

AXILE V-series

C-type
3-Axis Vertical
Machining Center



BUFFALO MACHINERY CO., LTD.

56, Lane 318, Desheng Road, Daya District,
Taichung City 428-46, Taiwan
P.O. Box 320, Daya, Taichung City, Taiwan
Tel: +886-4-25 60 37 59 Fax: +886-4-25 60 37 69
E-mail: info@mail.buffalo.com.tw
www.buffalo-machinery.com



National Award
of Outstanding



ISO 9001:2015
FM 538421



ISO 14001:2015
EMS 546518



ISO 50001:2011
ENMS 642457

www.axilemachine.com

> AXILE /'æksail/, stands for "agile"

Agility is the best word to define the identity of AXILE. Motor agility is the ability to move quickly and precisely, which is the essence of **high-speed machining**. Mental agility is the ability to think and understand quickly, to be **smart** in other words.

AXILE provides agile smart machining.

Highly sophisticated part manufacturers face the same problems everywhere: lower selling prices every day, higher costs and a shortage of specialized labour. AXILE proposes highly productive machines based on **high-speed and 5-axis technologies at very competitive prices**.

The new AXILE line is built with **standard high-tech design and components** from world-class suppliers to **ensure the best quality and reliability**. AXILE patented **SMT technology** attains reaching high levels of **accuracy** and embraces **Industrie 4.0 technologies**, **reliability** is upgraded, maintenance costs minimized and downtime avoided.

AXILE products are proudly designed and manufactured at Buffalo's facilities, one of the leading technology manufacturers in **Taichung (Taiwan)**. Taichung is the world's biggest **cluster of machine tool builders**, thanks to abundant specialized workforce and a component supply chain far more efficient than in any other country. The rationalized range of 3X and 5X high-speed VMC's covers only the most requested sizes to reach economies of scale to maintain reasonable market prices.

AXILE is conceived to conquer the premium market of 3X and 5X high-speed vertical machining centers. Such markets will grow and AXILE will be the real Asian big player amongst its European competitors.

AXILE, motor and mental agility at a competitive price.



