+GF+

+GF+ Machining Solutions

Mikron MILL E 500U 700U

3+2 and Full Simultaneous 5 Axis Machining …*The* 5th Generation and rated "Best in Class" on Performance, Acceleration, Accuracy and Part reach +120 and -65 degrees

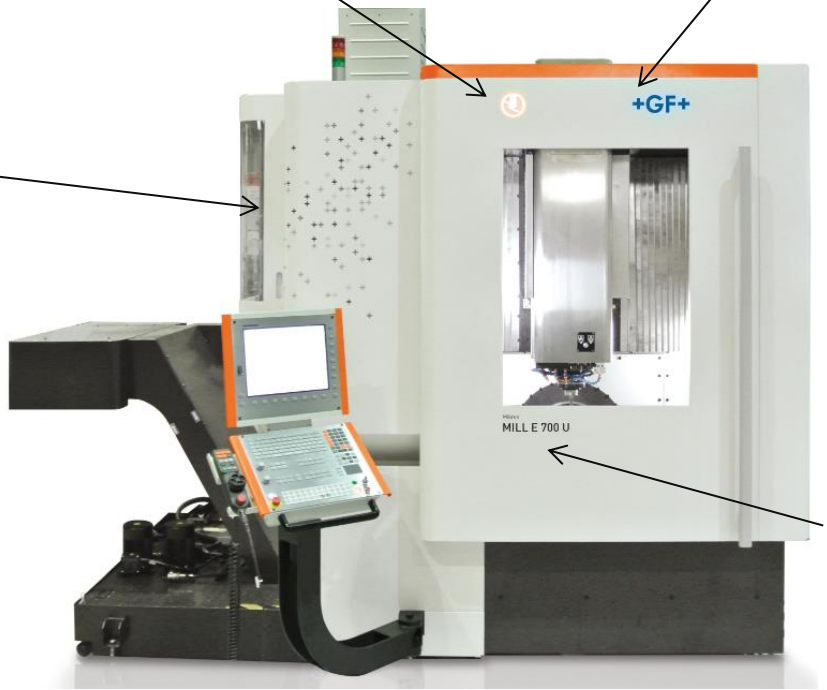
5/19/19 – Ken Otzel/HPM
(508)958-5565 *otz1@aol.com*

Mikron **MILL E 5/700 U: A New Look!**

GF Technology Identifier

GF backlighted Logo

GF Sparkles



GF new Naming

Milling Technology Identifier

GF MS Product Naming 101

Harmonizing the product portfolio

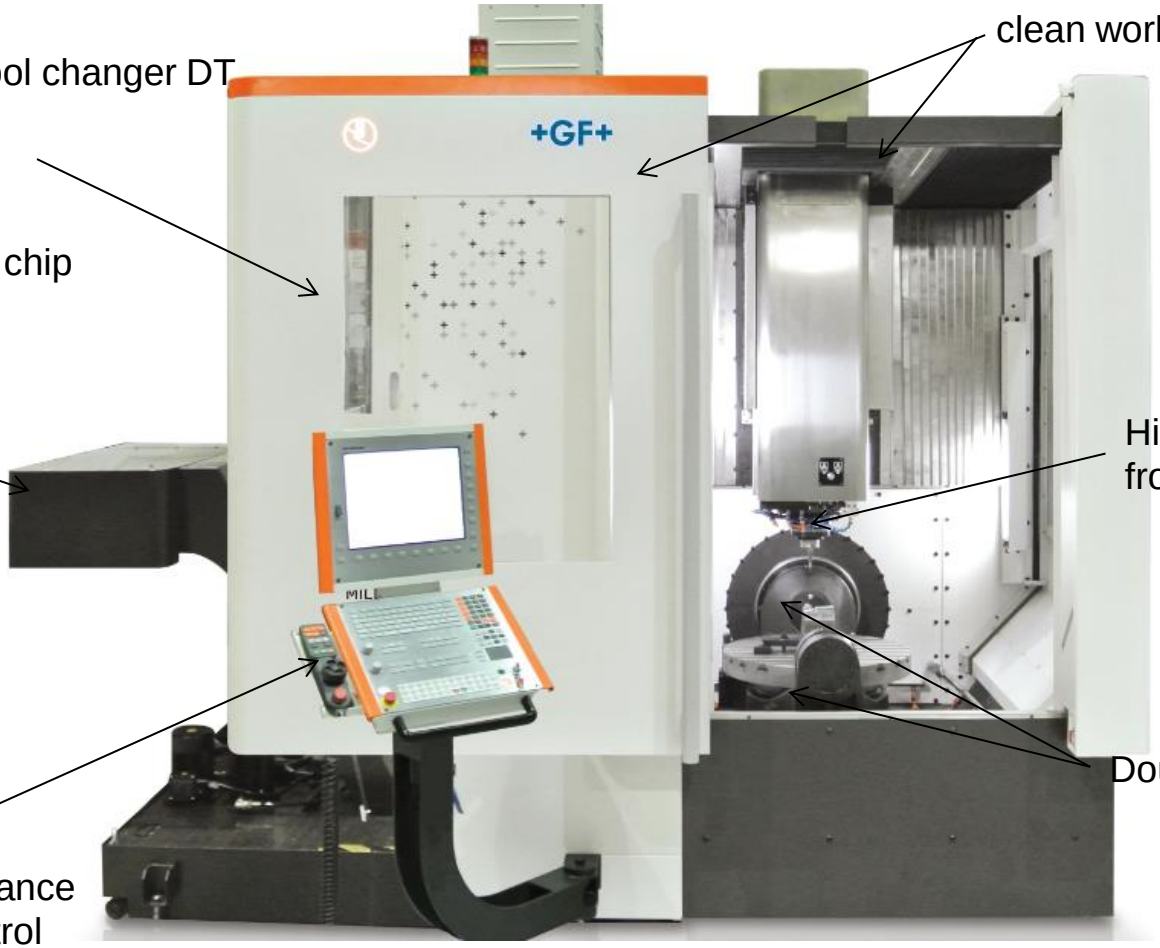
Technology	Application	Product level	X-travel	Specification
Mikron AgieCharmilles Step Tec System 3R	MILL CUT FORM DRILL LASER TRANSFORMER WORKPARTNER	X – Extreme S – Sensation P – Performance E – Efficiency C – Comfort	Travel length (in mm)	Axes (U – universal) Feature (MillTurn/Oiltech) Market (Moldtech, Tiremold) Dedicated

MILL E 5/700U

The Machine

Mikron MILL E 500/700 U

GF MS with 5-Axis high efficiency machine



Complete machine enclosure for clean working environment

Integrated tool changer DT 30 or CT60

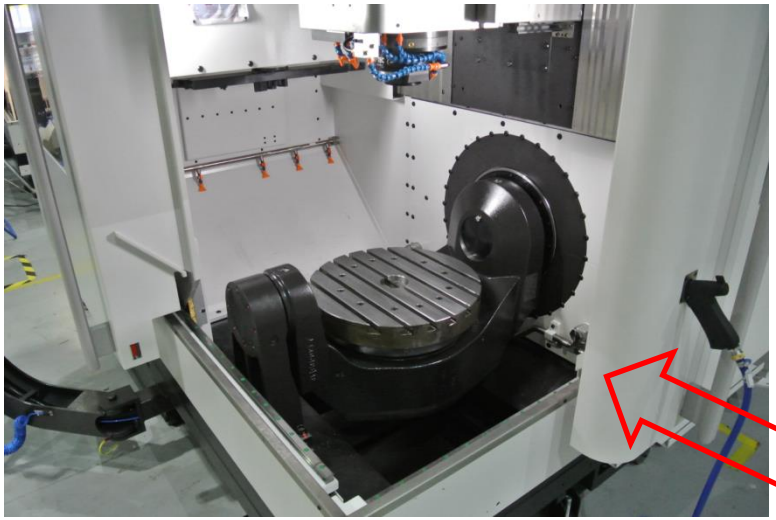
Itegrated Lift up chip conveyor

High-tech motor spindles from StepTec

Double supported rotary table

High performance machine control iTNC530 HSCI

Efficient accessibility MILL E 500 U



Easy, fast and safe operations
efficient and user-friendly control
perfect access to the part thanks
to large corner doors opening

Efficient accessibility MILL E 700 U

Perfect access from both sides, possibility to easy load heavy parts by crane thanks to large doors opening

