



Samurai 220H Premium Model

Innovation Machining Center

WELCOME TO THE FUTURE OF MACHINE TOOLS

The introduction of the Samurai 220H marks a new chapter in Machine Tool technology. Small components are currently manufactured on relatively large machinery which is an inefficiency in machine purchase cost, energy and floorspace. Samurai have engineered the most compact and capable machine tool in the world by not following any design norms, and going back to fundamentals.

By utilising multiple 220H in your production facility, you will achieve a significant reduction in overall cycle time which is proportional to a reduction in lead time and increase in profits, while maintaining your perfect quality standards.

The new SAMURAI HMI™ control with custom Quick Setup screen allows for the fastest job setup times ever seen.

Machine Specification Summary

6kW Peak Spindle Power
8hp

400x240x360mm XYZ Working Envelope
15.75x9.44x14.17"

1160x910x1960mm WxDxH Machine Dimensions
45.67x35.83x77.95"

50m/min Max Rapid
1968ipm

0.1µm Positioning Resolution
0.000039"

1000Kg Machine Mass
2204lbs

£26,890 Price



The Most Advanced BT30 Tool Changer in the World

is also the Most Affordable

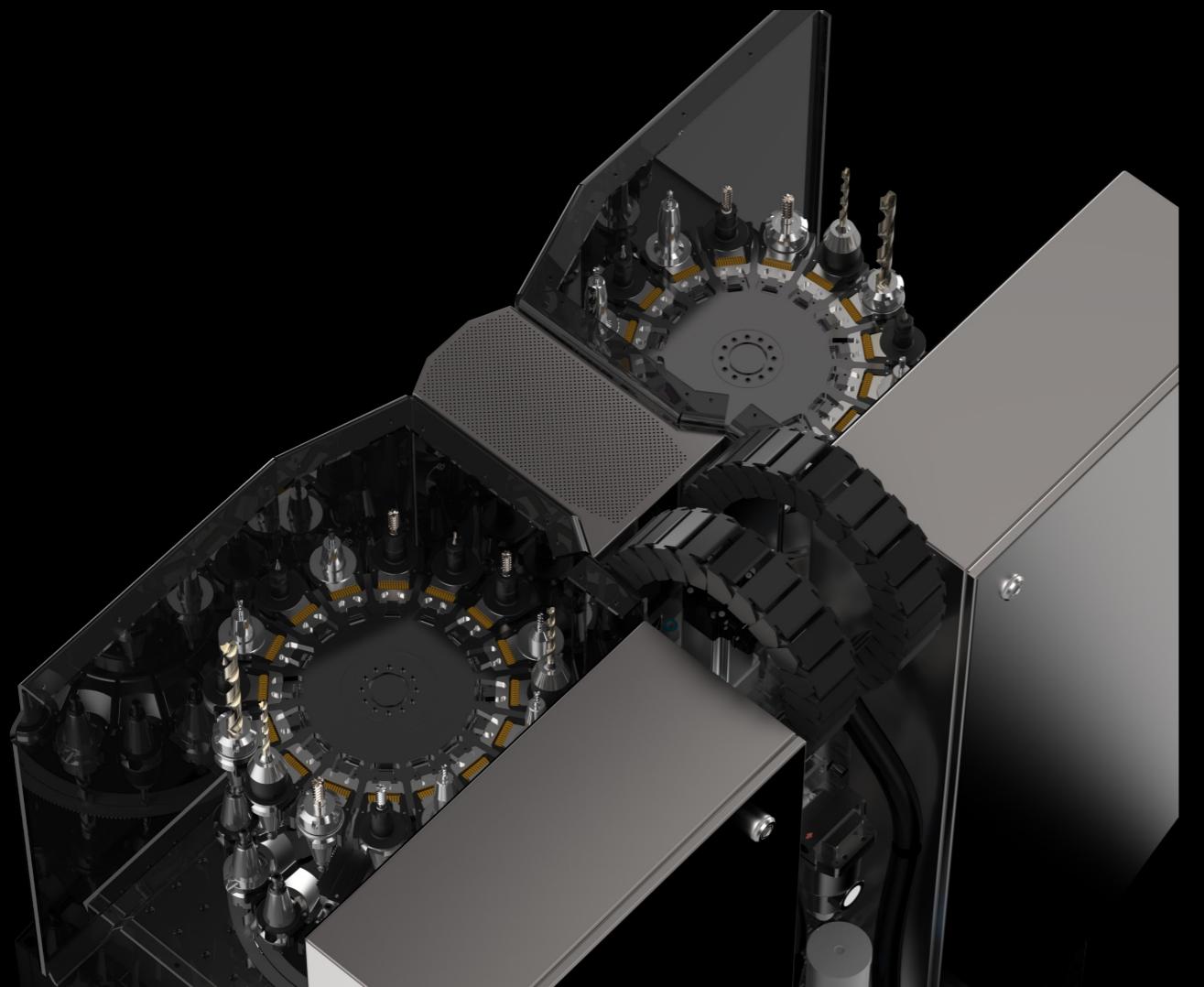
Samurai have developed the fastest, most compact and most affordable automatic tool changer for BT30 tooling. The Type 1 ATC was designed to be manufactured on the Samurai 220H therefore achieving a lower component cost that was not previously possible.

The multiple carousel design decouples the tool change time with tool storage capacity, allowing the 220H to exceed in both areas.

64 Tool Storage Capacity

0.5s* Tool to Tool time

0.9s** Chip to Chip time



Large tools up to 104mm diameter can be held in the carousel by following the specific guideline:

Extra Large Tools: Up to 104mm diameter, locks carousel to only one tool

Large Tools: Up to 82mm diameter, reduces carousel capacity from 16 to 8 tools

Normal Tools: Up to 51mm diameter, full carousel capacity

Long Tools: Up to 20mm diameter, full carousel capacity

Tool change speeds are adjusted in real time based on the automatic detection of tool size and weight.

