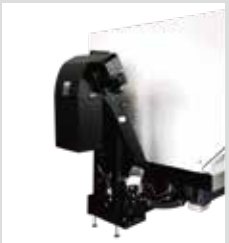
Spin window

For easier view of working area when huge amount of coolant and chips are produced

Separate type CTS unit including:

- Cartridge filter
- Paper filter
- Through spindle 40 & 70 bar centrifugal and screw pumps
- Oil skimmer
- Oil cooler

Recommended for high aluminum or cast iron material



Chip conveyor

Chain type conveyor takes bigger and curly chip away. Scrapper type conveyor takes smaller and lighter chips as well as dusty chips away.

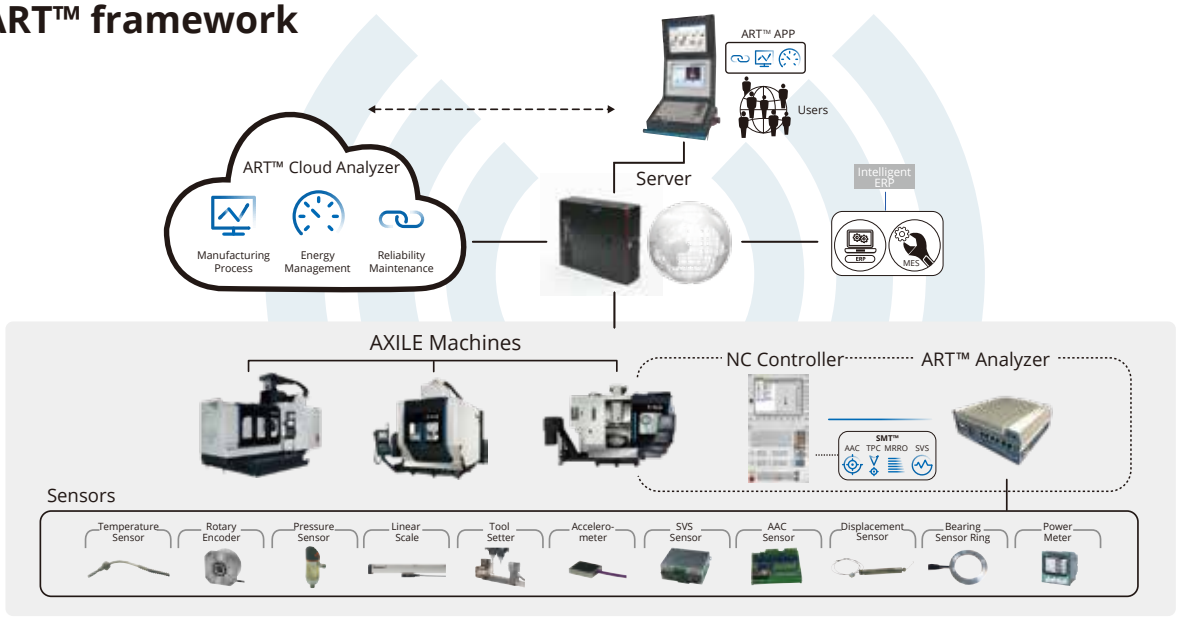
TECHNOLOGIES

ART™ INTELLIGENT MONITORING SYSTEM

The future of manufacturing depends on optimized intelligent production. To gain an edge on the competition, embracing smart manufacturing is the best way to stay ahead of the curve.
To deliver agile smart machining, and that all-important competitive edge, we have created ART™, an intelligent monitoring system that enables 24/7 operations and eliminates unexpected downtime.
ART™ monitors all wearing components, energy consumption, and fluids such as lubricant and coolant, to supply real-time status updates on the machine and its components, and to pre-empt future issues.

Utilizing ART™ in daily operations immediately improves production efficiency by empowering machinists to make informed decisions. Moreover, ART™ gives manufacturers the reassurance required to embrace automation solutions, by delivering vital oversight through total operational transparency.

ART™ framework



The Core Functions to Boost Productivity & Profitability

Manufacturing Process (MP)

Unexpected downtime is the enemy of profitability. ART™ delivers machine components diagnosis, machine lifetime estimation, and consumable supplies monitoring to prevent machine failure and eliminate unplanned downtime.