Integrated Automation

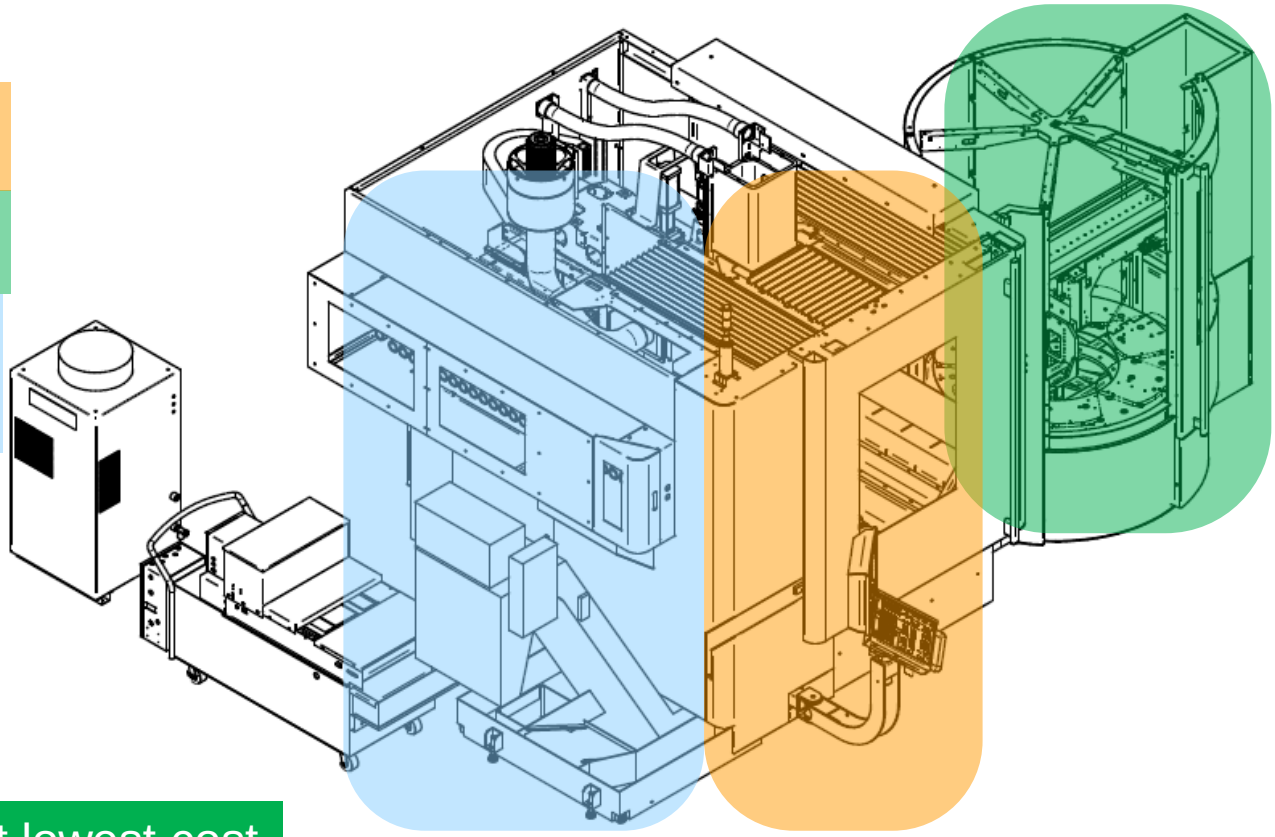
Unattended machining capabilities

Work area

Pallet area

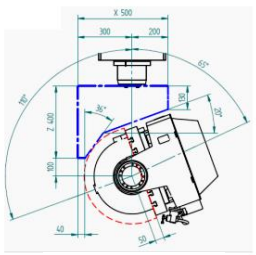
Tool area and electric

hydraulic / pneumatic

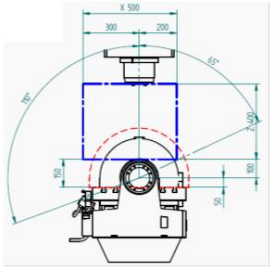


Additional autonomy at lowest cost
quick Return On Investment

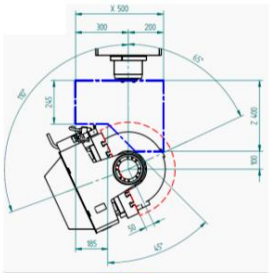
Table choice:
3+2 or 5 axis simultaneous



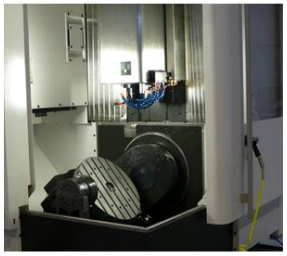
+ 120°



0°

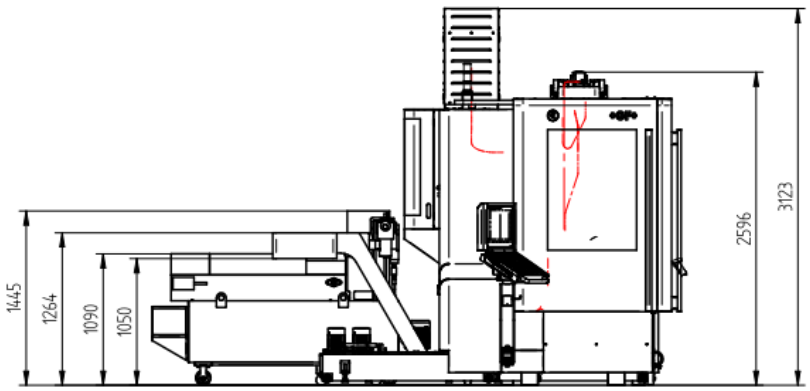


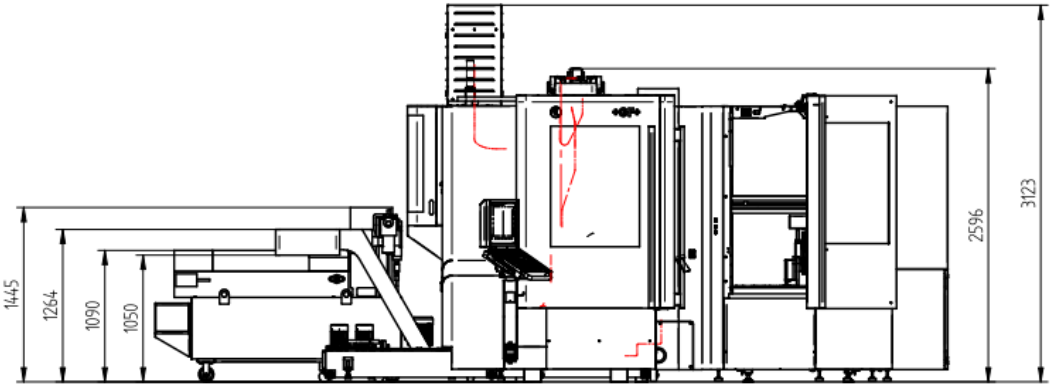
-65°

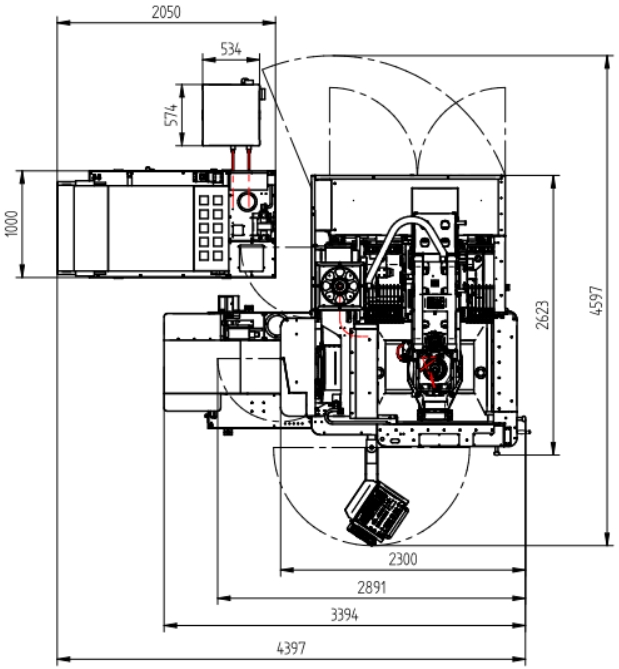


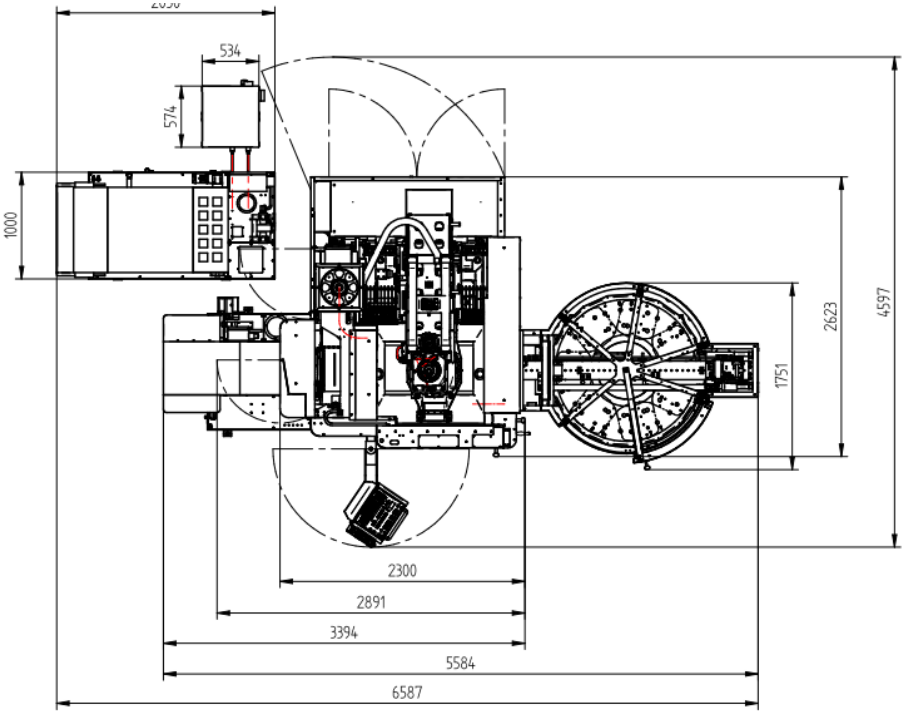
		HEM 500/700U	
		Gearbox 3+2 	**Torque** simultaneous 
Speed B	rpm	17	32
Speed C	rpm	28	112
Max. torque B	Nm	400	1890
Max. torque C	Nm	120	858

