

# **HX504 SERIES**

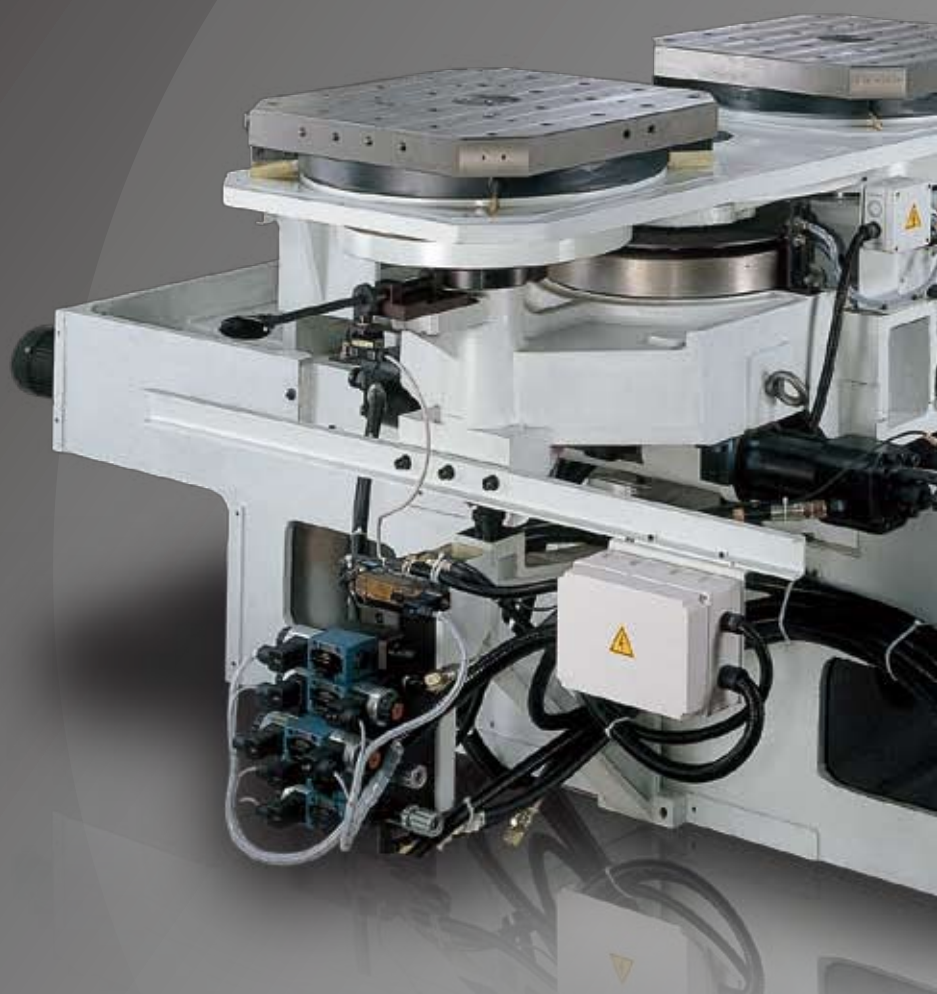
**HX500 series is the fourth generation of our time proven MK60H series (more than 500 units 1996-2007)**