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Design concept

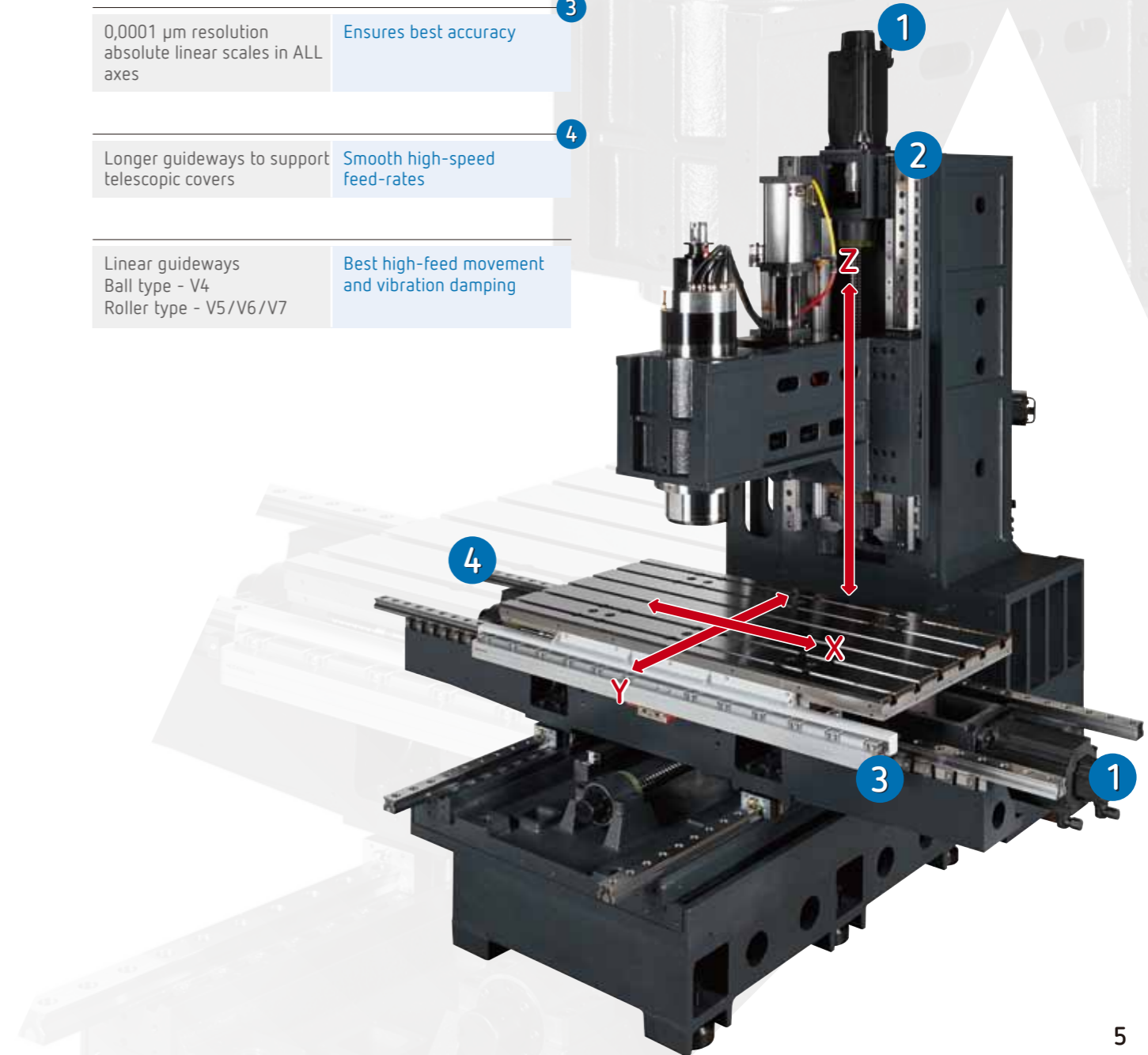
The structure



Flat support for tool magazine directly supported on the floor	No bending of the column and no limitation for bigger, heavier magazines	1
C-type proven design	High rigidity of Z-axis and spindle headstock Same behavior in full X and Y travel	2
All body made of high-quality casting	Optimal damping of machining vibrations Homogeneous thermal behaviour	3
Wide distance between Y-axis guides	Best support for saddle and table and stable machining even with heavy loads	4

Agility

Direct driven servomotors (no belts/gears)	Best dynamic and minimal elasticity in the driving chain	1
No counterbalance for Z-axis	Best dynamics using high-power Z-axis servo motor	2
0,0001 μm resolution absolute linear scales in ALL axes	Ensures best accuracy	3
Longer guideways to support telescopic covers	Smooth high-speed feed-rates	4
Linear guideways Ball type - V4 Roller type - V5/V6/V7	Best high-feed movement and vibration damping	



Smart Technology




Smart Machining Technology (SMT)

High-speed and 5-axis technologies pursue lower manufacturing costs for complex products, but they also represent some serious challenges for accuracy and reliability. This is why Buffalo dedicated almost a decade to research the necessary knowledge to dominate such technologies. We call them SMT.

- 
Tool-tip Positioning Control (TPC) PATENTED
 Direct displacement measure and real-time monitoring and compensation technology
- 
Metal Removal Rate Optimization (MRRO) PATENTED
 Maximal metal removal rate, cutting force and chatter-free machining
- 
Axial Accuracy Control (AAC) PATENTED
 A machine thermo monitoring and compensation technology
- 
Spindle Vibration Supervision (SVS) PATENTED
 Spindle vibration monitoring and real-time control technology

Axile Reliability Technology (ART)

Axile also embraces Industrie 4.0 and is developing its own patented technologies called ART. The main components of the machine will be equipped with sensors that collect relevant data like vibration, acceleration or temperature, to monitor working conditions in real-time.

- 
Reliability Maintenance (RM) PATENT PENDING
 Predictive maintenance
- 
Energy Management (EM) PATENT PENDING
 ISO14955 (Eco-friendly)
- 
Manufacturing Process (MP) PATENT PENDING
 Process & production planning

Reliability

SMT and ART technologies are applied to predict Mean Time Between Failure (MTBF)

Spindle Vibration Supervision

SVS

How to real-time monitor the spindle vibration to remain the machining accuracy under long time operation?

VIBRATION SENSOR → AMPLIFIER → MPU → CNC

compensation command

MEMORY

- **HIGH FINISH QUALITY**
Spindle Life Time
- **LONGER LIFE TIME**
Wear reduction on spindle bearings and tools
- **EASY FOR MAINTENANCE**
Abnormal vibration data recording

THREE LEVELS FOR SPINDLE VIBRATION MONITORING

Velocity (mm/s)

LEVEL 3

LEVEL 2

LEVEL 1

shock

starting time

duration

ending time

time (sec)

- LEVEL 1**
shows the warning message to notify operator
- LEVEL 2**
shows the error message and reduces spindle speed and feed rate
- LEVEL 3**
machine shut down immediately to prevent crash