Reliability Maintenance (RM)

Knowledge is power. ART™ achieves superior data collection and analytics on machine status and utilization rates, to deliver real-time information for optimized production strategies.

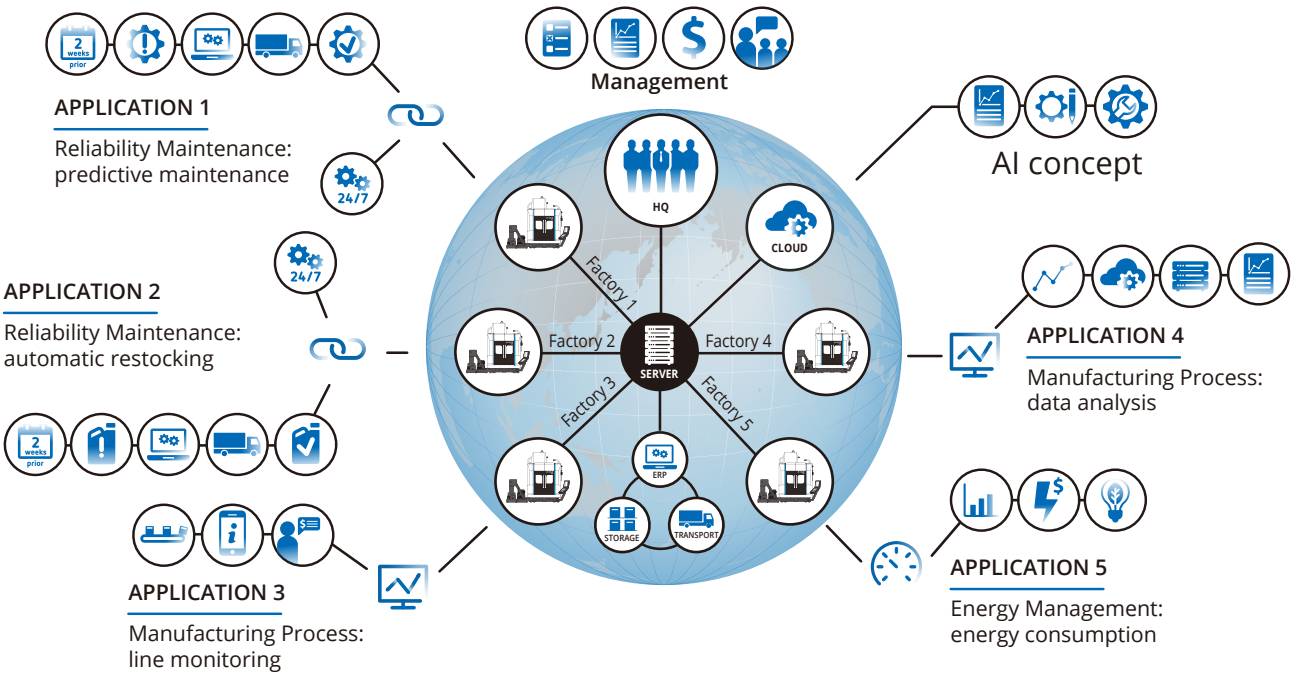
Energy Management (EM)

Every penny counts. ART™ enables manufacturers to monitor their power consumption, to identify ways to maximize energy efficiency and reduce expenditure.

Intelligent Management (IM)

ART™ provides analytic information for managers to understand the machine performance and take the immediate actions to optimize the machine capability.

Industry 4.0 Solutions to Intelligent Machine

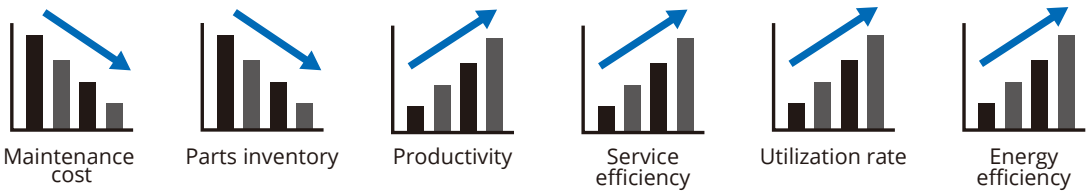


How ART™ Brings Production Benefits

> Clearly displays machine status, for quick decision-making
> Maximizes machine accessibility and utilization, for optimized production
> Provides real-time notification of abnormal conditions, for swift intervention
> Gives machinists the information required to optimize removal rates and machine lifetime