Layout Mikron MILL E 500 U

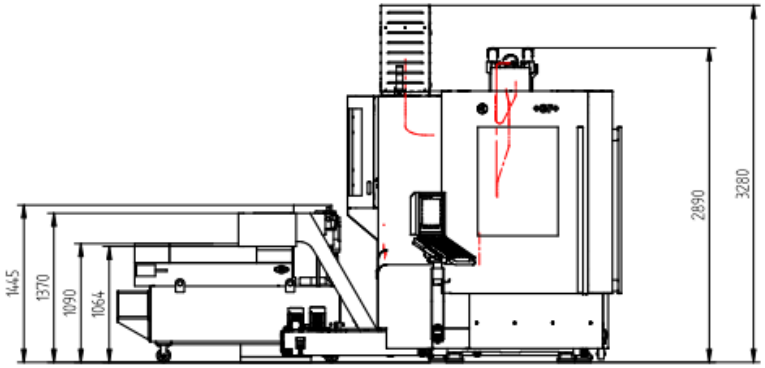


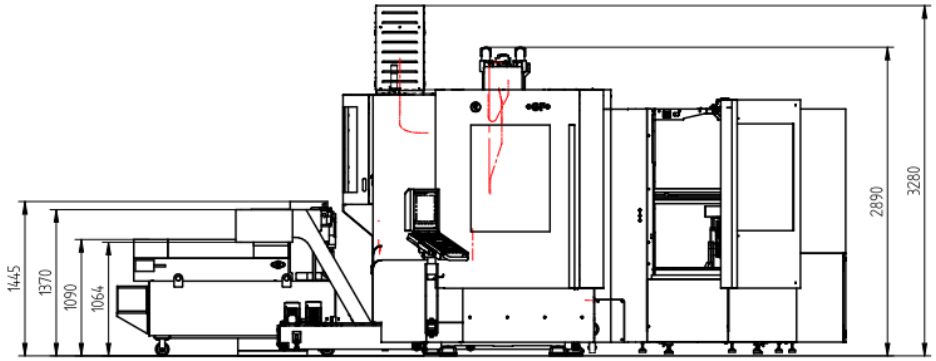


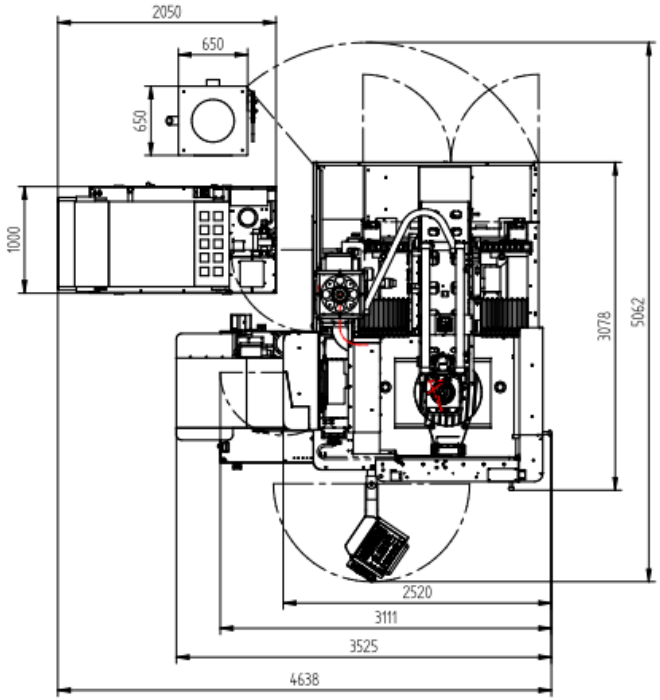


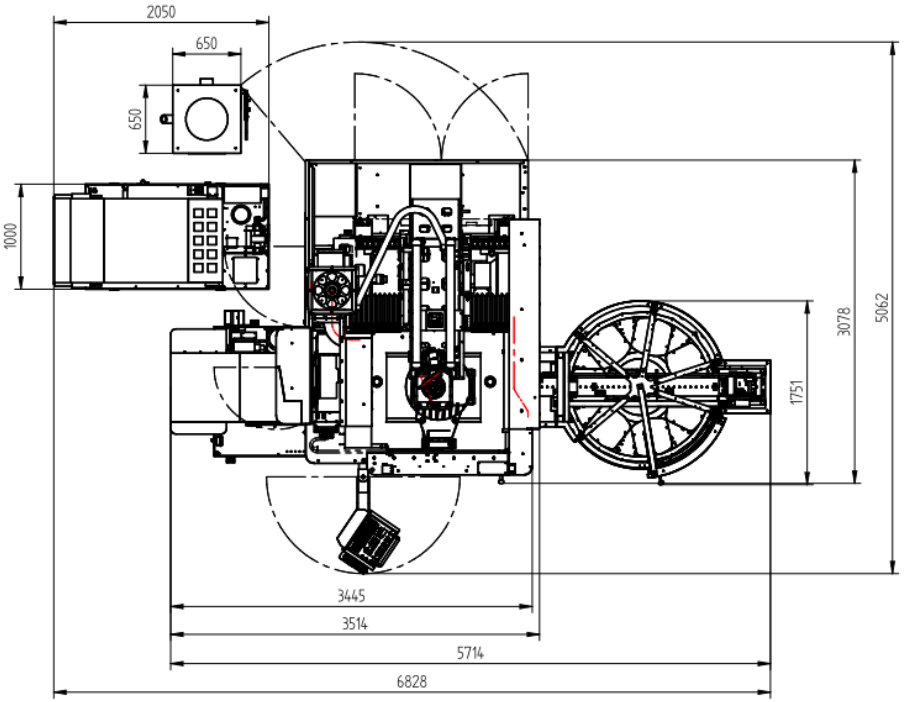


Layout Mikron MILL E 700 U







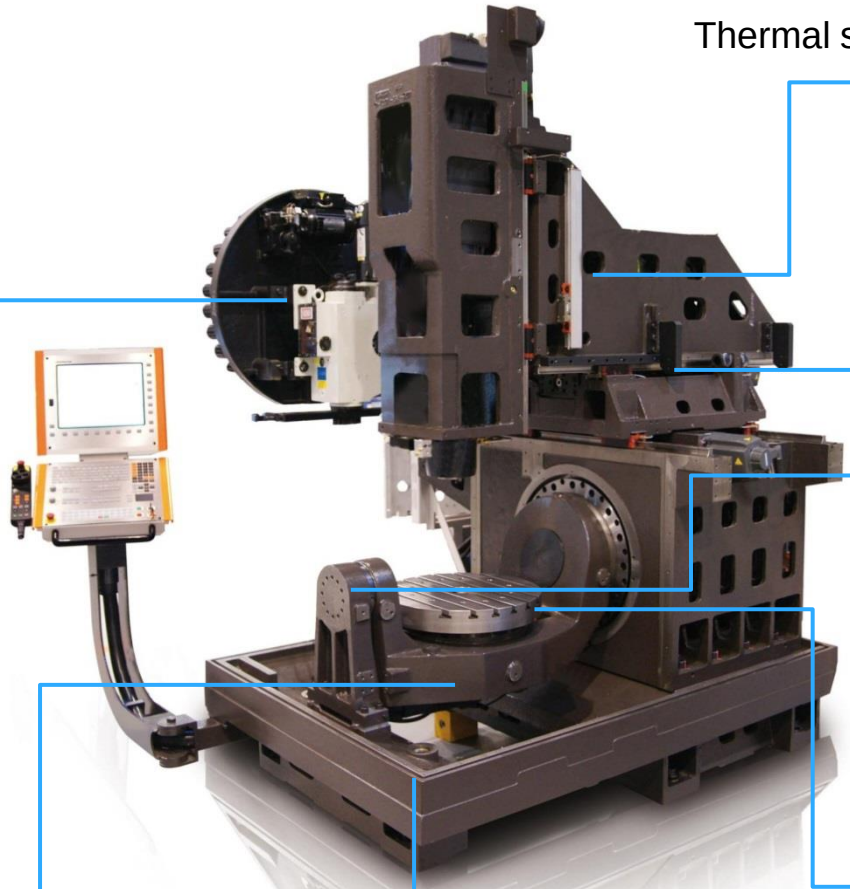


Technical Dates Mikron MILL E 500/700 U

Machine			Mikron MILL E 500 U		Mikron MILL E 500 U		Mikron MILL E 700 U		Mikron MILL E 700 U	
			RTT 3+2		RTT Simultan		RTT 3+2		RTT Simultan	
Axis travel										
Lengthwise	X	mm	500		500	19.69	700		700	27.56"
Crosswise	Y	mm	450		450	17.72"	600		600	23.62"
Vertical	Z	mm	400		400	15.75"	500		500	19.69"
Swivel axis		°	-65 / +120		-65 / +120		-65 / +120		-65 / +120	
Rotation axis		°	n x 360		n x 360		n x 360		n x 360	
Axes			3+2		Five-axis simultaneous		3+2		Five-axis simultaneous	
Spindle			Notes:*20,000 Spindle is our own GF Step-Tec Hybrid Spindle, All are Coolant Thru Spindles on the E series							
Spindle type			In-line	Motor	In-line	Motor	In-line	Motor	In-line	Motor
Max. rotations		min^{-1}	12'000	20'000	12'000	20'000	12'000	20'000	12'000	20'000
Max. torque		kW/Nm	20/88	36/120	20/88	36/120	20/88	36/120	20/88	36/120
Tool interface			ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63	ISO 40 BT 40 CAT 40	HSK-A63
Travel speed										
Rapid traverse	X, Y, Z	m/min	30 / 30 / 30		30 / 30 / 30		30 / 30 / 30		30 / 30 / 30	
Rapid traverse	B, C	min^{-1}	17 / 28		32 / 112		17 / 28		32 / 112	
Automation										
Tool magazine		unit	DT 30 / CT 60		DT 30 / CT 60		DT 30 / CT 60		DT 30 / CT 60	
Pallet magazine		unit	5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320		5 Delphin 400/400 or 5 MTS 400/400 or 7 Dynafix 350/350 or 7 UPC 320/320	
Pallet changing time		sec.	30		30		30		30	
Robot interface			Available		Available		Available		Available	
Rotary swivel table										
T-groove table		mm	500		500		630		630	
Workpiece weight (3/5)		kg	300 / 200		300 / 200		450 / 450		450 / 450	
Weight										
Machine weight		kg	6030		6030		6030		6030	
Control										
Heidenhain		12 / 20 k	iTNC 530 HSCI FS		iTNC 530 HSCI FS		iTNC 530 HSCI FS		iTNC 530 HSCI FS	
Fanuc		12 k	0i-MD		-		0i-MD		-	