Reliability Maintenance

RM

Machine

Field Data Acquir

Processor

Database

Monitor

Analysis

Reliability Maintenance

Cloud Analysis & Application

Accuracy

Linear axes accuracy

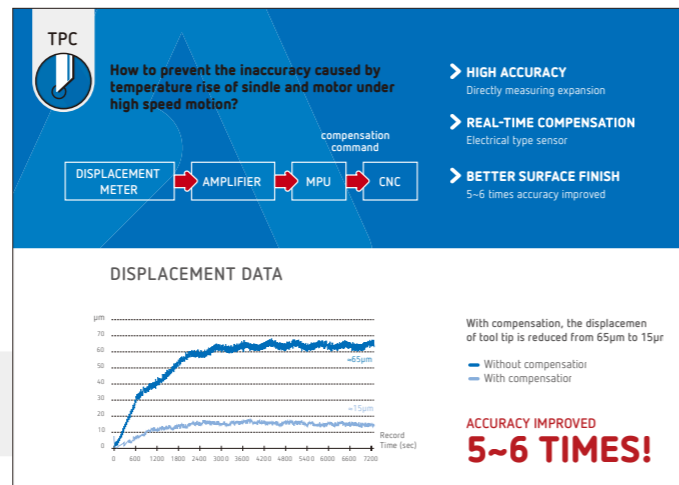
Ballscrew's thermal growth

0.001 μ m resolution absolute linear scales in ALL axes



Spindle thermal growth at high-speed

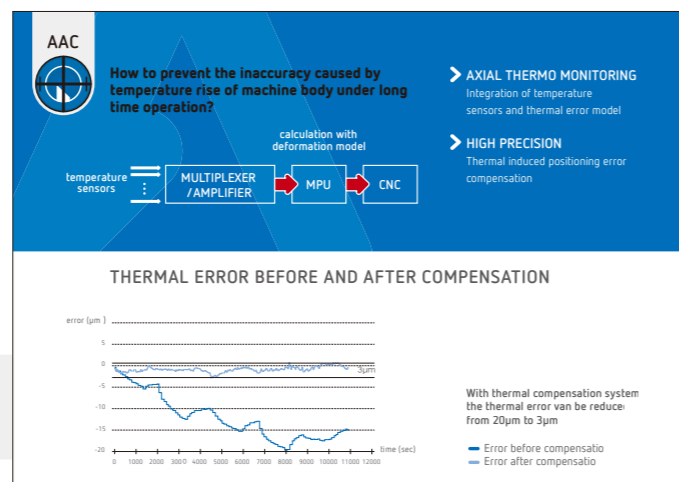
TPC



Tool-tip Positioning Control

Angular deformation in machine body causing linear errors

AAC



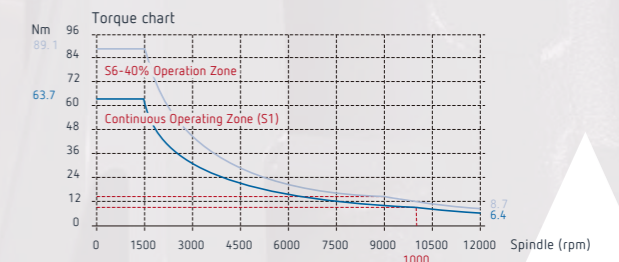
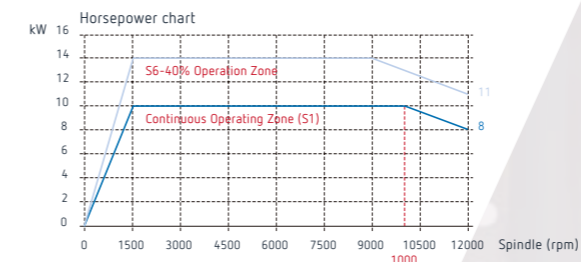
Axial Accuracy Control

Spindle

In-line high-performance spindles V4/V5/V6/V7

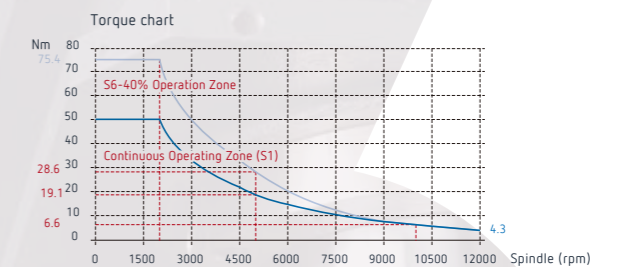
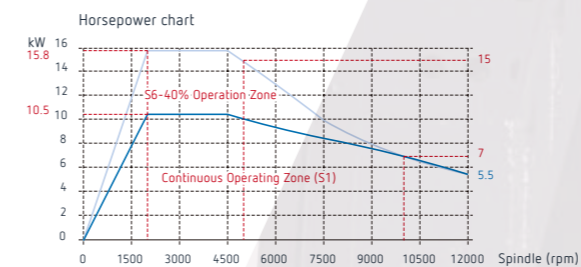
Heidenhain