How ART™ Brings Maintenance & Service Benefits

> Delivers pre-emptive error messages prior to breakdown, to eliminate unexpected downtime
> Decreases service expenses, by precisely identifying the issue
> Enhances service efficiency, by recommending appropriate action
> Reduces spare parts inventory, by highlighting exactly what is needed and when
> Automatically orders new parts, by linking to online purchasing system
> Allows machines and equipment to remain on stand-by, always ready to work



SMT™

SMART MACHINING TECHNOLOGY

As pioneers of advanced mechatronic systems with decades of R&D expertise, AXILE has taken 5-axis CNC machining to the next level. Our patented SMT™ (Smart Machining Technology) delivers groundbreaking compensation and calibration functionality for unrivaled cutting speeds and industry-leading accuracy, and more importantly, resolves the aforementioned issues created by thermal expansion.

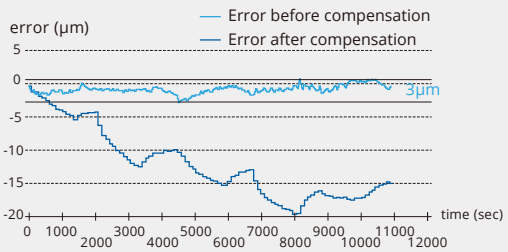
With AXILE's SMT™ manufacturers can have it all. There's no longer the need to choose between speed and precision, meaning manufacturers can produce superior parts rapidly, while also securing total process reliability and long-term machining performance.

Axial Accuracy Control

> **AXIAL THERMO MONITORING**
Integration of temperature sensors and thermal error model

> **HIGH PRECISION**
Thermal induced positioning error compensation

Thermal Error Before and After Compensation



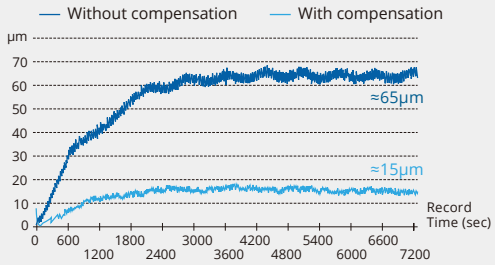
With thermal compensation system, the thermal error van be reduced from 20μm to 3μm.

Tool-tip Positioning Control

> **HIGH ACCURACY**
Directly measuring expansion

> **BETTER SURFACE FINISH**
5~6 times accuracy improved

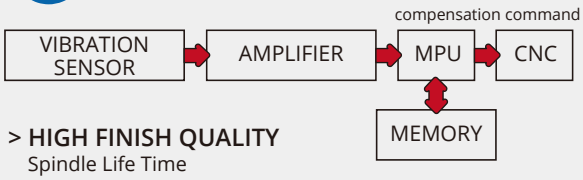
> **REAL-TIME COMPENSATION**
Electrical type sensor



With compensation, the displacement of tool tip is reduced from 65μm to 15μm.