Deep Dive: Features, Options, Subassembly

Basic machine: the technology



Thermal symmetrical construction

Load easy up to 60 tools

Large dimension Ball screw

High stiffness and stability do to counter bearing

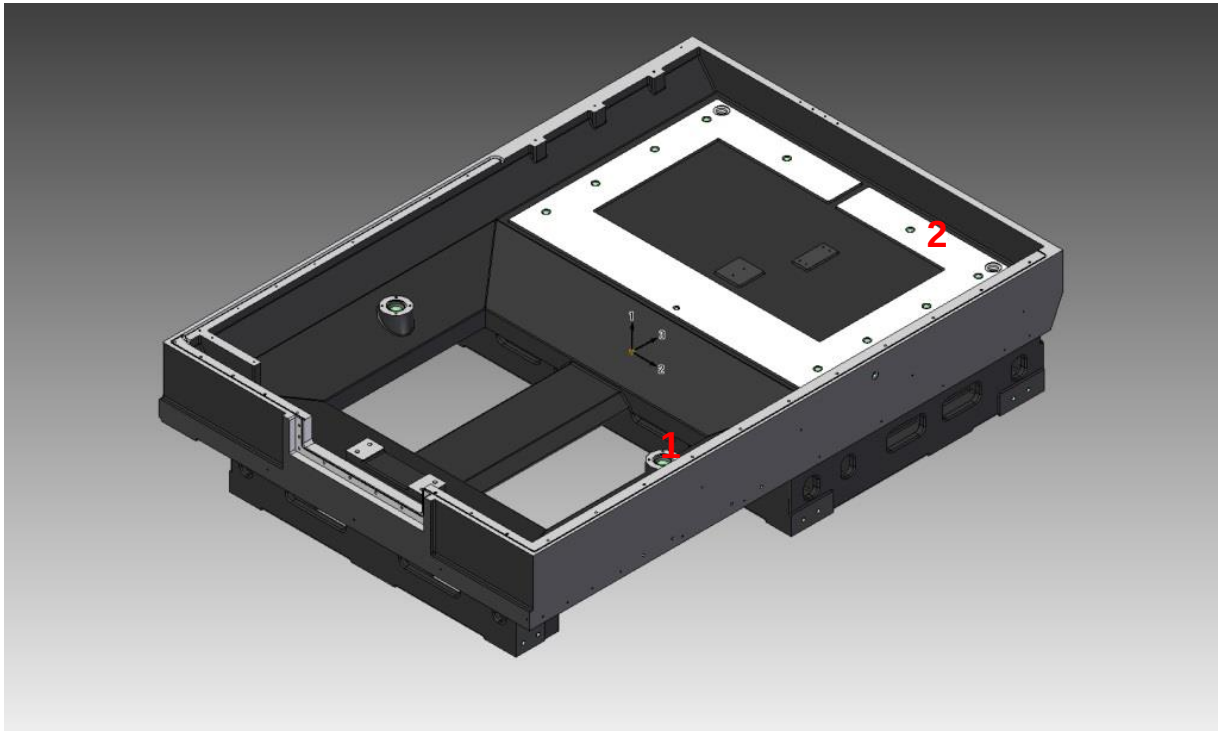
Well integrated rotary tilting table

Compact footprint

Centralized chip drop opening

Today's MILL E

2019 MILL E 700 U: Base

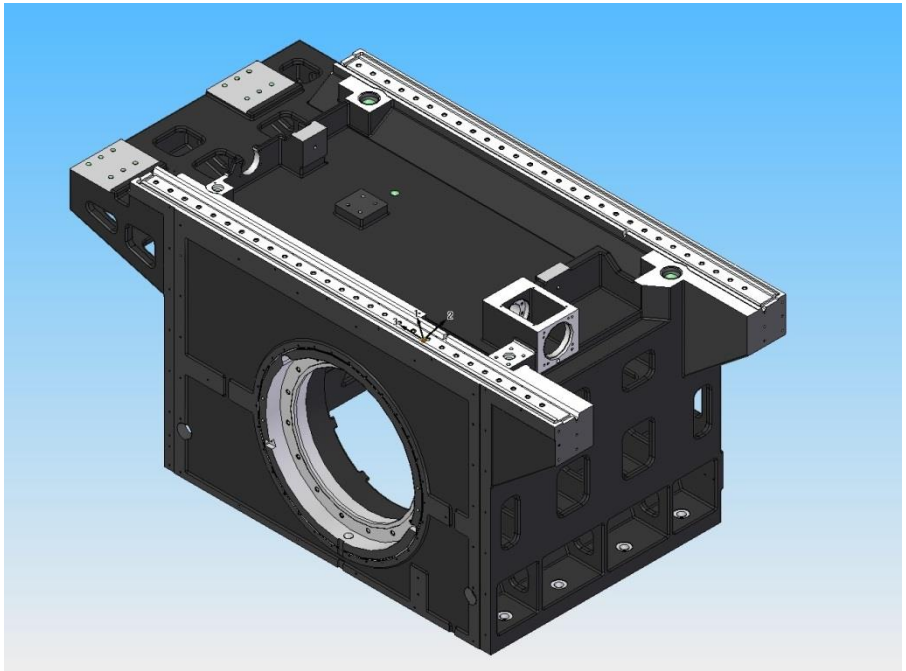


L * W * H (mm):	2160 * 1500 * 490
Weight (kg):	1952

1: Make the bridge stronger to strengthen the rigidity of the machine base in Y axis
2: Add a surface to fix the column to make the machine base is strengthened

Today's MILL E - Very Beefy Construction

2019 MILL E 700 U: Column



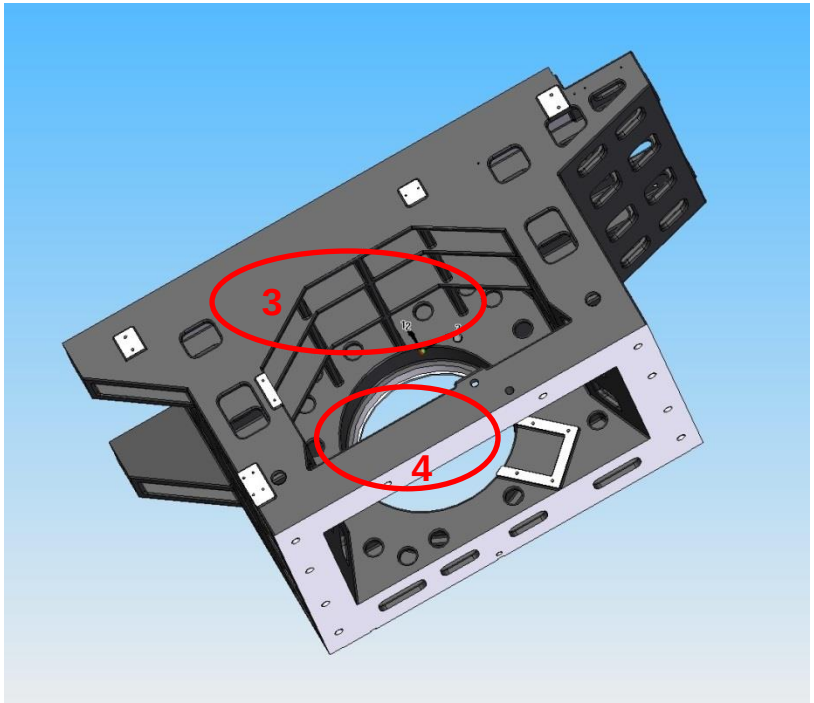
L * W * H (mm): Weight (kg):

1790 * 855 * 885 / 1331

1. Make the ribs thicker and angles bigger to strengthen the stiffness of the X axis
2. Make a surface to add some sheet metal to cover the casting

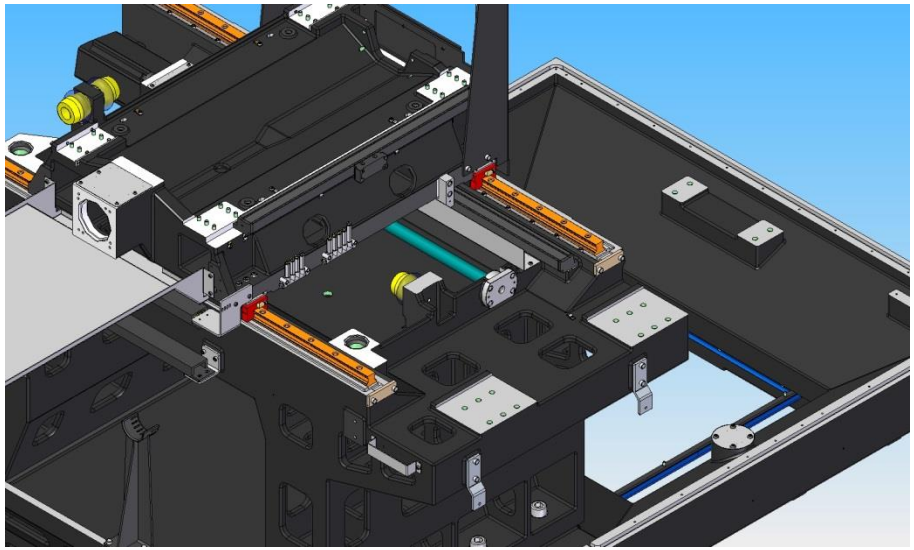
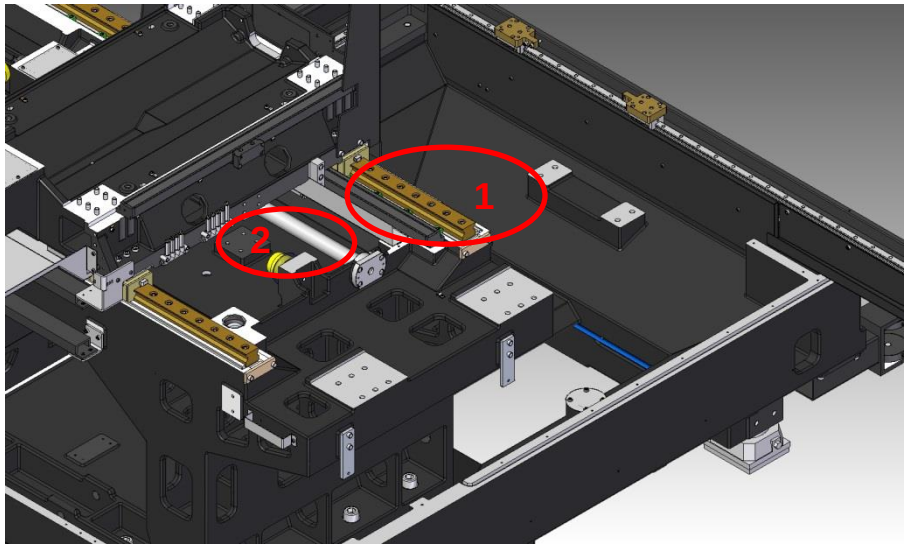
Today's MILL E