Spindle Motor Heidenhain QAN-200UH



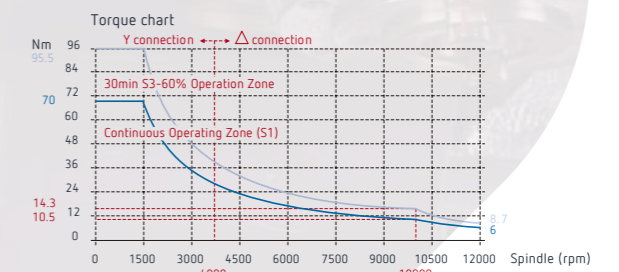
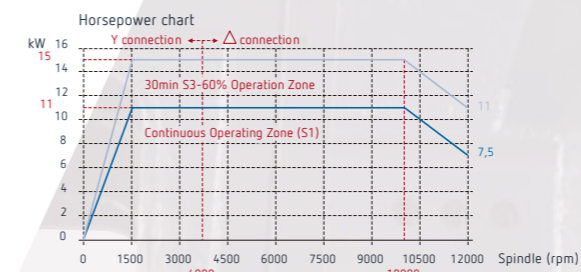
Siemens

Spindle Motor Siemens 1PH8107-1SG02-3LA1



Fanuc

Spindle Motor Fanuc aiT12



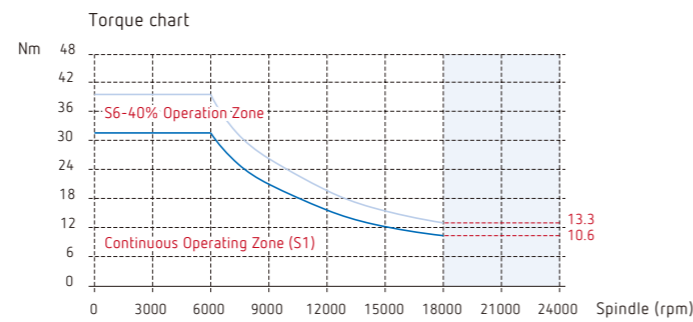
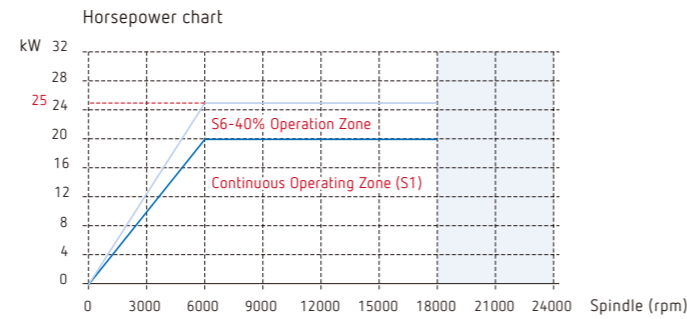
Spindle

High speed built-in spindles

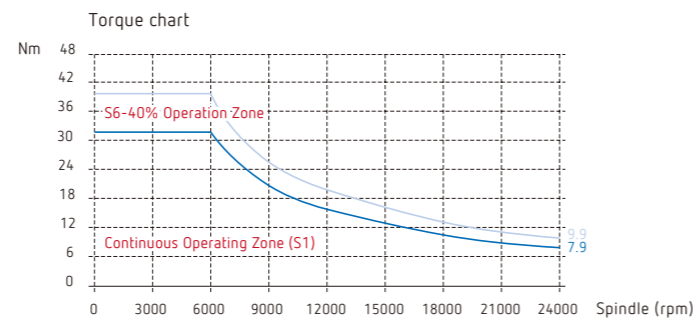
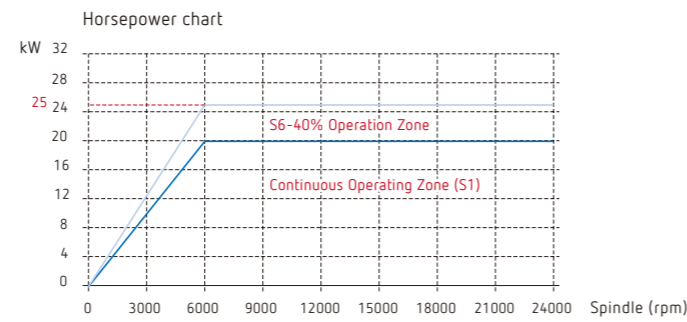