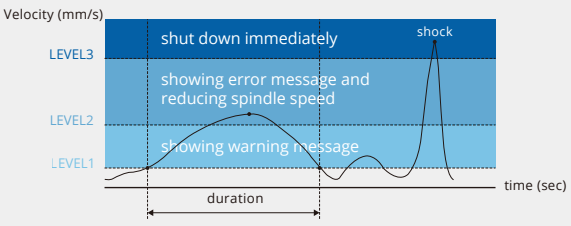
ACCURACY IMPROVED **5~6 TIMES!**

Spindle Vibration Supervision



> **HIGH FINISH QUALITY**
Spindle Life Time

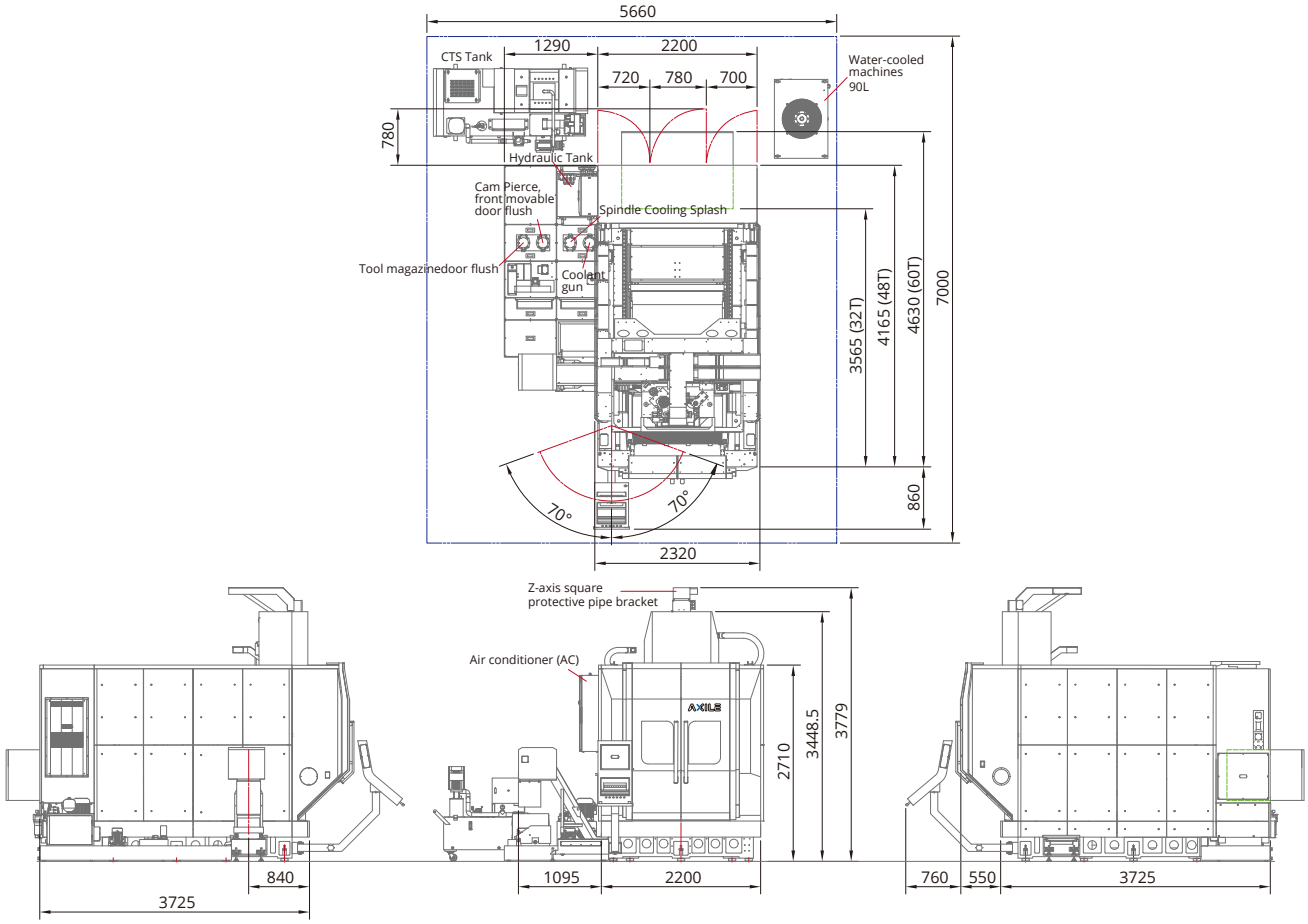
Three Levels for Spindle Vibration Monitoring



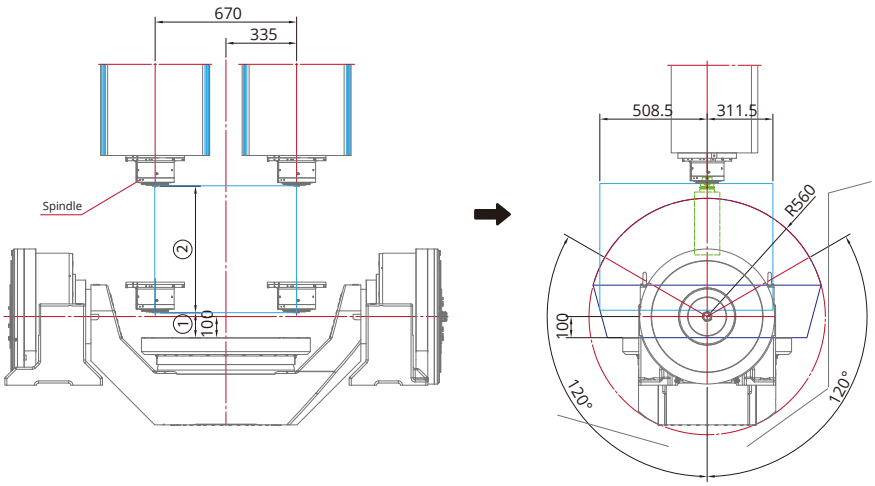
> **LONGER LIFE TIME**
Wear reduction on spindle bearings and tools