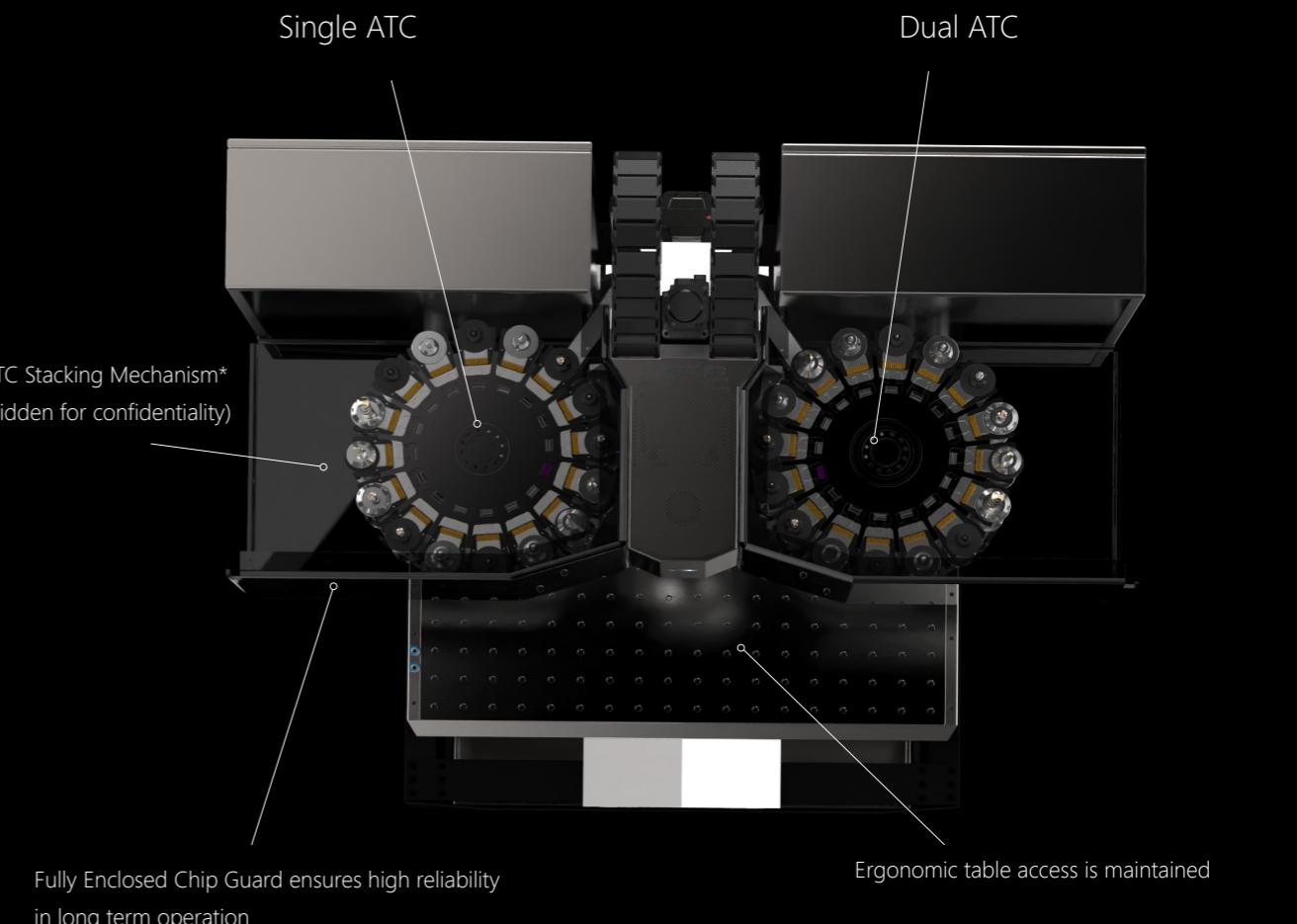
Tool to tool time
according to tool mass:

<1.2Kg 0.5s

1.2-2Kg 0.8s

2-3Kg 1.8s

3-4Kg 2.8s



Titanium ATC Arm increases acceleration

THK Caged Ball LM Guide
ensures long durability at high
speed

Brush keeps chips out and
allows for up to 300mm long
tooling



Fully Servo driven ATC ensures high performance and component wear feedback through servo load monitoring.

Dual ATC

Single ATC

The Perfect Ergonomics for Human Setup and Operation

120mm Distance from Table to Machine Front

Key Design Features

Ergonomics

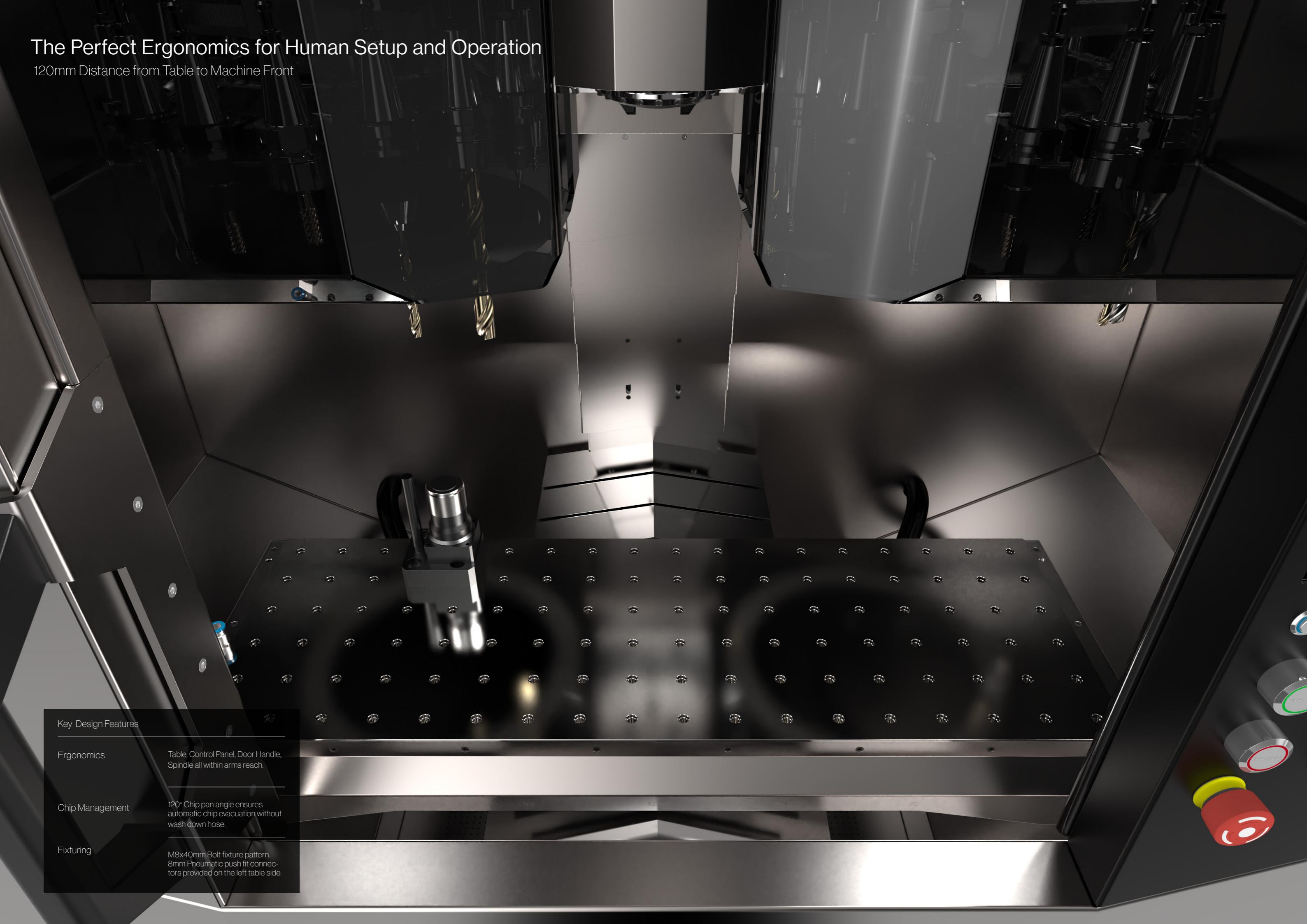
Table, Control Panel, Door Handle, Spindle all within arms reach.