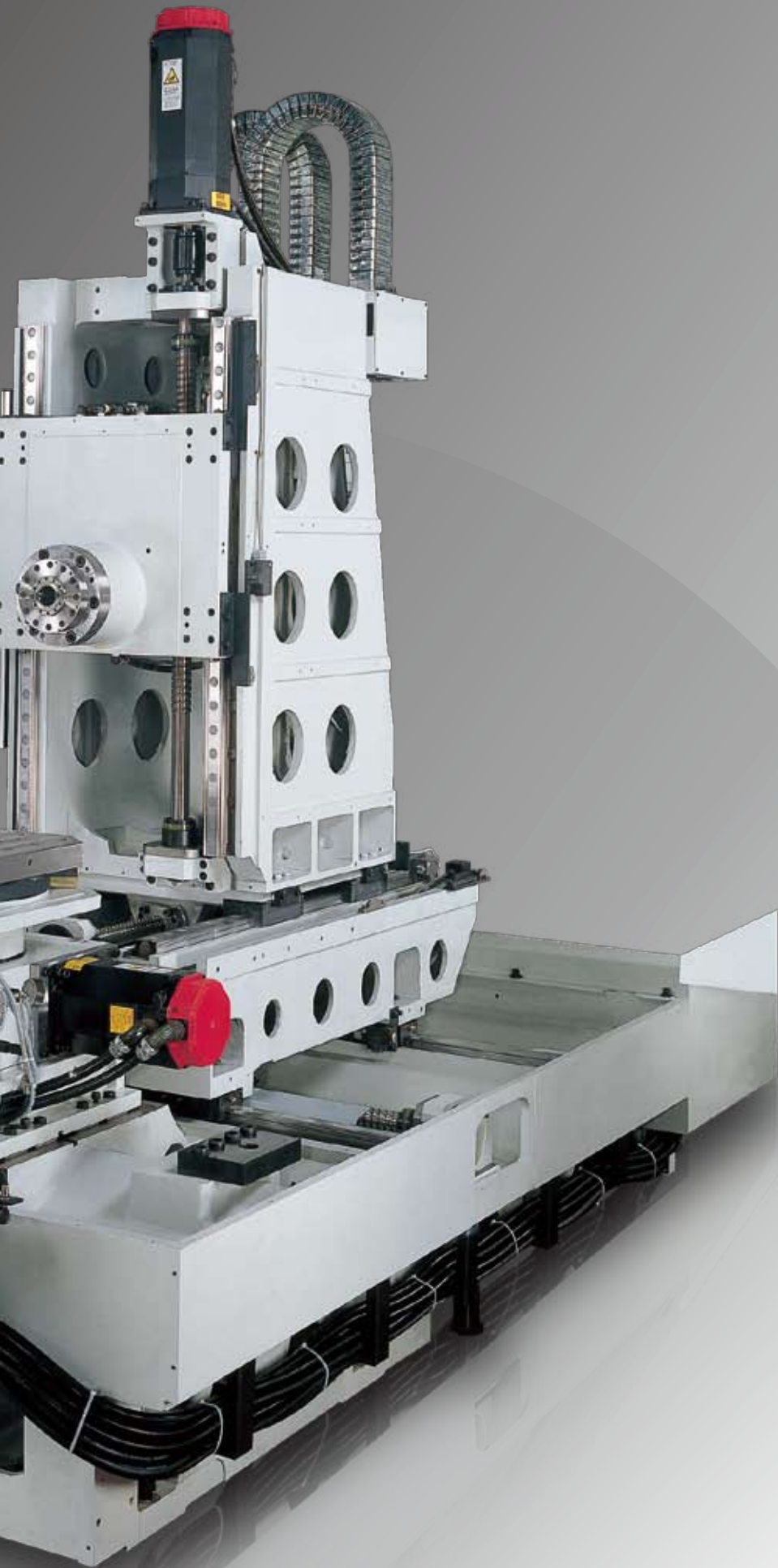


**HX504A:** NO.40 spindle, 1° table

**HX504B :** NO.40 spindle, 0.001° full B table







# Thermal management

To meet more and more severe “WORKING ACCURACY” requirements, the “THERMAL MANAGEMENT” as standard on HX500 SERIES