> **EASY FOR MAINTENANCE**
Up to 12000 abnormal vibration data recording

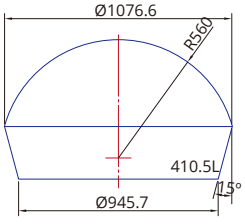
LAYOUT AND WORKSPACE



INTERFERENCE



Spindle	①	②
A	130	600
B	146	600
Direct BT40	112	600
Direct BT50	110	550



*Note:
The workpiece size for turning is limited by the weight (850 kg), its maximum height and the cutting force applied. Please request for the limitation diagram or send the drawing of the part to confirm if it can be machined.

TECHNICAL DATA

COMMON DATA FOR G8

TABLE (NOTE 1)				
Table size (diameter)	Ø800 mm		Ø31.5 in	
Number and hydraulic ports	3			
Working pressure of hydraulic ports	80 bar		1160.3 psi	
Number and pneumatic ports	1			
Working pressure of pneumatic ports	6 bar		87 psi	
LINEAR AXES				
X travel (carriage left and right)	670 mm		26.4 in	
Y travel (gantry back and forth)	820 mm		32.3 in	
Z travel (head stock up and down)	600 mm		23.6 in	
Max feedrate X/Y/Z	60 m/min		2362 in/min	
Guideways type	Roller			
Guideways size X/Y/Z	55/45/45 mm		2.1/1.7/1.7 in	
Distance between X/Y guides	590/1472 mm		23.2/57.9 in	
Ballscrew diameter/pitch	45/20 mm		1.7/0.7 in	
X/Y/Z axis motor power/torque	X/Y 6/19.2 ; Z 8.9/28.4 kW/Nm		X/Y 8/14.1 ; Z 11.9/20.9 hp/ Ft/lbs	
ROTARY AXES (NOTE 1)				
A range (swivelling)	±120 deg			
C range (rotary)	360 deg			
SPINDLE (STANDARD)				
Spindle speed	20000 rpm			
Transmission	Built-in			
Motor type	Asynchronous			
Bearing type (front/rear)	Angular ball			
Bearing cooling and lubrication	Oil/Air			
Power S1/S6-40%	A: 25/40 kW	B: 23/36 kW	A: 33/53 hp	B: 30.8/48.3 hp
Torque S1/S6-40%	A: 87/135 Nm	B: 77/120 Nm	A: 64.2/99.5 Ft/lbs	B: 56.8/88.5 Ft/lbs
SPINDLE (OPTIONAL)				
Spindle speed	15000 rpm			
Transmission	Built-in			
Motor type	Asynchronous			
Bearing type (front/rear)	Angular ball			
Bearing cooling and lubrication	Oil/Air			
Power S1/S6-40%	A: 30/46 kW	B: 30/46 kW	A: 40/61 hp	B: 33.5/44.3 hp
Torque S1/S6-40%	A: 130/200 Nm	B: 130/200 Nm	A: 95.9/147.5 Ft/lbs	B: 88.5/118 Ft/lbs
MEASURING FEEDBACK				
Linear axes type	Linear scale			
Linear axes resolution	0.1 µm			
Rotary axes type	Rotary scale			
Rotary axis accuracy	±5"			
TOOL CHANGER				
Change type	Pick-up			
Magazine type	Carrousel (x2)			
Carousel drving system	(x2) Servomotor and gearbox			
Magazine positions	32/64 48/96 60/120			
Tool shank type	HSK-A63			
Maximum tool length	300 mm		11.8 in	
Maximum tool diameter (with adjacent pot empty)	Ø75/Ø120 mm		Ø3/Ø4.7 in	
Maximum tool weight	7 kg		15.4 lbs	
Max. loading weight	160 kg/352.7 lbs (32T); 240 kg/529.1 lbs (48T); 300 kg/661.3 lbs (60T); 320 kg/705.4 lbs (64T); 480 kg/1058.1lbs (96T); 600 kg/1322.7 lbs (120T)			
ACCURACY (VDI/DGQ 3441)				
Positionning	0.005 mm		0.0002 in	
Repeatability	±0.0025 mm		±0.00009 in	
EXTERNAL COOLANT SUPPLY				
Exteral nozzels coolant supply (number) pressure	(4x) 3 bar		(4x) 43.5 psi	
Exteral nozzels air supply (number) pressure	(2x) 6 bar		(2x) 87 psi	
Tank capacity	425 L		112.2 US gal	