2019 MILL E 700 U: Column



L * W * H (mm):	1790 * 855 * 885
Weight (kg):	1331

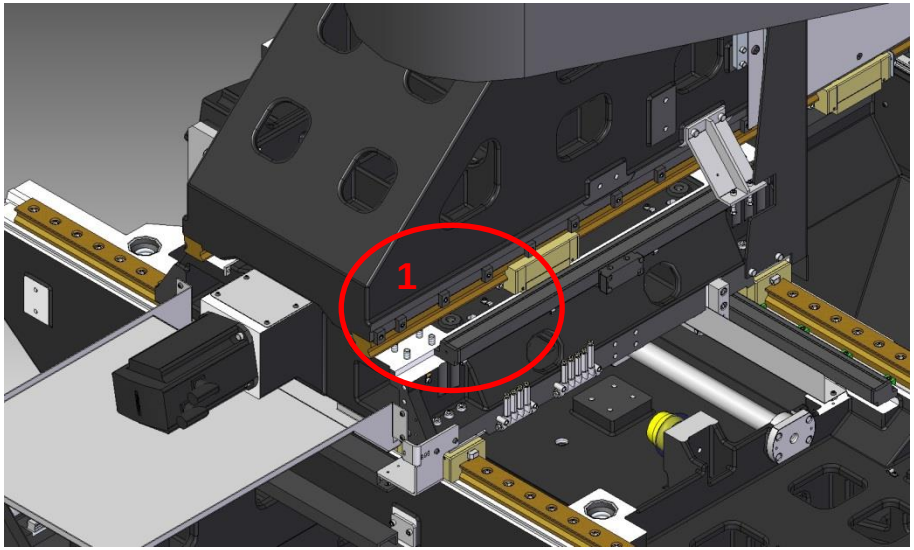
3: Make more ribs and add height to strengthen the stiffness of the column in X axis
4: Add rib to make the column as a whole so that the supplier can maintain quality of the column.

2015 HEM 700 U: X linear guides & ball screw	2019 MILL E 700 U: X linear guides & ball screw
	
Linear guides: 35 Ball Ball screw: 32*10 Press blocks: Yes	Linear guides: 45 Roller Ball screw: 40*10 Press blocks: Yes

1.Change the linear guides from 35B to 45R to improve the stiffness of X axis
2.Change the ball screw from 32*10 to 40*10 to improve the stiffness of X axis

HEM U compared to MILL E

2019 MILL E 700 U: Y linear guides & ball screw

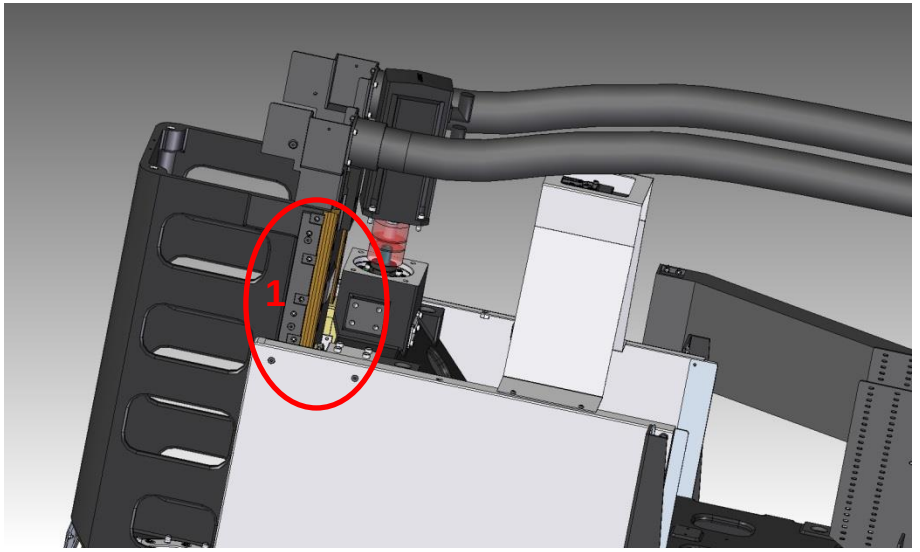


Linear guides:	45 Roller
Ball screw:	40*10
Press blocks:	Yes

1.Change the linear guides from 35B to 45R to improve the stiffness of Y axis
2.Change the ball screw from 32*10 to 40*10 to improve the stiffness of Y axis
3.Add some press blocks to make the linear guides more rigid and easier to adjust the accuracy

HEM U compared to MILL E

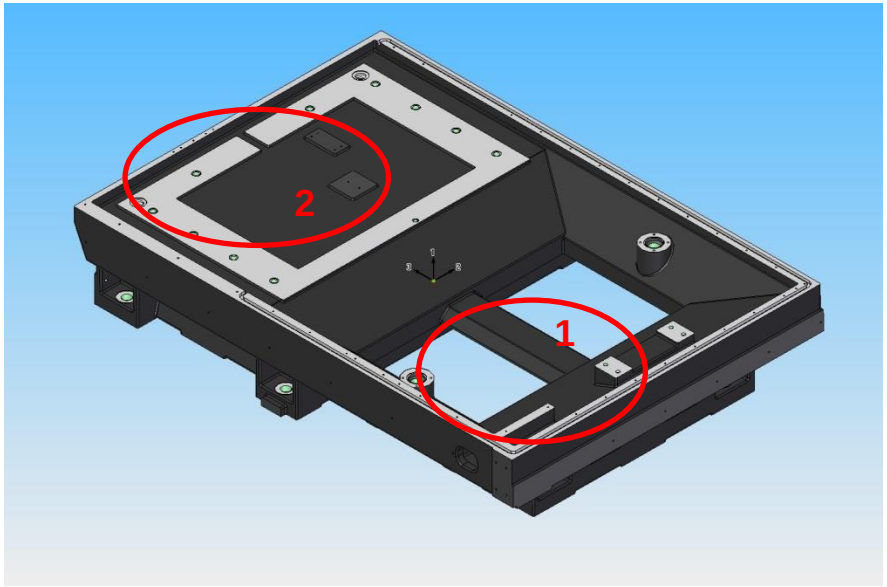
2019 MILL E 700 U: Z linear guides & ball screw



Linear guides:	35 Roller
Ball screw:	32*10
Press blocks:	Yes

1.Change the linear guides from 35B to 35R to improve the stiffness of Z axis
2.Add some press blocks to make the linear guides more rigid and easier to adjust the accuracy

2019 MILL E 500 U: Base



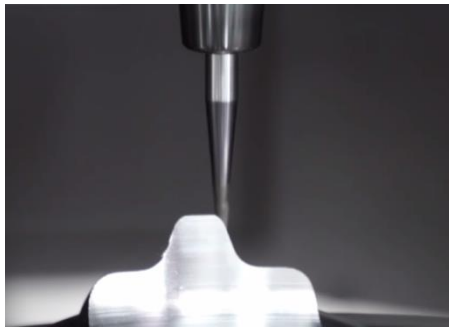
L * W * H (mm):	1800 * 1255 * 340
Weight (kg):	1040

1: Add a bridge to the base to strengthen the rigidity of the machine base in Y axis
2: Add a surface to fix the column to make the machine base stronger

Machine Performance

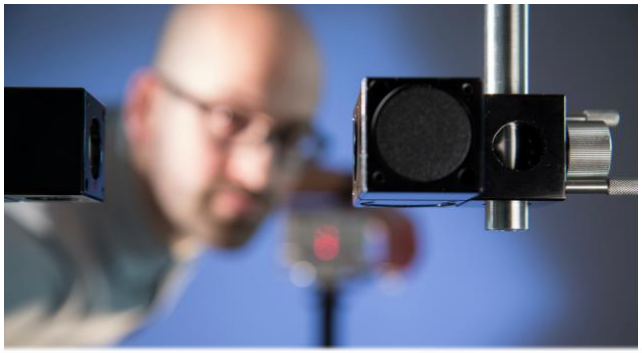
Dynamics Properties			
MILL E		500U	700U
Rapid feed rate	m/min	30	30
Acceleration	M/s^2	4	4
Chip to Chip time	S	7.4	7.4
Spindle			
Spindle Type		Motor spindle HPC 190 Step-Tec	Royal In line spindle
Speed	Rpm	20’000	12’000
Torque	Nm	120	75

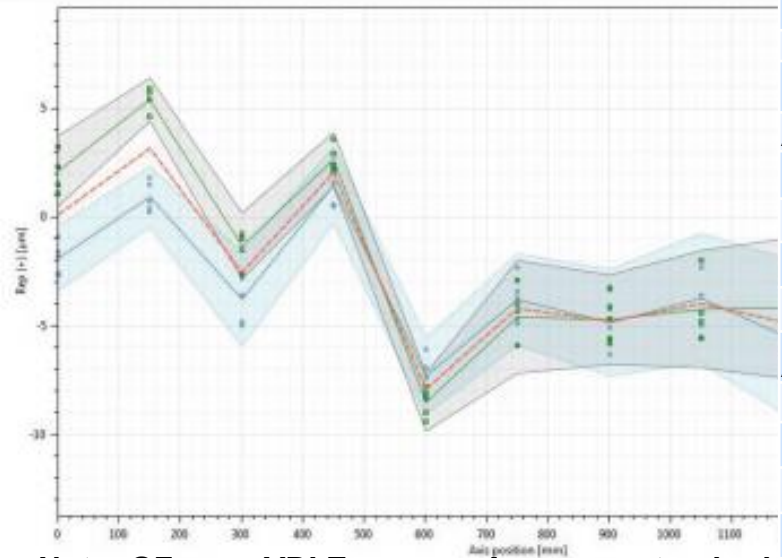
Increase process time



Note: Chip to Chip time with Optional 170 Position Tooling Tower is approximatly 4 seconds using a our Dual Gripper,