Chip Management

120° Chip pan angle ensures automatic chip evacuation without wash down hose.

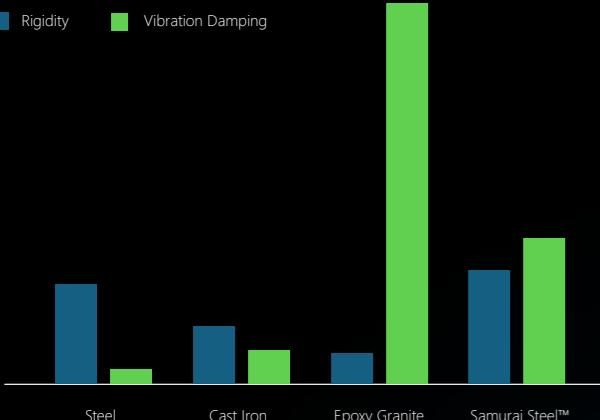
Fixturing

M8x40mm Bolt fixture pattern. 8mm Pneumatic push fit connectors provided on the left table side.



Samurai Steel™ Structure Achieves High Rigidity and Vibration Damping

A Revolution in machine frame technology



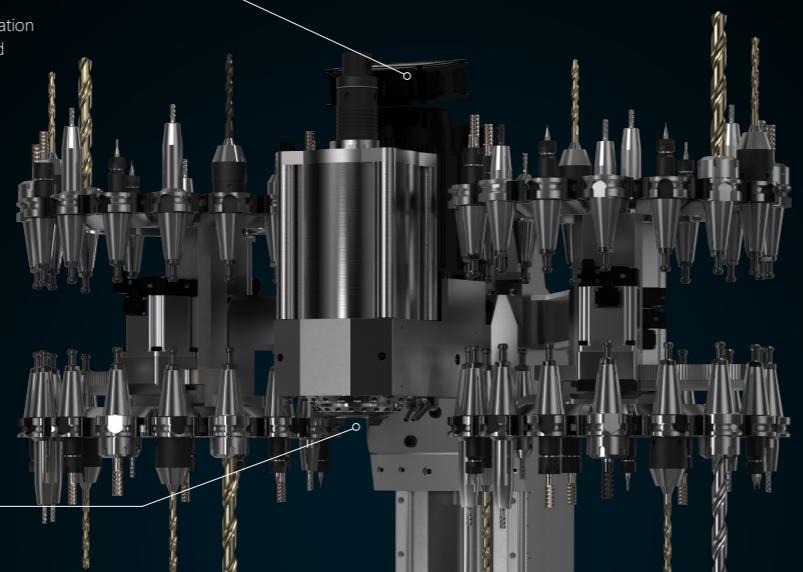
After an 8 year commitment to not develop machines with Cast Iron, Samurai have finally made a major breakthrough in machine frame technology.

Our Steel undergoes a confidential process to dramatically improve its vibration damping ability compared with traditional Cast Iron frame designs. With our approach, the traditional FEM frame analysis is not required to optimise the rib layout, since there are no ribs.

Samurai Steel™ is the key ingredient to building the first compact CNC machine that can achieve cutting performance and surface finish quality of much larger machinery.

Air Cooled Spindle Servo

Continuous thermally stable operation is achieved. Automatic fan speed adjustment.

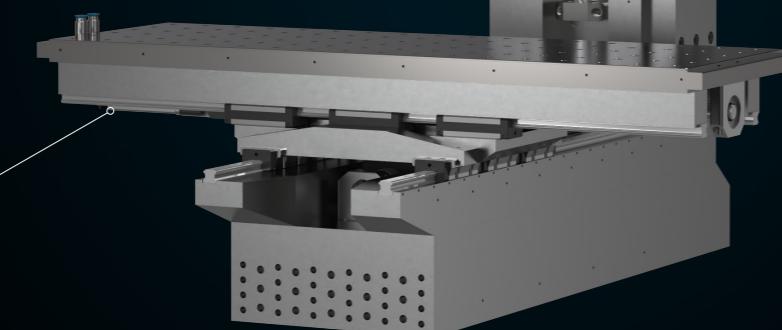


Large Z Axis Clearance

480mm max spindle nose to table distance for 4th or 5th axis integration.

High Rigidity LM Guide

THK SHS15 LM Guides are used with 3 carriages per rail to reduce wavering and increase rigidity.

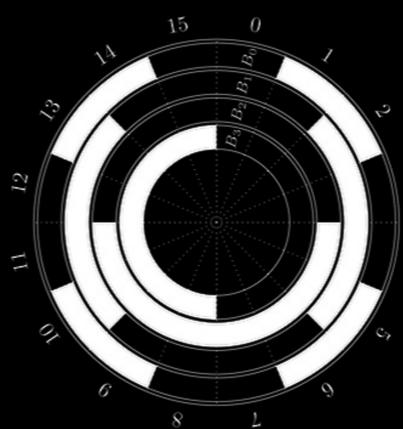


High precision HCFA Servo

X6 Servo with 23bit encoders. Advanced algorithm to suppress resonance vibration leads to higher dynamic rigidity.

THK Technology Enables High Precision

The global standard for Machine Tools



23 Bit Absolute Multi Turn Encoder

Machine Resolution

0.1 μ m

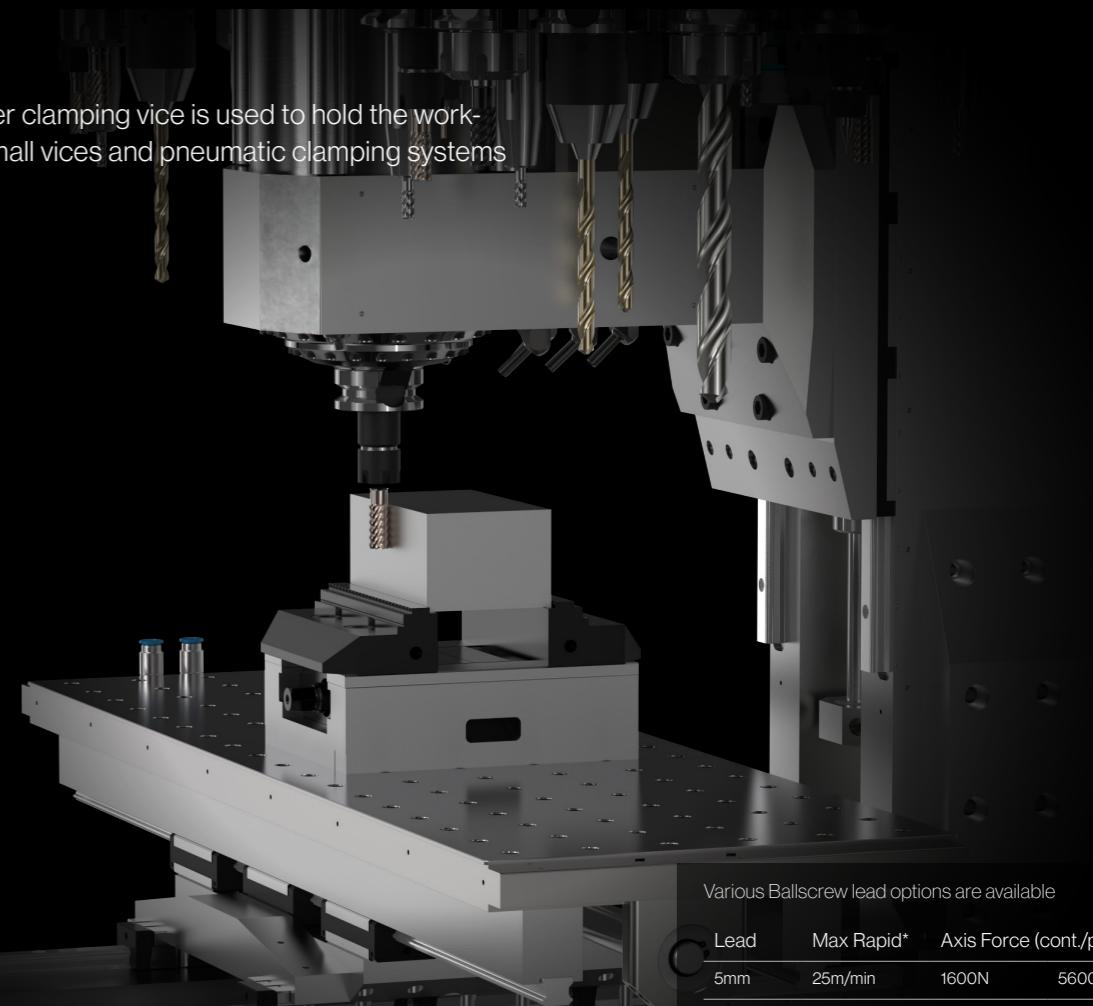
- 10 year encoder battery
- 0.0001mm
- Never requires homing
- 0.000039°