V4/V5

- > 18.000 rpm
- > 20/25 kW S1/S6-40%
- > 31,8/40 Nm S1/S6-40%

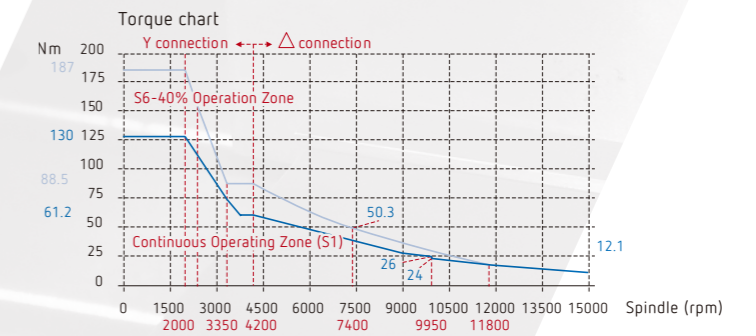
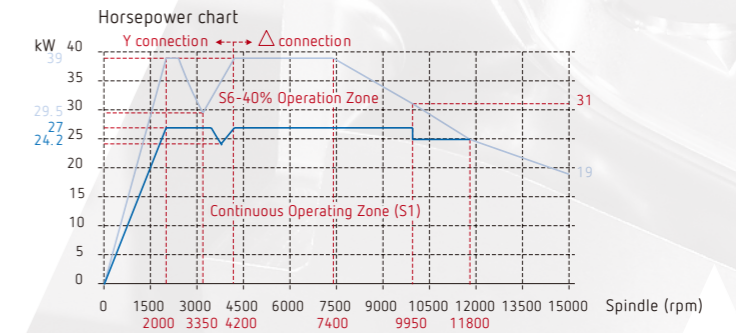


- > 24.000 rpm
- > 20/25 kW S1/S6-40%
- > 31,8/40 Nm S1/S6-40%

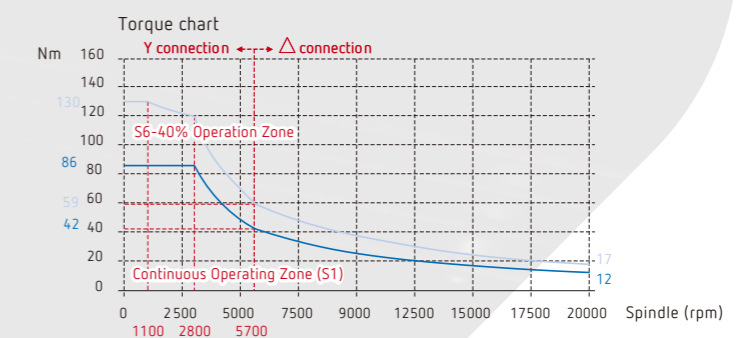
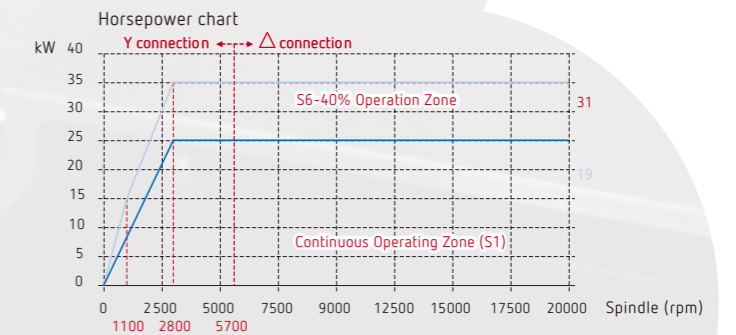


V6/V7

- > 15.000 rpm
- > Double winding synchronous motor
- > 130/187 Nm S1/S6-40%
- > 27/39 kW S1/S6-40%



- > 20.000 rpm
- > Double winding synchronous motor
- > 86/130 Nm S1/S6-40%
- > 25/35 kW S1/S6-40%



➤ Chip and tool management

Flushing chips away



- 1 Chip flushing
- 2 Coolant through spindle
- 3 Coolant at spindle

32 tools



40 tools



40 tool magazine: tools are accessible by operator

Surveillance and maintenance of tools is possible while machine is in automatic mode.

➤ Control unit

A controller for every user

Heidenhain
iTNC 530 HSCI / TNC 640

Siemens
840D sl

Fanuc
31iMB

- High performance path control available
- Automatic smoothing of contour
- Perfect surfaces can be created with any CAM tool
- 3D radius compensation available
- Quick mid program start up on specific NC blocks

- 3D line graphics enables visualization of externally generated NC programs
- Free contour programming

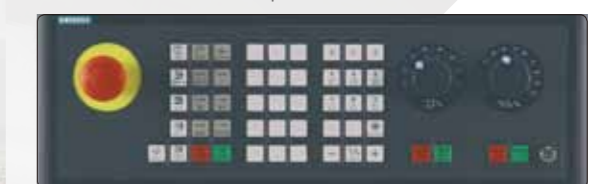
Heidenhain TNC640



Siemens 840D sl- top part



Siemens 840D sl- bottom part

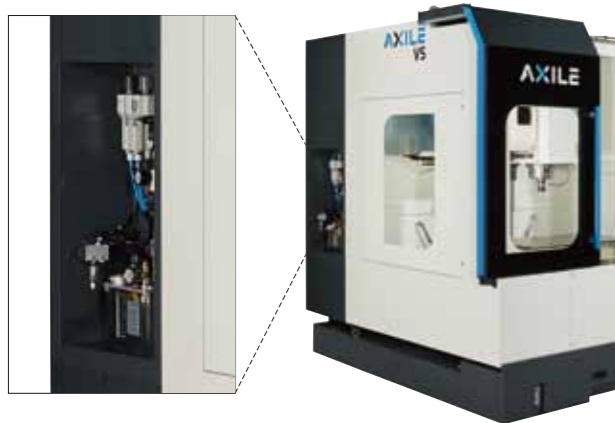


➤ Ergonomics

Accessibility to work area and focus on the operator

Wide opening of front door. Complete roof integrated in the door. Over-head crane reaches table center