Machine Accuracy





Note: GF uses VDI European Accuracy standard testing Back and forth Full travel, then calculate the mean. Not JIS (Japanese) which ONE direction Only and is very misleading

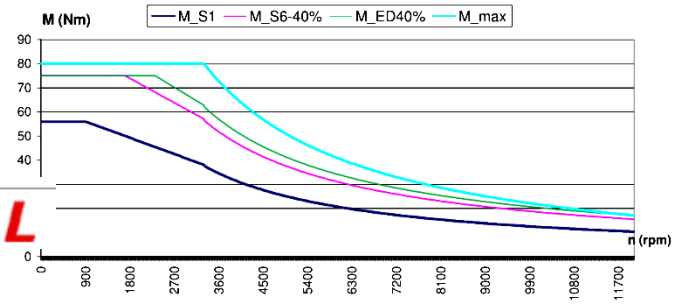
Positional accurecy		Target in µm	Achieved on the Prototype MC µm
Positional accuracy of X- axis			
Accuracy	**A**	8	2.395
Positional deviation	**M**	5	1.3
Reversal	**B**	4	0.48
Repeatability	**R+/-**	5	1.73
Positional accuracy of Y- axis			
Accuracy	**A**	8	2.047
Positional deviation	**M**	5	0.98
Reversal	**B**	4	0.62
Repeatability	**R+/-**	5	0.921
Positional accuracy of Z- axis			
Accuracy	**A**	8	2.519
Positional deviation	**M**	5	0.7
Reversal	**B**	4	0.16
Repeatability	**R+/-**	5	2.071
Positional accuracy of C- axis			
Accuracy		10“	1.63”
Positional deviation		5“	0.36”
Reversal		4“	0.8”
Repeatability	**R+/-**	5“	1.15”
Positional accuracy of B- axis			
Accuracy		14“	1.73”
Positional deviation		8“	0.41”
Reversal		5“	0.66”
Repeatability	**R+/-**	8“	1.08”

Spindles

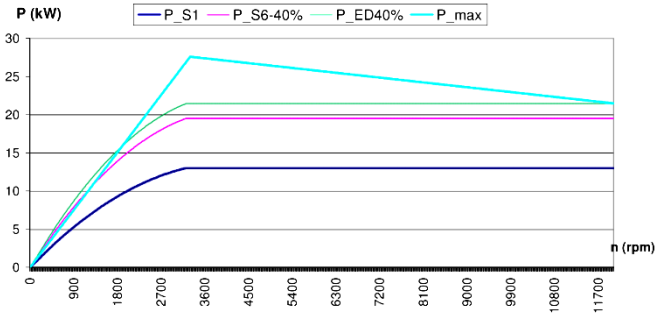
12.000rpm Inline BT/ISO 40

ROYAL

M S1/S6 56/75 [Nm]



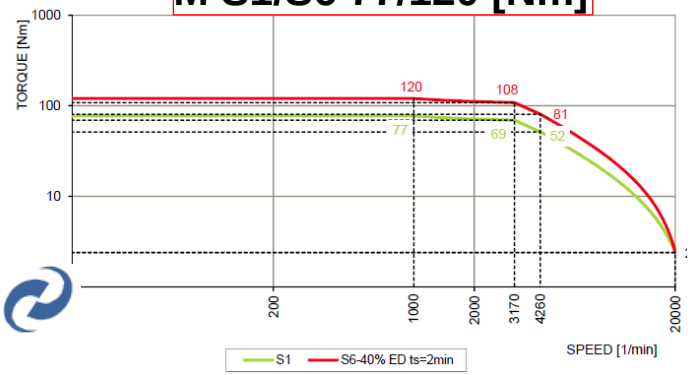
P S1/S6 13/20 [kW]



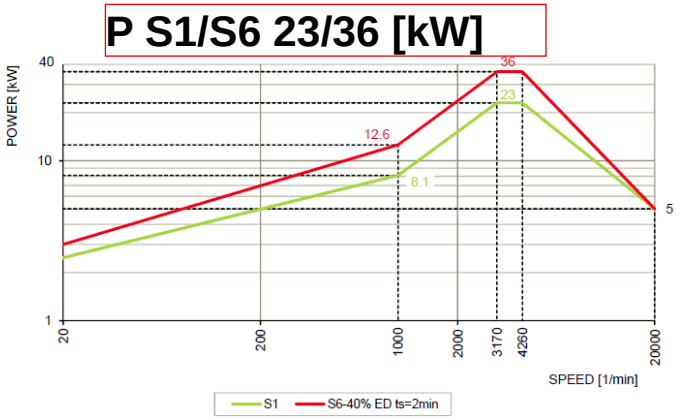
20.000rpm Step-Tec Motor Spindle HSK 63

STEP TEC

M S1/S6 77/120 [Nm]



P S1/S6 23/36 [kW]

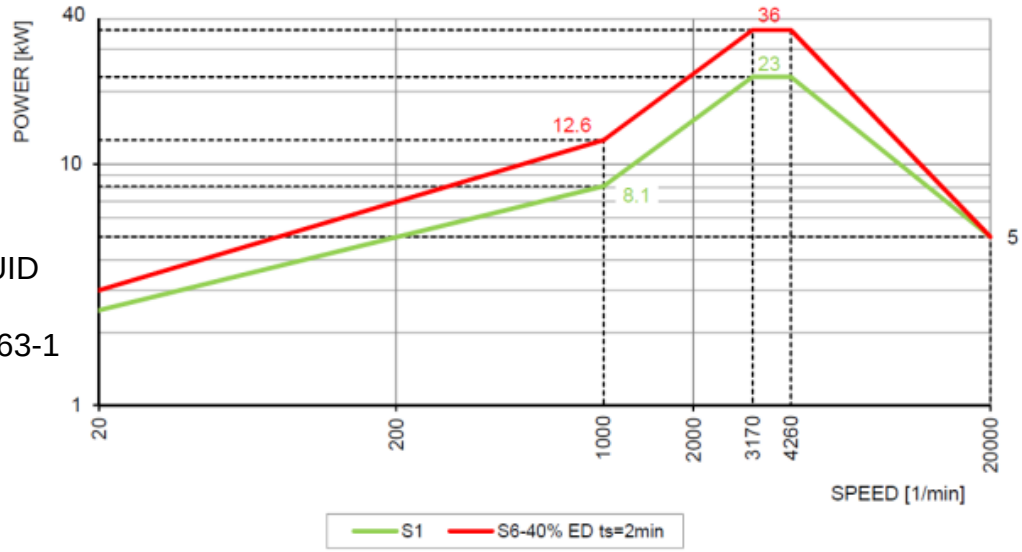


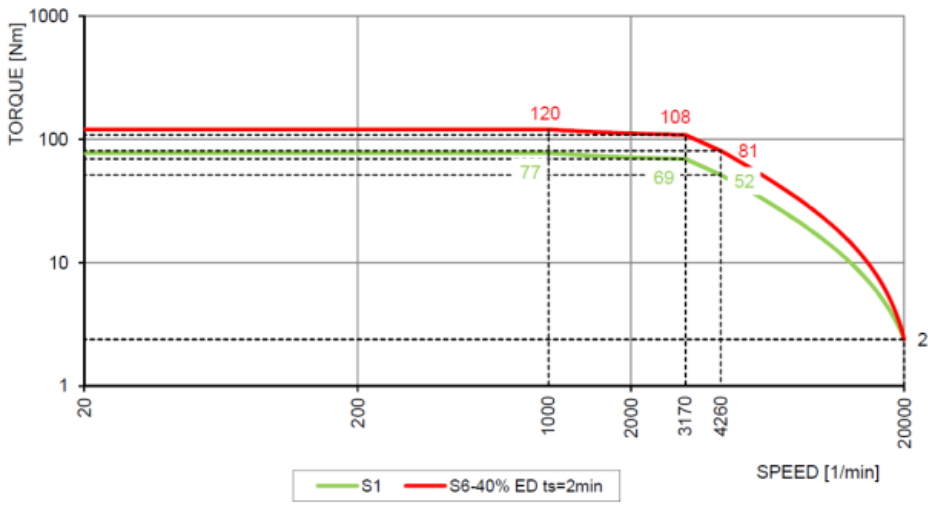
Spindles HPC 190 motor spindle 20k

Technical data

Power (S6)	36 kW
Torque (S6)	120Nm
Speed max.	20 000 min -1
Acceleration	2.5 s
Encoder	1V pp Incr. 128
Cooling	COOL-CORE FLUID
Lubrication	Oil - air
Tool interface	HSK-A63 DIN69063-1
Unclamp hydr.	7.5 – 9.5 MPa

SDM20, Profibus / RS485
V3D Vibration measuring system

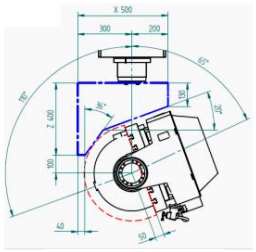




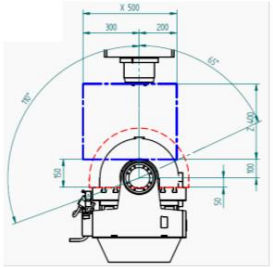
STEP TEC

Motor Spindle

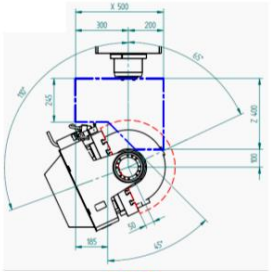
Table choice:
3+2 or 5 axis simultaneous