*SHS, HSR LM Guide is owned by THK Co., Ltd

All machines are made in the United Kingdom to ISO230-1:2012 standards.

SCHUNK KSC3 Center clamping vice is used to hold the work-piece. Other similar small vices and pneumatic clamping systems can be used.



Various Ballscrew lead options are available

Lead	Max Rapid*	Axis Force (cont./peak)**	
5mm	25m/min	1600N	5600N
6mm	30m/min	1330N	4670N
8mm	40m/min	1000N	3500N
10mm	50m/min	800N	2800N

*80% max rapid speed recommended for daily use. **Software may limit the force to prevent damage

Factories of the Future will be Beautiful

A mastery of Engineering is linked to a mastery of Art - When Engineering becomes exceptional, beauty is inevitable



Thermally Stable and High Power Density Spindle

The most spindle technology packed into the smallest space

Samurai developed the smallest #30 taper spindle without compromising on capability and features of typical machining centers. The low spindle mass enables hyper acceleration of the spindle rotation to achieve 6K RPM rigid tapping.

The use of a highly efficient servo motor combined with active air and water cooling allows the spindle to make 2kW continuous cuts in plastics or super alloys. Active temperature monitoring adjusts the Y axis position accordingly to cancel spindle position displacement.

6kW Peak Power

12,000RPM / 7.9Nm

23.4Nm / 4,000RPM

5µm Runout

Various Spindle RPM & Torque options available

12,000RPM / 7.9Nm

10,000RPM / 9.5Nm

8,000RPM / 11.9Nm

6,000RPM / 15.9Nm

4,000RPM / 23.4Nm



Energy efficient bearing protection

Labrynth seal combined with self generating air shield provides the highest level of protection from ingress of coolant without requiring a pressurised air supply.



Resource efficient spindle cooling

By utilising the main coolant system, space and cost of the spindle cooling method is reduced compared with a dedicated oil cooler.

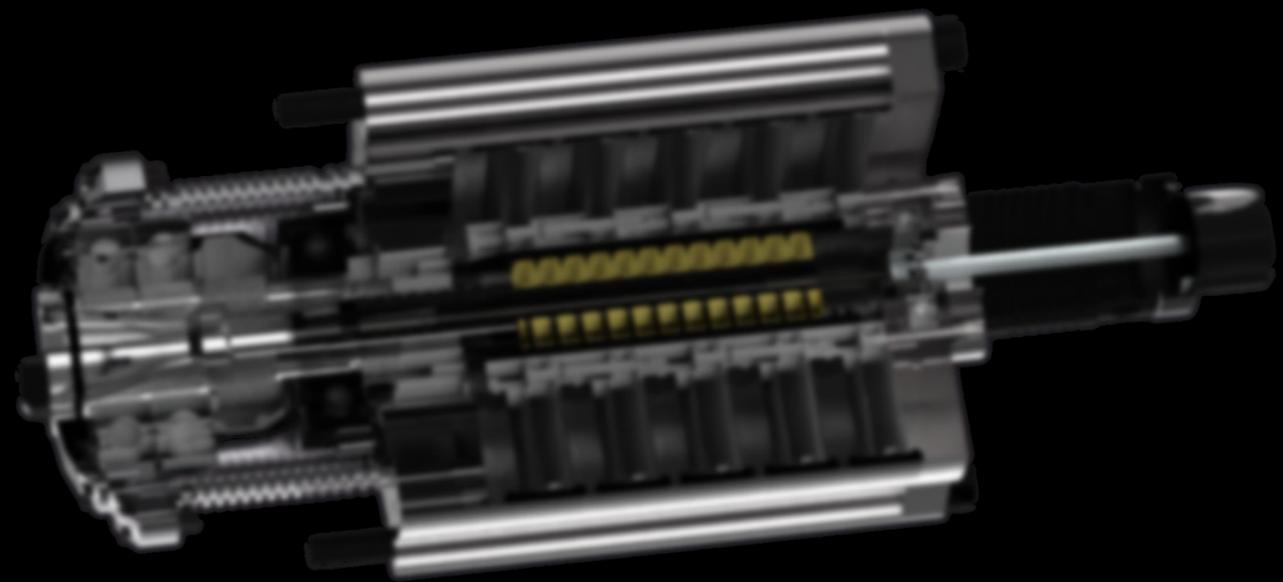


20 Bar Through Spindle Coolant

Rotary Union fitted as standard enables through spindle air and easy retrofitting of TSC pump (option).

NSK Super precision Angular contact Bearings

Back to back NSK spindle bearings provide high rigidity and precision at the spindle nose. Spring preloaded rear bearing ensures optimal bearing preload for the machines service life. Packed with NSK ROBUSTGRD™ grease to minimize environmental impact of oil and remove the need for relubrication.