Easy access, loading and unloading of bulky and heavy workpieces



All necessary consumables are located in the back for convenient checking and tank re-filling

Easier maintenance routine for operator

Standard chain type lift conveyor in front of the machine

Chip bucket can easily be reached from the machine front

Swivelling control panel on the right side

Comfortable operator usage and compact design



➤ Standard and optional equipment

Standard details of a premium machine



Electrical cabinet in the right side of machine

Improves the layout as the back of the machine can be place close to wall



Separate type cooling unit including:

- > Cartridge filter
- > Paper filter
- > Through spindle 20 bar centrifugal pump or ...
- > Through spindle 70 bar screw type pump with stepless programmable pressure
- > Oil skimmer
- > Coolant chiller

Recommended for high aluminum or cast iron material cutting

“Customize the machine to your needs”

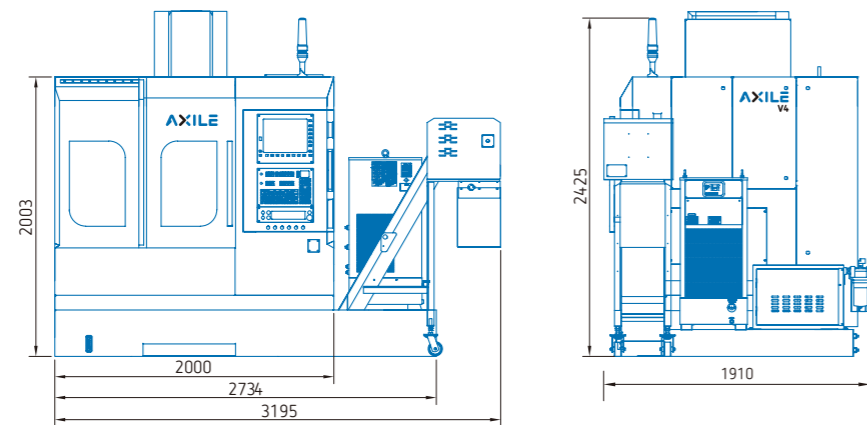
Chain-type chip conveyor and high pressure (20 bar) coolant through spindle