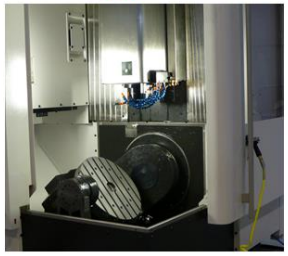
+ 120°



0°



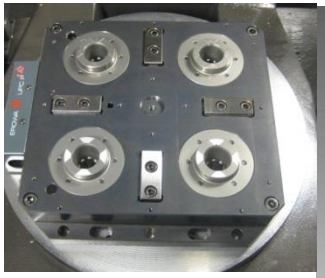
-65°

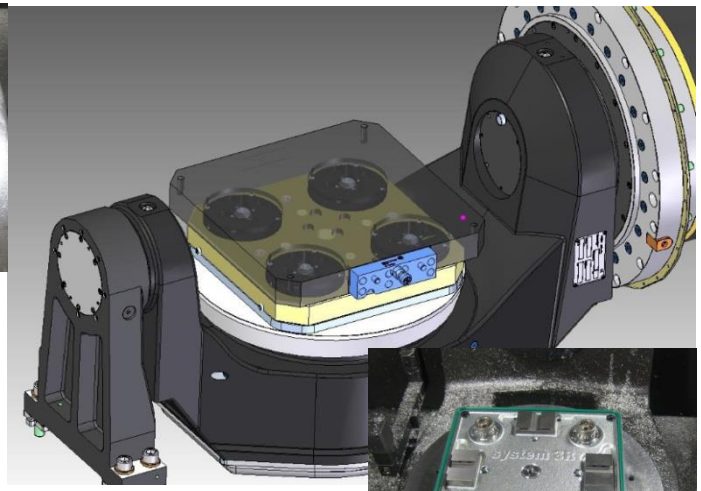


		HEM 500/700U	
		Gearbox 3+2 	**Torque** simultaneous 
Speed B	rpm	17	32
Speed C	rpm	28	112
Max. torque B	Nm	400	1890
Max. torque C	Nm	120	858

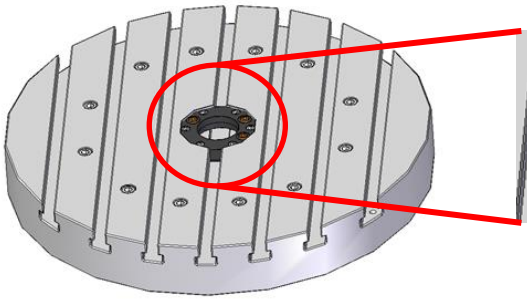
Integrated Clamping

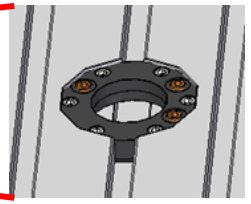
Several Integrated clamping systems for simultaneous and 3+2 table offered as a standard



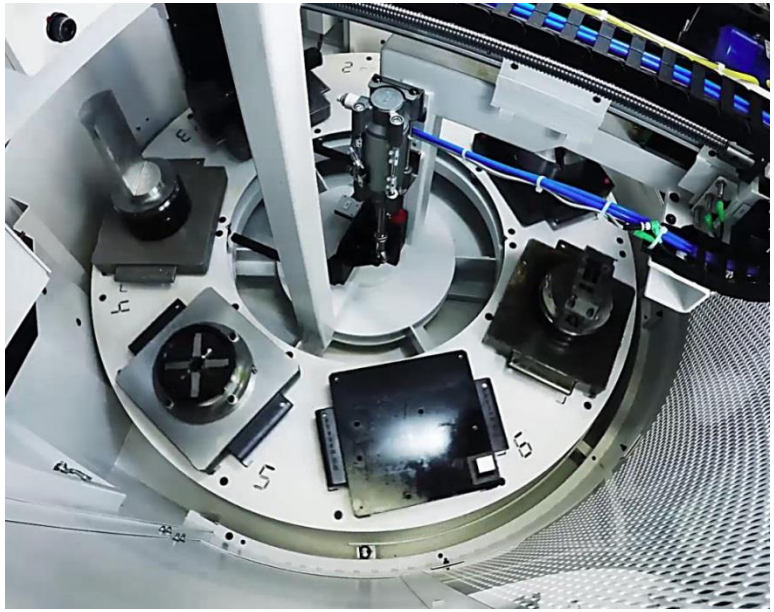


Automation can be done with a external robot system and our standard Robot interface. Thanks to Additional Rotary transmission in the centre of the table





Automation

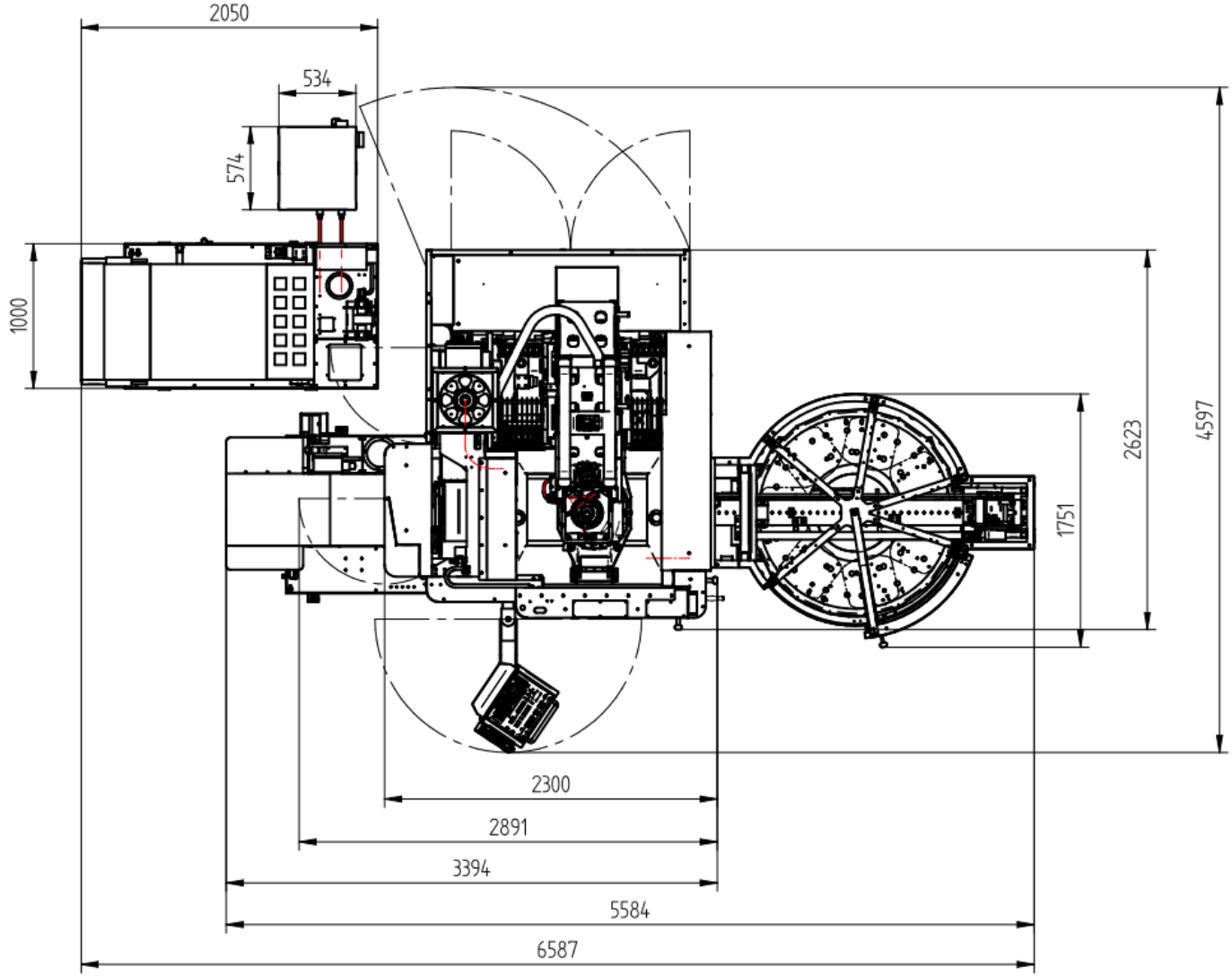


Lower your costs, increase productivity with Automation

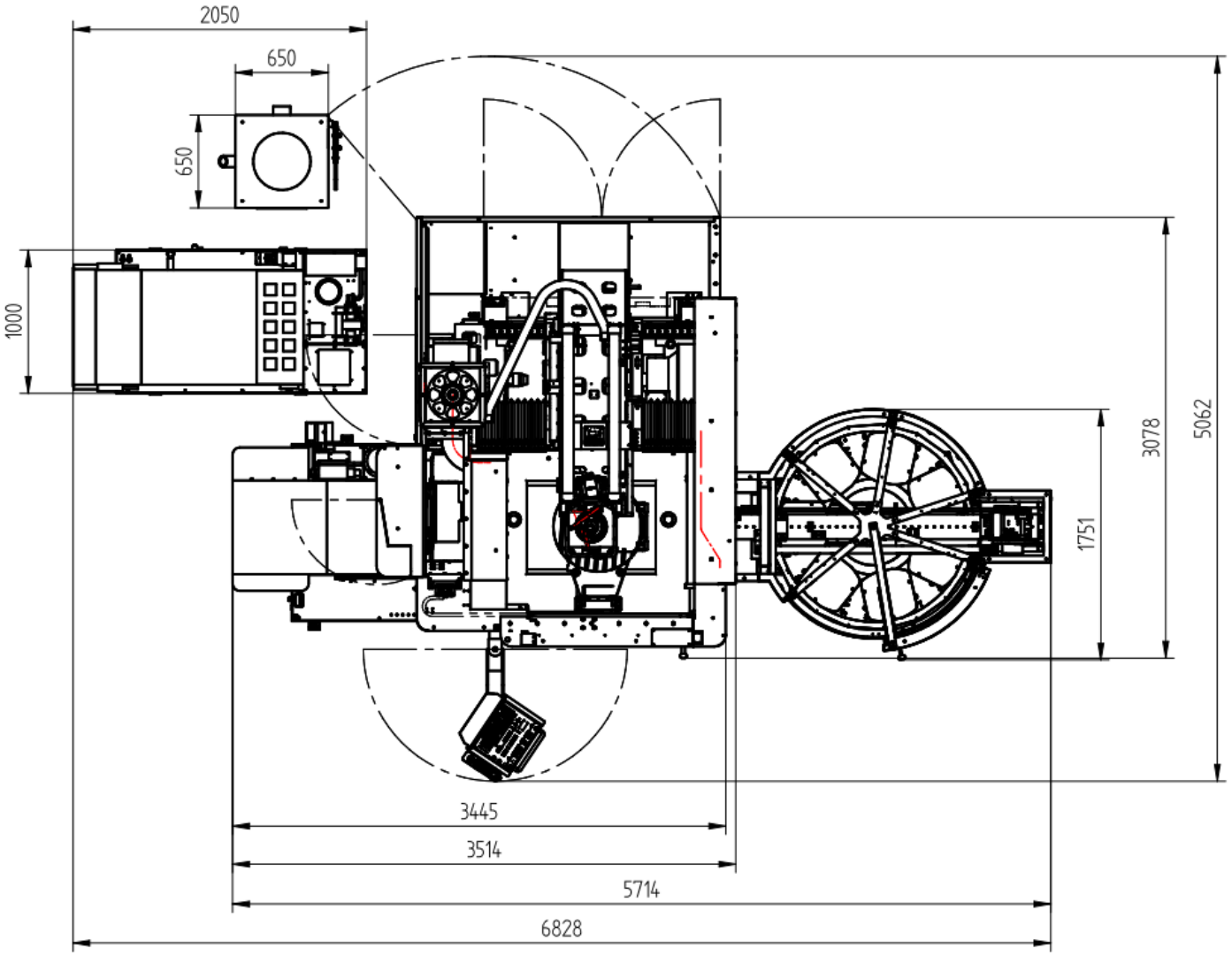
- 7* Dynafix 350*350
- 7* UPC 320*320
- 5* Delphine 400*400
- 5* MTS Erowa 400*400