A Sophisticated & Compact Coolant System

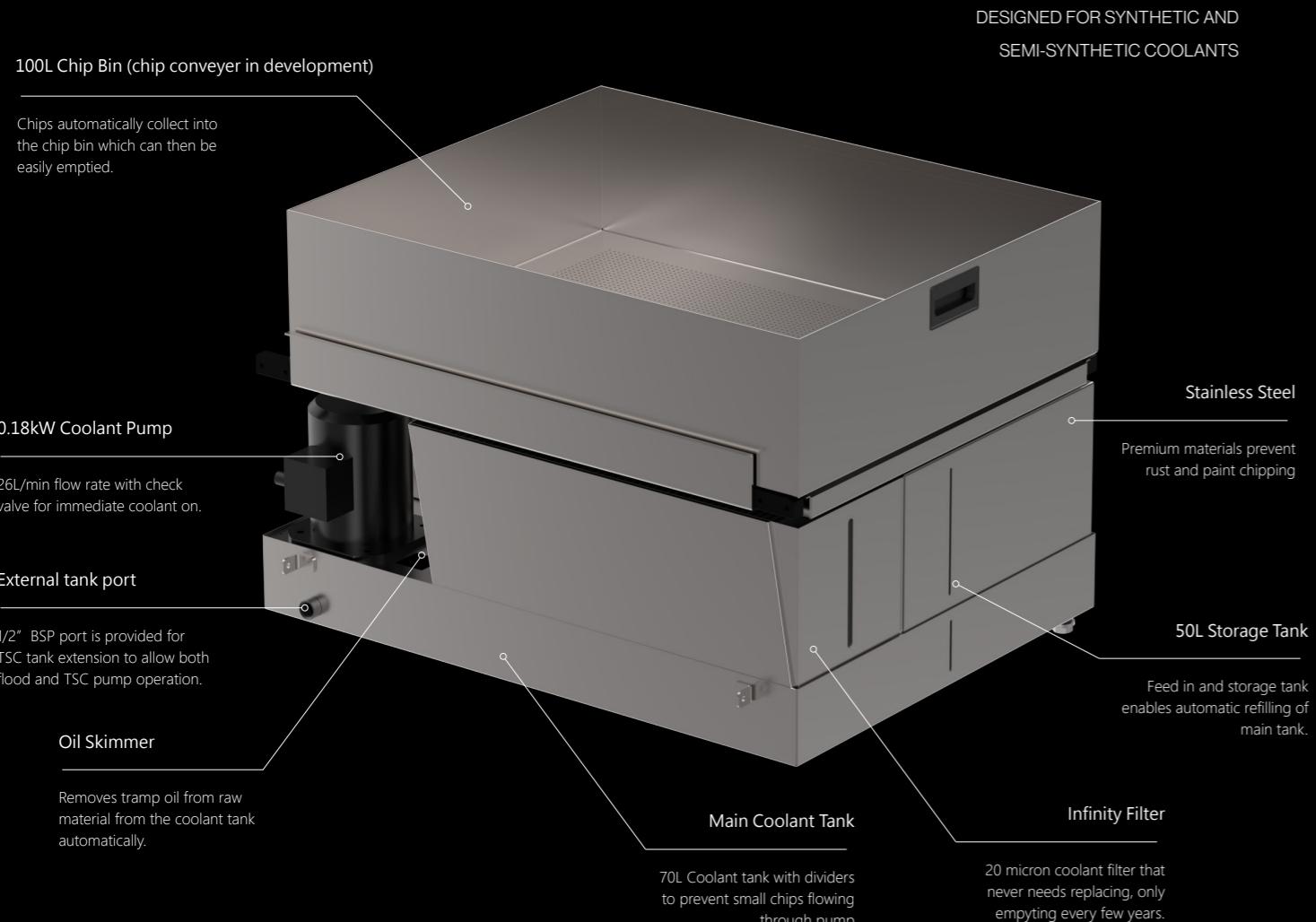
Automatic coolant management removes the need for operator management

"Machine tool manufacturers often neglect the coolant system which results in an unpleasant experience for the operator and visitors to the machining facility. The job of managing coolant is left to the customer and within their company most people do not want to do this job. Machinists are too busy to spend time managing coolant and companies would rather not waste resources on hiring coolant managers, who would need to interrupt the machining process anyway."

The result is coolant tanks that go foul and gather large amounts of bacteria, creating an unhealthy environment and a job that no one wants to do."

The future of coolant management is one done by robots, not humans
Samurai's innovation in coolant management makes automated coolant management affordable and reliable.

Using a combination of multiple sensors, valves and advanced software, the 220H is capable of precisely controlling the coolant concentration (option) and tank capacity without any human intervention.



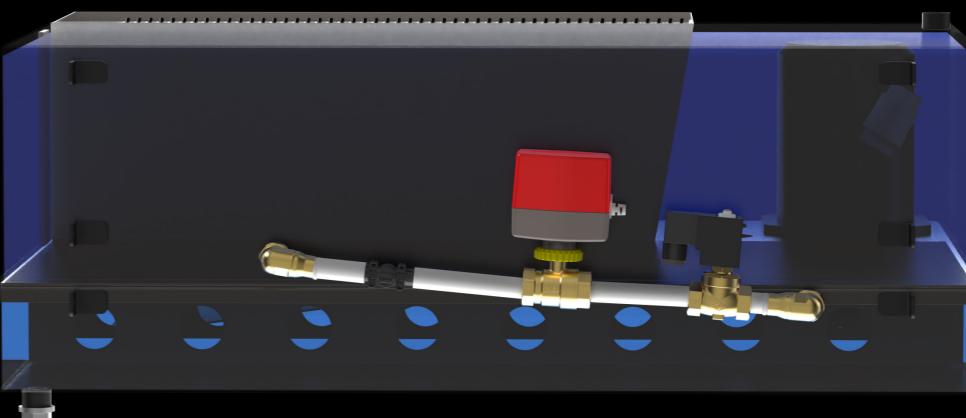
Samurai coolant filling method

By using a smaller main coolant tank the coolant needs to be replaced more often which ensures coolant at the cutting tip is always clean and new. To ensure the operator does not need to constantly refill the tank there is a storage tank and valve system to automatically refill the main tank. This valve system also allows the storage tank to be connected to a central coolant system pressurised at 3 bar. Best practice is to refill the central coolant system and let the machine take care of its coolant level. Automatic coolant concentration measurement and mixing is available as an option.



Triple Layer redundancy

Accidental overfilling due to component or software failure is prevented with the triple redundancy layer. Upon power disconnection valves are automatically shut by spring and capacitor to shut ball valve. Manually operated valve included.



Samurai coolant processing method

Coolant enters the chip bin and roughing chips are filtered out, then the remaining coolant and fine chips pass through a coolant guide plate with a finer filter to the infinity filter which has a 20 Liter storage of fine chips. Only very clean coolant can enter the main coolant tank, but there are still dividers to prevent any remaining chips from having a direct path to the pump.

The Control of the Future - SAMURAI HMi™

A Machine Control with Intelligence

The demand for a control that is reliable but also has functionality of modern computer systems sparked the development of the SAMURAI HMi™.

Built from the ground up in 2025, it carries no unnecessary traditions or procedures and simply provides the most efficient and ergonomic operator experience.



The Windows - PLC duality provides exceptional reliability and allows full use of Windows software on the machine control. CAD/CAM software can be run locally on the machine, as well as remote monitoring software that allows full machine control from any location.

Optional Windows Configuration: Windows 11 LSTC IoT Enterprise, i7 CPU, 64GB RAM, 1TB SSD
Wifi & Bluetooth modules can be removed upon request.

Custom Macros, Samurai Post Processor, Legacy Mode, PLC Programming, OPC UA connection and Fanuc Post processor compatibility are available.