## Coupling spindle

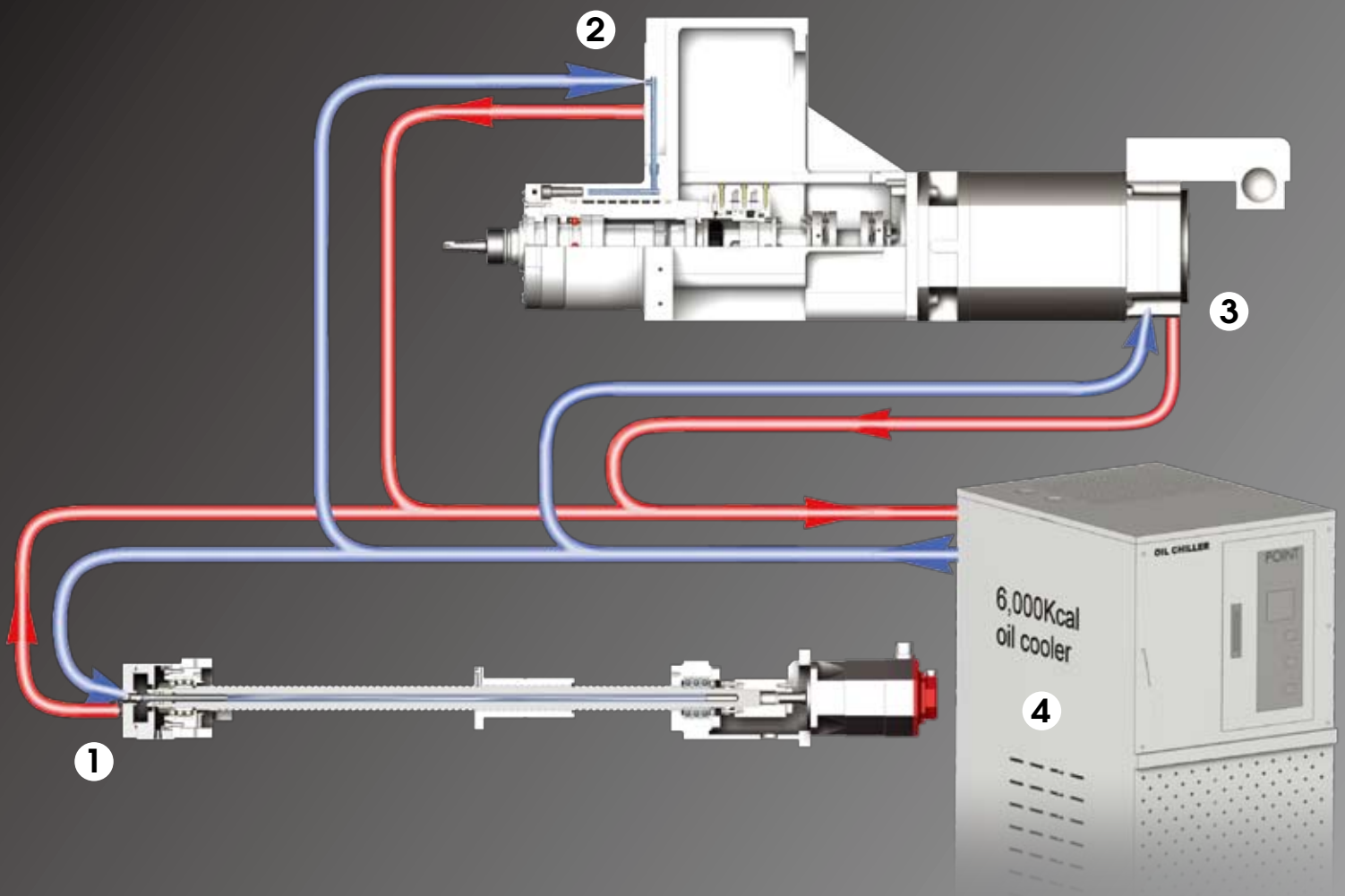
### ① Coolant through ball screw (CTB)

- To keep a). Under  $\pm 10 \mu\text{m}$  repeatability on X, Y & Z
- b). Stable rigidity on ball screw system.