COMMON DATA FOR G8 (CONT.)

SPINDLE THROUGH COOLANT SUPPLY (OPTIONAL)			
High pressure pump	40 bar		580.1 psi
Filter type	Catridge		
SPINDLE THROUGH COOLANT SUPPLY WITH SEPARATE TANK(OPTIONAL)			
High pressure pump	40/70 bar		580.1/1015.2 psi
High pressure pump with stepless programable pressure	0-70 bar stepless		0-1015.2 psi stepless
Filter type	Catridge and paper band		
Additional accessory	Coolant chiller and oil skimmer		
CONTROL UNIT			
Brand/Model	Heidenhain TNC 640	Sinumerik ONE	Fanuc 31i-B5 plus
SUPPLIES			
Installed power	85 kVA		
DIMEMSION			
Length	3565 mm/140.3 in (32T/64T); 4165 mm/163.9 in (48T/96T); 4630 mm/182.2 in (60T/120T)		
Width	4410 mm		173.6 in
Height	3779 mm		148.7 in
Weight	18000 kg		39683 lbs
Floor Space	3565x4410mm/140.3x173.6 in (32T/64T); 4165x4410 mm/ 163.9x173.6 in(48T/96T); 4630x4410 mm/182.2x173.6 in (60T/120T)		

SPECIFIC DATA FOR G8

WORKPIECE AND TABLE (NOTE1)				
Maximum table load (note 2)	B: 1200 kg	A/C: 1300 kg	B: 2645 kg	A/C: 2866 kg
Pitch of T-slot	B/C: 90 mm	A: 100 mm	B/C: 3.5 mm	A: 3.9 mm
SPINDLE				
Spindle taper	HSK-A63			
Spindle nose to rotary table clamping surface	130~730 mm		5.1~28.7 in	
ROTARY AXES (NOTE1)				
Maximum sviwelling (A) speed (note 2)	80 rpm			
Maximum rotary (C) speed	100 rpm			
Driving system in swivelling (A) axis	Dual torque motor			
Driving system in rotary (C) axis	Torque motor			

SPECIFIC DATA FOR G8 MT

WORKPIECE AND TABLE (NOTE1)		
Maximum table load	850(Turning) / 1200(Milling) kg	1873(Turning) / 2645(Milling) lbs
T-slot (w/pitch/no)	14 x 30 x 12 mm	0.5x1.2x0.5 in
SPINDLE		
Spindle taper	HSK-T63	
Spindle nose to rotary table clamping surface	130~730 mm	5.1~28.7 in
ROTARY AXES (NOTE1)		
Maximum sviwelling (A) speed	15(Turning) / 100(Milling) rpm	
Maximum rotary (C) speed	1000(Turning) / 100(Milling) rpm	
Driving system in swivelling (A) axis	Dual torque motor	
Driving system in rotary (C) axis	Torque motor	
Power & torque of swivelling (A) axis	20.4/1948x2 kW/Nm	27.3/1436.8x1.4 hp/ Ft/lbs
Power & torque of rotary (C) axis	55/525 kW/Nm	73.7/387.2 hp/ Ft/lbs
Brake type of swivelling (A) axis	Hydraulic clamping	
Braking torque of swivelling (A) axis	4000x2 Nm	2950.4x1.4 Ft/lbs
Brake type of rotary (C) axis	Hydraulic clamping	
Braking torque of rotary (C) axis	4000 Nm	2950.4 Ft/lbs

** Specifications are subject to change without notice.*
** NOTE1: Rotary-tilting table details may differ depending on the table manufacturer.*
** NOTE2: The tech data may vary according to different brands.*

AXILE HEADQUARTERS

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