Zone Mode

For running high volume jobs with a short cycle time, the operator now is displayed only the information that is relevant to their task. Part time remaining, including audible reminders at set times, part count remaining, estimated job completion time, part changeover time history are displayed.



Tool Management

The most efficient method to set and monitor tooling. Full carousel is visible and tooling can quickly be selected and loaded in the spindle. Tool life is monitored and tools are automatically replaced with backup tools in the carousel when a wear threshold is reached. Auto organise to perfectly optimise tool position to reduce cycle time in production.



Production Run

After the first part run has been completed successfully, the operator can switch to Production Run mode. It displays only the information that is useful during production, such as remaining cycle time, current positions, G Code display, and active tooling. The tooling cards show all tools in the program, and their expected remaining life.

First Run

To ease the initial setup process and for small batch operation, a screen specific to running a new setup has been developed. The machine automatically detects changes in the tooling, offsets or program and switches to first run mode. Information relevant to the operator is displayed, such as axis and spindle load monitoring, active and next tools, and time remaining till next tool change, Z retract. Automatic reduction of rapid, tool change rates, and tool change wait for unproven tools. Axis forces are automatically reduced for the first Z move, and collision detection is active. Spindle and feedrate overrides can automatically be written to the program with one button.

Quick Setup

Not all setups are complicated, so we have optimised a setup screen to contain everything needed to setup the machine with no excess. Everything fits on one screen which saves the operator time and effort. Manual probing function allows jogging the axis into a probe and the position is measured. There is no need for setting up a probing routine, however these can be accessed in Advanced Setup. Tooling in the program is scanned and compared with the tool library. Tools that do not match are flagged and can be quickly set with one button to guide loading tools into the spindle. Full MDI function for traditional machine

Detailed Info

Every object can be selected to provide more detailed information. Using the 3rd dimension allows for vast amounts of information to be displayed without cluttering up main screens. Selecting the Cycle remaining object provides fully detailed timing info, such as time till the next Tool change, Z Retract, Line or M Code. Total cutting and non cutting times are displayed. Stop and retract function allows the operator to pause the machine at the next Z Retract, Tool Change or other code without having to manually wait to feedhold at the correct time.

THE FUTURE OF PRODUCTIVITY

Reduce cycle time with higher spindle count

"As machining technology becomes fully optimised, there is no longer significant improvement. Machines run as fast as possible and tooling would overheat if it's run faster.

The result is marginal cycle time improvements per year with no drastic change."

To drastically reduce cycle time more spindles must be used.
The 220H is small and affordable enough to put multiple spindles in the same space as larger machinery.

Per unit of floorspace the Samurai 220H can achieve up to 500% overall cycle time reduction compared with traditional machining centers.

Feeds and speeds are typically limited by heat generation at the cutting edge. By using more spindles each cutting tool can be run slower to increase tool life while overall production time is reduced.

Specification	Traditional VMC	220H x5
Footprint (W • L)	5.76m ²	5.27m ²
Working envelope (X • Y)	0.32m ²	0.48m ²
Power	18kW	30kW
RPM	12,000	60,000
ATC Capacity	30	320

Traditional VMC	Traditional VMC	Samurai 220H				
Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H
Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H	Samurai 220H





Safety Door Interlock System

Door interlock system included as standard conforms to EN ISO 13849-1

Jog Buttons with Motorised Slider

To replace the traditional MPG, Samurai developed a more efficient method to setup work offsets using a dedicated jog speed/step slider. Custom step and feedrate presets can be set in control and motor function creates the physical presets on the slider.



360° Pallet Truck Access

Both standard and wide size pallet trucks can move the machine from all 4 directions.



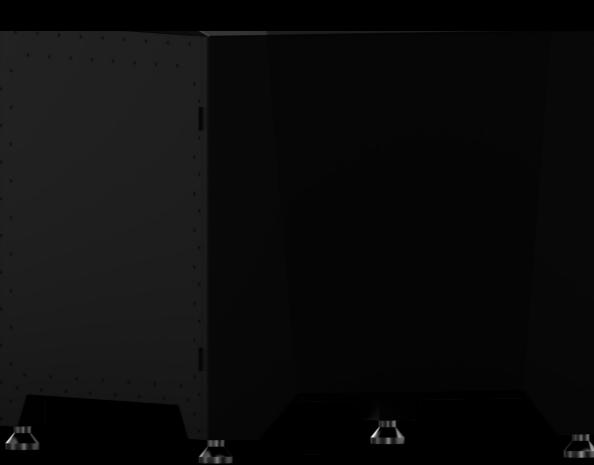
Automatic Grease Lubrication System

As standard fitted automatic grease lubrication system with 5 years of grease cartridges provided.



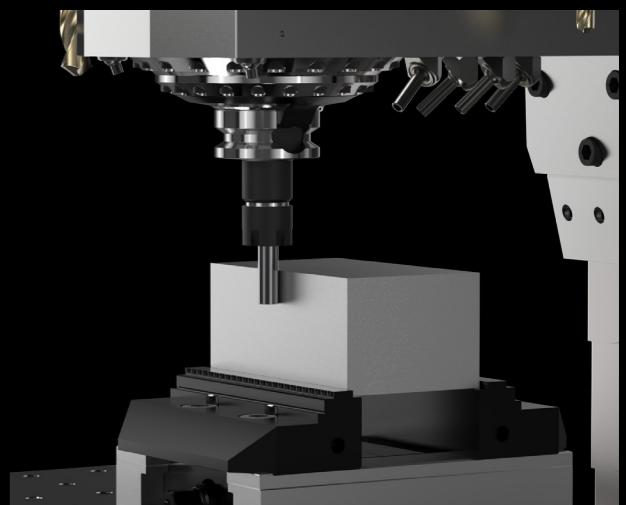
Feedrate, Spindle Override dials

For manual adjustment of feed rate speeds and spindle speeds, 20 position code switches are fitted.



Self Levelling Machine Feet

To enable simple installation and relocation of machinery, self levelling feet are fitted as standard.



Samurai Rigid Tool Probing

To reduce the cost of a probing system, we have developed a probe using the servo torque limiting function to detect a workpiece within $\pm 0.02\text{mm}$.

MACHINE SPECIFICATIONS

Specification for one configuration type is displayed

Please contact Samurai for specifications of exact configurations.