Pallet Automation	pcs	7 / 5
Pallet changing time	sec	30
Max payload	kg	200

Footprint with Automation/TSC Mill E 500U



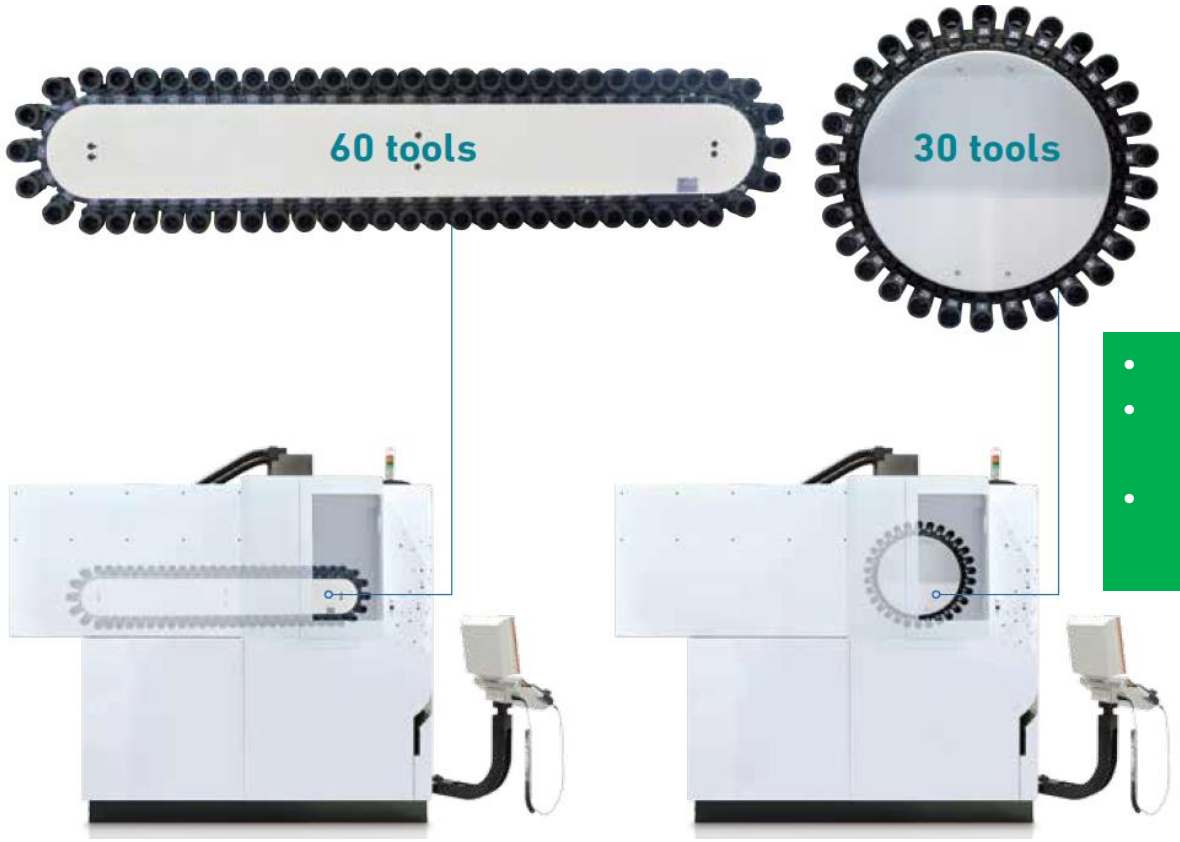
Footprint with Automation/TSC Mill E 700U



Tool changer

Tool changer for 30 or 60 tools
Different tool taper available HSK- A63, BT-ISO 40

Separate tool loading door enables to load tools during the milling process



***2nd Quarter 2020**
170 Tool Tower, DUAL Gripper Option Can Be added.
Approximate 4 sec. "chip to chip time" and having RFID Chip Reader

- **Ergonomic and user friendly**
- **Ensures Productivity and Process reliability**
- **Parallel machining and tool loading**

Professional chip Management

Adapted chip management

- **Solution for high-volume aluminum Milling chips** with slat band lift-up chip conveyor and coolant unit with fine filtration
- **Solution for high-volume steel Milling chips** with scraper lift-up chip conveyor and coolant filtration unit

Options

- Through-Spindle coolant
- Wash-down system
- Coolant thermal control
- Oil skimmer

Band filter CAC system

This unit filters the emulsion from small chips and particles with a paper band filter.

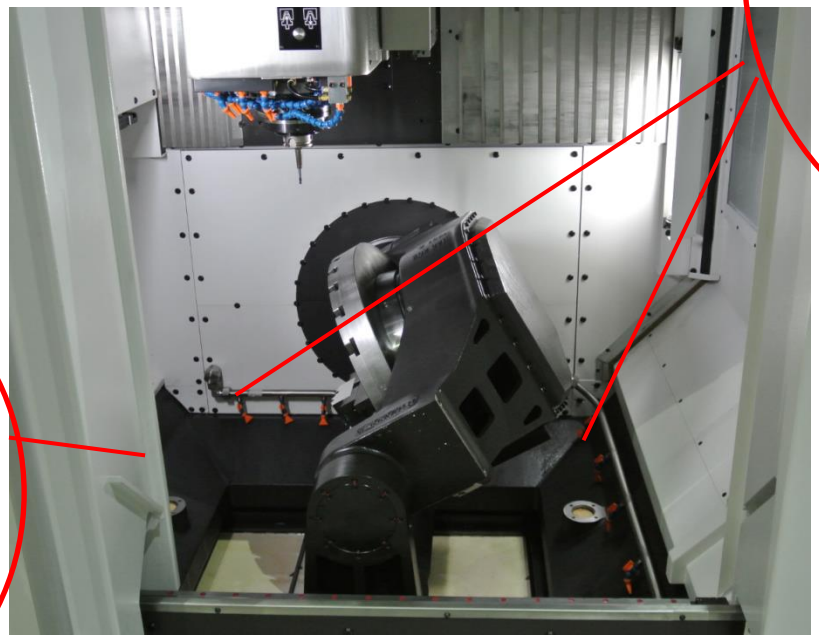
Electrical connection:	50/60 Hz
Capacity:	600 l
Filter system:	Paper band

With the option of 20bar or 50/70bar

Wash down system

Wash down system in Full Direction of the machine area

Washer jets in the right side of the machining area



Washer jets in the left side of the machining area

Mist extraction unit

-The extraction system fitted on the cabin draws the air out of the working area into the filter unit.
-The extracted air flow is sucked through a prefilter (mechanical woven filter) to which large particles of liquid cling.
-The mist extraction system has two of these filter cells.

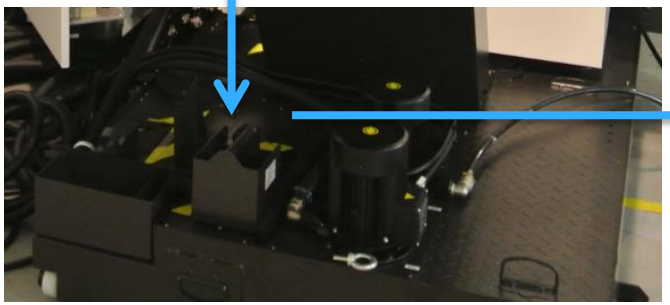
Nominal volumetric displacement 900 m3/h.

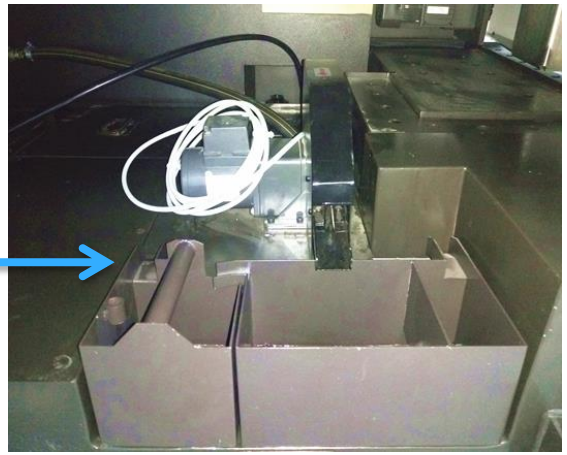
Touch probe / Tool Measuring

Oil skimmer

The oil skimmer consists of a disk that rotates in the cooling lubricant (emulsion). Oil that rises to the top clings to the disk. A wiper unit removes the oil from the disk. The removed oil is collected in a separate tank.

Easy to be maintained





Mill E Series ~ Incredible Value

Unleash your full potential

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otz1@aol.com

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