Machine is prepared for every machining operation

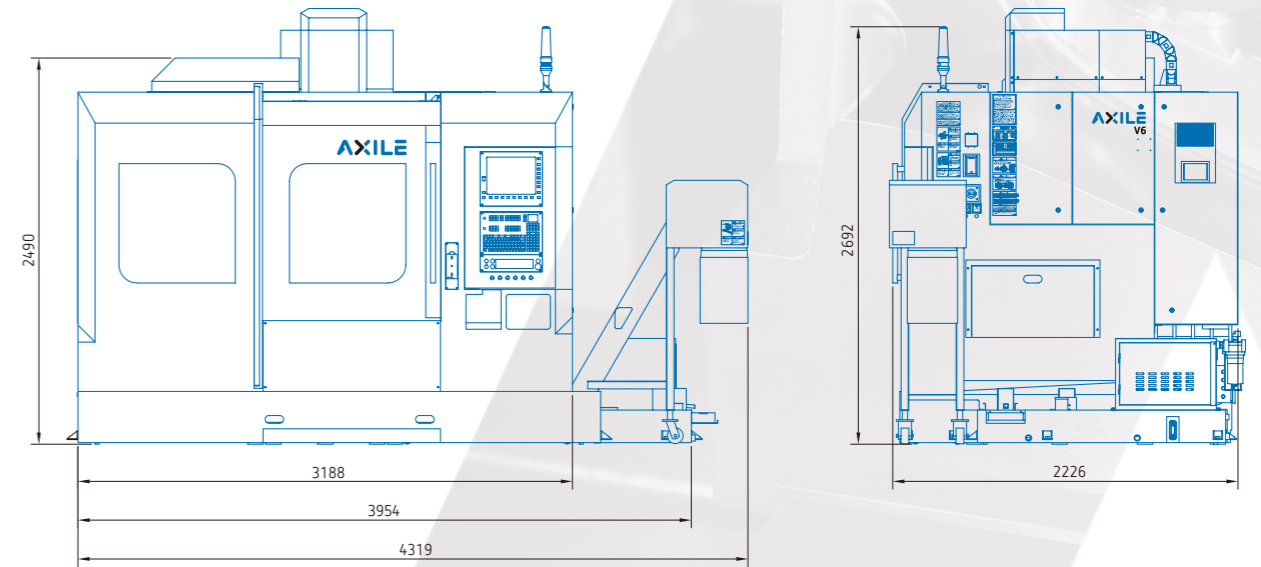


Layout

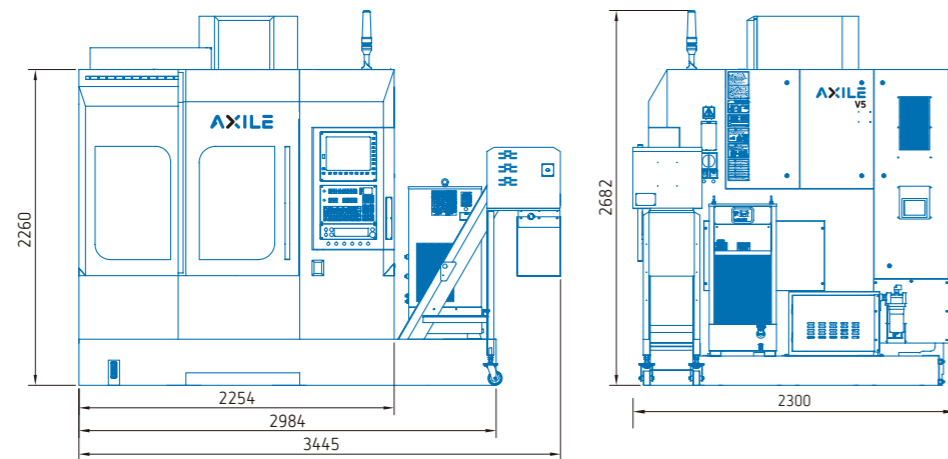
AXILE
V4



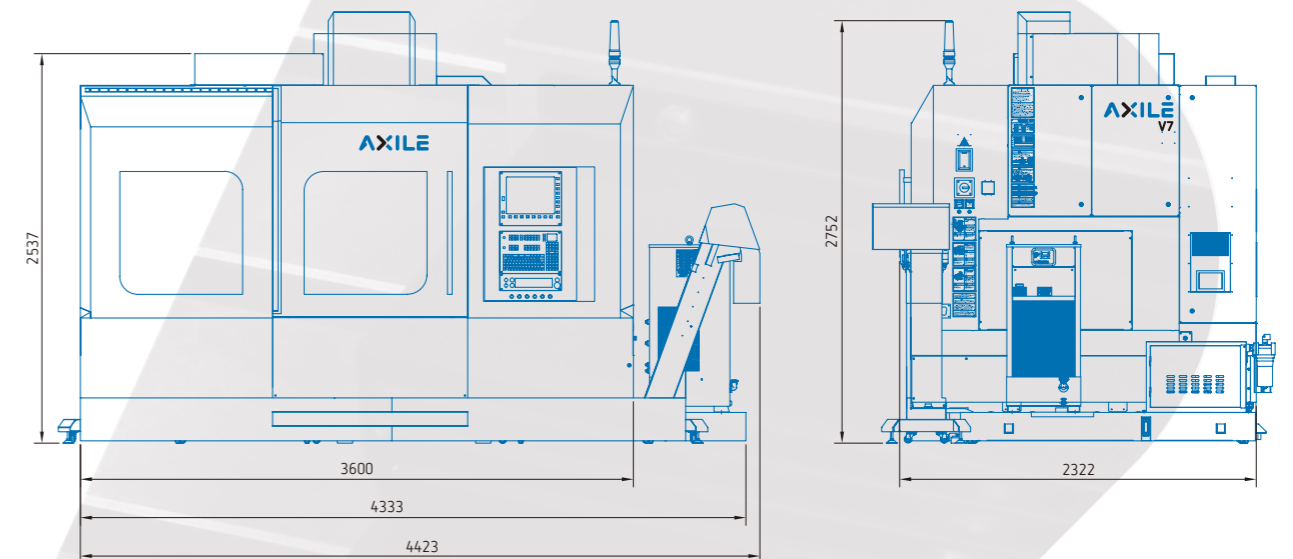
AXILE
V6



AXILE
V5



AXILE
V7



> Technical data

Basic parameters

LINEAR AXES		V4	V5	V6	V7
X travel (carriage left and right)	mm	600	800	1050	1200
Y travel (gantry back and forth)	mm	400	500	600	730
Z travel (headstock up and down)	mm	450	500	600	650
Max feedrate X/Y/Z	m/min	36	40	40	40
WORKPIECE AND TABLE					
Table size	mm	770x410	900x520	1200x600	1400x710
Maximum table load	kg	400	600	800	1000
IN-LINE SPINDLE (STANDARD)					
Spindle taper		ISO40	ISO40	ISO40	ISO40
Max Speed	rpm	12000	12000	12000	12000
Power S1/S6-40%(Heidenhain)	kW	10 / 14	10 / 14	10 / 14	10 / 14
Torque S1/S6-40% (Heidenhain)	Nm	63.7 / 89.1	63.7 / 89.1	63.7 / 89.1	63.7 / 89.1
Power S1/S6-40% (Siemens)	kW	10.5 / 15.8	10.5 / 15.8	10.5 / 15.8	10.5 / 15.8
Torque S1/S6-40% (Siemens)	Nm	50 / 75.4	50 / 75.4	50 / 75.4	50 / 75.4
Power S1/S6-40% (Fanuc)	kW	11 / 15	11 / 15	11 / 15	11 / 15
Torque S1/S6-40% (Fanuc)	Nm	70 / 95.5	70 / 95.5	70 / 95.5	70 / 95.5
BUILT-IN SPINDLE (OPTION)					
Spindle taper		HSK-A63	HSK-A63	HSK-A63	HSK-A63
Max Speed	rpm	18000	18000	15000	15000
Power S1/S6 (40%)	kW	20 / 25	20 / 25	27 / 39	27 / 39
Torque S1/S6 (40%)	Nm	31.8 / 40	31.8 / 40	130 / 187	130 / 187
BUILT-IN SPINDLE (OPTION)					
Spindle taper		HSK-A63	HSK-A63	HSK-A63	HSK-A63
Max Speed	rpm	24000	24000	20000	20000
Power S1/S6-40%	kW	20 / 25	20 / 25	25 / 35	25 / 35
Torque S1/S6-40%	Nm	31.8 / 40	31.8 / 40	86 / 130	86 / 130
TOOL CHANGER					
Magazine positions		30/32/40	30/32/40	30/32/40	30/32/40
Change time T-T (50/60 Hz)	s	1.55 / 1.31	1.55 / 1.31	1.55 / 1.31	1.55 / 1.31
Maximum tool length	mm	200	300	300	300