Description		Unit	220H Premium Model
Travel	X Axis	mm (inch)	400 (15.75)
	Y Axis	mm (inch)	240 (9.44)
	Z Axis	mm (inch)	360 (14.17)
	Distance from table surface to spindle gague	mm (inch)	480 (18.89)
Table	Table size	mm (inch)	720 x 240 (28.3 x 9.4)
	Table loading capacity (distributed)	Kg (lbs)	80 (176)
	Table loading capacity (undistributed)	Kg (lbs)	40 (88)
	Table surface clamping	mm	M8x1.25 + 8H8 Dowel 40x40
Spindle	Max. spindle speed	RPM	12K/10K/8K/6K/4K
	Max. spindle torque	N.m (ft-lbs)	7.9/9.5/11.9/15.9/23.4 (5.8/7/8.8/11.7/17.3)
	Max. spindle power (Peak/15min/continuous)	kW (hp)	6/4/2 (8/5.36/2.68)
	Taper	-	ISO #30
Feedrate	Rapid traverse rate, ₁	m/min (ipm)	X / Y / Z: 50/50/50 (1968/1968/1968)
	Cutting feedrate, ₁	m/min (ipm)	X,Y,Z: 10 (393)
Acceleration	Max. axis acceleration with 20kg table load	g	2
	Max. axis acceleration with max table load	g	0.4
ATC	Tool storage capacity	-	16/32/64
	Max. Extra large tool diameter (locked carousel)	mm (inch)	104 (4.09)
	Max. Large tool diameter (reduced capacity)	mm (inch)	82 (3.22)
	Max. Tool diameter (free carousel)	mm (inch)	51 (2)
	Max. Long tool diameter (free carousel)	mm (inch)	20 (0.78)
	Max. Tool length	mm (inch)	96 (3.8)
	Max. Long tool length	mm (inch)	300 (11.8)
	Tool Selection	-	Fixed Pocket
	Tool change time, ₂ (Tool-to-tool)	s	0.5 <max tool mass 1kg> 1.8 <tool mass 1-4kg>
	Tool change time, ₂ (Chip-to-chip)	s	Adjacent: 0.6 / Farthest: 1.4
	Total Tank Capacity	L (gal)	120 (26.4)
	Main Tank Capacity	L (gal)	70 (15.4)
Coolant	Storage Tank Capacity	L (gal)	50 (11)
	Coolant pump power	kW (hp)	0.18 (1/4)
	1 Phase	Rated Voltage	VAC
		Rated Capacity	kVA
Power Requirements	3 Phase	Rated Voltage	VAC
		Rated Capacity	kVA
	Compressed air supply	bar (psi)	6 (87)
	Machine Height	mm (inch)	1980 (77.95)
Machine Size	Machine Width	mm (inch)	1160 (45.67)
	Machine Depth (excluding door handle)	mm (inch)	910 (35.83)
	Base Machine Mass	Kg (lbs)	1000 (2204)

For more details regarding specific option specification please contact Samurai Machine Tools.

¹ Max rapid and cutting rates vary depending on selected ballscrew configuration

² Tool change time dependant on selected ballscrew configuration, weight of tool and maximum performance mode

Specifications and options contained within this catalogue may be changed without prior notice.

STANDARD & OPTIONAL SPECIFICATIONS

A wide variety of options are available to suit specific needs

Please contact Samurai for additional custom options.

Description	220H Premium Model	Price
ATC	Single ATC (16 tools)	●
	Single Stacked ATC (32 tools)	£3,895
	Dual ATC (32 tools)	£2,835
	Dual Stacked ATC (64 tools)	£7,842
Spindle	Maximum Spindle Speed / Torque	12,000 / 7.9Nm
		10,000 / 9.5Nm
		8,000 / 11.9Nm
		6,000 / 15.9Nm
		4,000 / 23.4Nm
Axis	Type of Pull stud	45°
		60°
Coolant	3 Axis	●
	4 Axis (simultaneous)	£2,917
	5 Axis (simultaneous)	£6,812
	Speed / Force	High Speed / Low Force
		Balanced
		High Force / Low Speed
Chip Management	26L/min Flood Coolant, 120L Tank, Overflow protection	●
	Air Blast	●
	Through Spindle Air	●
	20 Bar Through Spindle Coolant + 40L Tank	£3,751
	Coolant Misc	Mist Collector
		Auto Coolant Mixing (40L Concentrate storage)
		Coolant Gun
Probing	Additional Storage Bin	£289
	Chip Conveyer System	£1,986
	Samurai Rigid tool probing	●
Warranty	Blum Novatest Z-Nano Automatic Wired Tool Height Setter	●
	Blum Novatest TC55 Automatic Wireless Probing	£3,060
Control	5 Years (10,400 hours)	●
	7 Years (14,560 hours)	£1,500
Power	SAMURAI HMi - Windows 10 LSTC, 16GB DDR5, Intel i3, 128GB NVMe	●
	SAMURAI HMi - Windows 11 LSTC, 64GB DDR5, Intel i7, 1TB NVMe	£1,108
	1 Phase 240VAC	●
Miscellaneous	3 Phase 380VAC	£180
	Automatic Grease lubrication system	●
	Side Access Door	£325
	Auto Door	£485

● Included as Standard

Please contact Samurai Machine Tools to select detail specification

Specifications, options and prices contained within this catalogue may be changed without prior notice.

Some options are not available in particular regions. Please contact our sales representative to confirm details.

 Flammable coolant such as oil-based coolant has a high risk of ignition, and will cause fire or machine breakage if ignited.

If you have to use a flammable coolant for any reason, please be sure to consult our sales representative.

PREMIUM SERVICE

To create machines of the future, service must also be of the future

"Traditional machinery is designed to only just handle the intended operating conditions, meaning that if the machine is crashed it will very likely need repairing. Many machine tool builders sell their machines through distributors who need to make a profit. They do this by charging excessive amounts for service. For example, Samurai's machine made by a Korean company ran out of battery because it was not used for 4 weeks. After contacting our local UK distributor, they first charged £350 for batteries that cost £10 according to the MTB, and £1000 to fix the parameters and install the batteries. They would not provide information on how to change the parameters. After doing some research we found what parameters needed changing and the machine could be re-referenced and alarms cleared. This took 20 minutes and cost £10."

The distributor network is fundamentally flawed, and it makes ownership of machinery stressful knowing that the service company is there to make a profit when your machine goes down."

Samurai approaches service in a new way;

1. Machines must be engineered to withstand all possible operating conditions.
2. If an operator error can cause damage, that is a machine design flaw.
3. Samurai must not make a profit from service.