Maximum tool diameter (with adjacent pot empty)	mm	75 / 125	75 / 125	75 / 125	75 / 125
Maximum tool weight	kg	8	8	8	8
ACCURACY (VDI/DGQ 3441)					
Positioning	mm	0.01/300	0.01/300	0.01/300	0.01/300
Repeatability	mm	0.01	0.01	0.01	0.01
CONTROL UNIT					
Heidenhain		640/530	640/530	640/530	640/530
Siemens		840D	840D	840D	840D
Fanuc		31iMB	31iMB	31iMB	31iMB
WEIGHT					
Machine weight including accessories (aprox.)	kg	4350	6250	7000	8850

Construction details

LINEAR AXES		V4	V5	V6	V7
Linear guideways type		Ball Type	Roller Type	Roller Type	Roller Type
Linear guideways size X/Y/Z	mm	35	35	45	45
Distance between X/Y/Z axis guides	mm	300/620/400	360/700/400	400/700/400	405/920/400
Ballscrew type					
Ballscrew diameter/pitch	mm	32 x P12	40 x P16	40 x P16	40 x P16
X axis motor power/torque (Heidenhain)	kW/Nm	2.64/8.4	2.64/8.4	5.0 / 16	5.7/18.1
Y axis motor power/torque (Heidenhain)	kW/Nm	2.64/8.4	2.64/8.4	5.7 / 18.1	5.7/18.1
Z axis motor power/torque (Heidenhain)	kW/Nm	3.1/9.9	5.4/17.3	5.4 / 17.3	8.6/27.5
X axis motor power/torque (Siemens)	kW/Nm	1.5/6	2.7/12	3.7 / 18	3.7/18
Y axis motor power/torque (Siemens)	kW/Nm	2.3/11	2.7/12	3.7 / 18	4.9/27
Z axis motor power/torque (Siemens)	kW/Nm	2.3/11	4.9/27	4.9 / 27	5.4/36
X axis motor power/torque (Fanuc)	kW/Nm	2.2/8	2.2/8	4 / 22	4/22
Y axis motor power/torque (Fanuc)	kW/Nm	2.2/8	2.2/8	4 / 22	4/22
Z axis motor power/torque (Fanuc)	kW/Nm	3 / 12	4/22	5.5/40	5.5/40
TOOL CHANGER					
Change type		Arm Type	Arm Type	Arm Type	Arm Type
Magazine type		ChainType	ChainType	ChainType	ChainType
MEASURING FEEDBACK					
Linear axes type		Linear scales	Linear scales	Linear scales	Linear scales
Linear axes resolution	µm	0.001	0.001	0.001	0.001
SPINDLE THROUGH COOLANT SUPPLY (STANDARD)					
High pressure pump	bar	20	20	20	20
Filter accuracy	µm	25	25	25	25