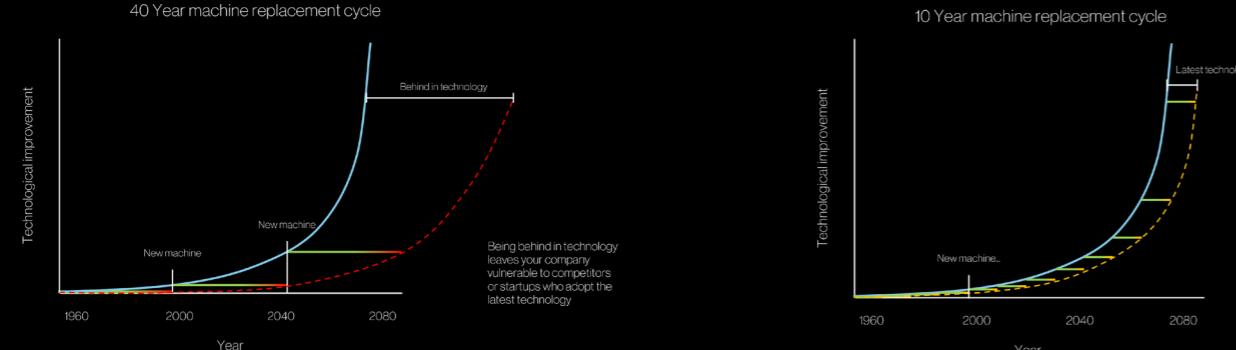
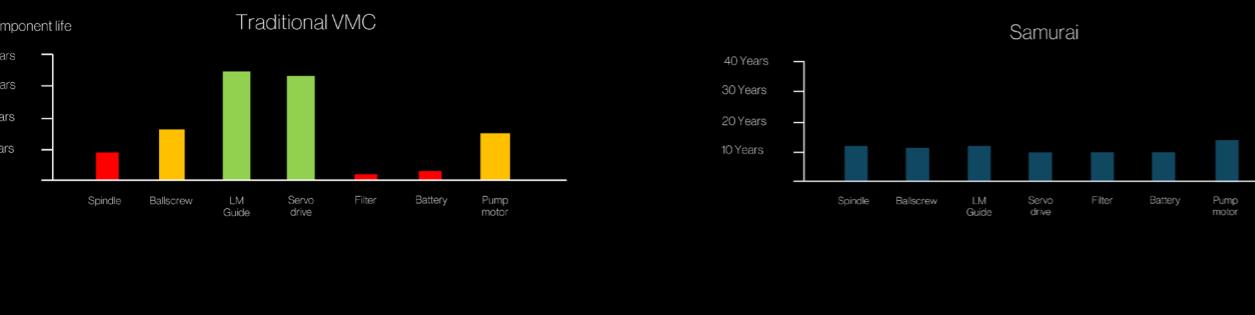
H Machines are engineered to not need servicing or replacement parts, but to simply last the expected service life of 10 years. This is achieved through a combination of oversized 80mm spindle bearings, 20mm ballscrews, and other components, and advanced software that can track the life of components, and predict and prevent crashes.

Can the machine last longer than 10 years?

Yes. If the machine is used less than 40 hours per week, with slower rapids and accelerations, less than 1kW continuous spindle load and isn't crashed it can last up to a maximum 20 years. Using advanced algorithms and servo technology, the machine is able to calculate in real time its expected life and display information in the maintenance page. You can use this information to optimise machining programs to either achieve highest productivity or longest service life. We are also working on a feature that allows the customer to set the machines service life then program speeds are automatically adjusted to achieve this life.

Why is a shorter service life better than longer?

1. It is possible to make a significantly higher profit by running machines quickly. To achieve that significantly higher speed there has to be a compromise which is the machines expected life. However since significant profit is made by reducing the machines life, it is possible to buy new machines which also ensures you stay competitive with the latest technology.
2. A better machine design can be achieved by removing the engineering constraint of maintenance access. Machines can be made more compact and powerful with bigger components that won't fail, rather than using smaller components that need replacing.



PREMIUM SUPPORT

Your questions will be answered by a human

Support

Samurai representatives will be available 24/7 to answer your questions both pre sales and for the full duration of your machine ownership. You will always speak to an engineer who knows about the technology and is committed to solving your problems.

Training

The following training courses are provided by Samurai free of charge with a machine purchase:

Programmer Training	Samurai Premises	2 hours
Operator Training	Samurai Premises	2 hours

If you are unable to attend our site, 2 hours remote training can be provided.

Remote Support

24/7 support can be provided via remote meeting on your machine.

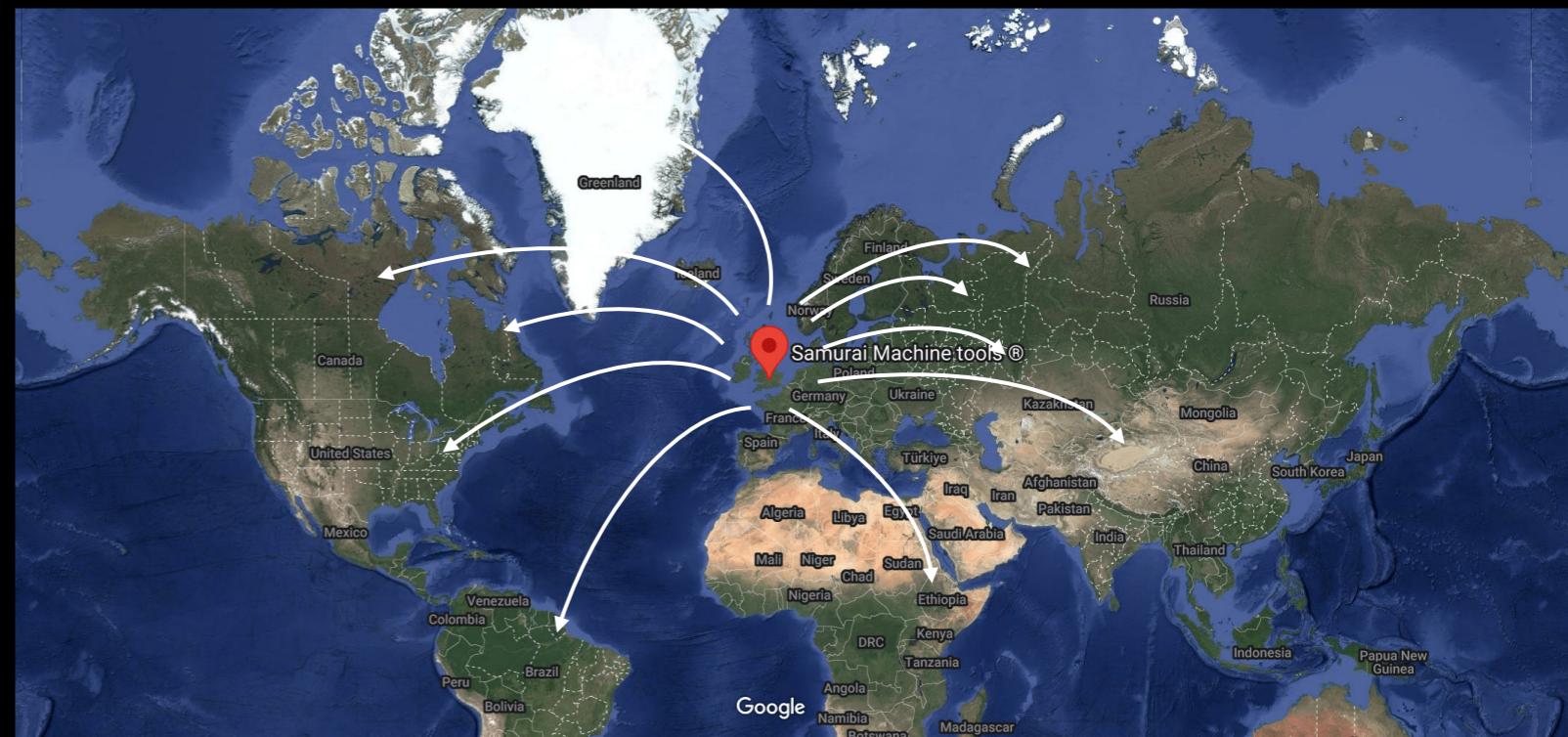
This can be provided to any location on Earth.

Requires internet connection

Manuals & Video Guidance

The SAMURAI HMI™ comes with manuals and video guidance seamlessly integrated in the control.

Internet connection not required



Service

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More Info Coming Soon

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*For more details, please contact Samurai Machine Tools LTD

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