### ② Spindle cooling circuit

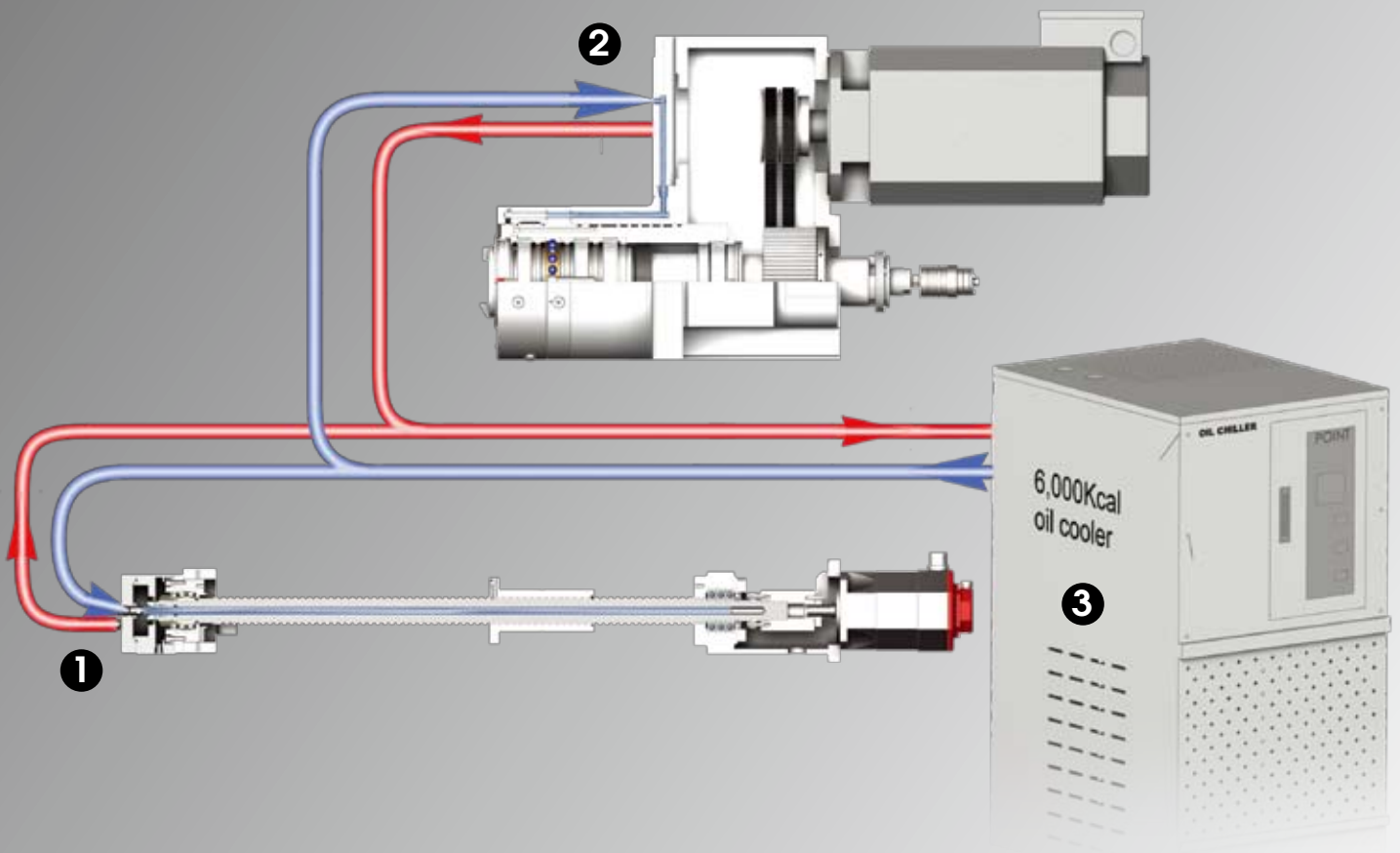
### ③ Spindle motor cooling circuit

### ④ 6,000 kcal large capacity oil cooler



## Belt spindle

- 1 Coolant through ball screw (CTB)  
To keep a). Under  $\pm 10 \mu\text{m}$  repeatability on X, Y & Z  
b). Stable rigidity on ball screw system.
- 2 Spindle cooling circuit
- 3 6,000 kcal large capacity oil cooler

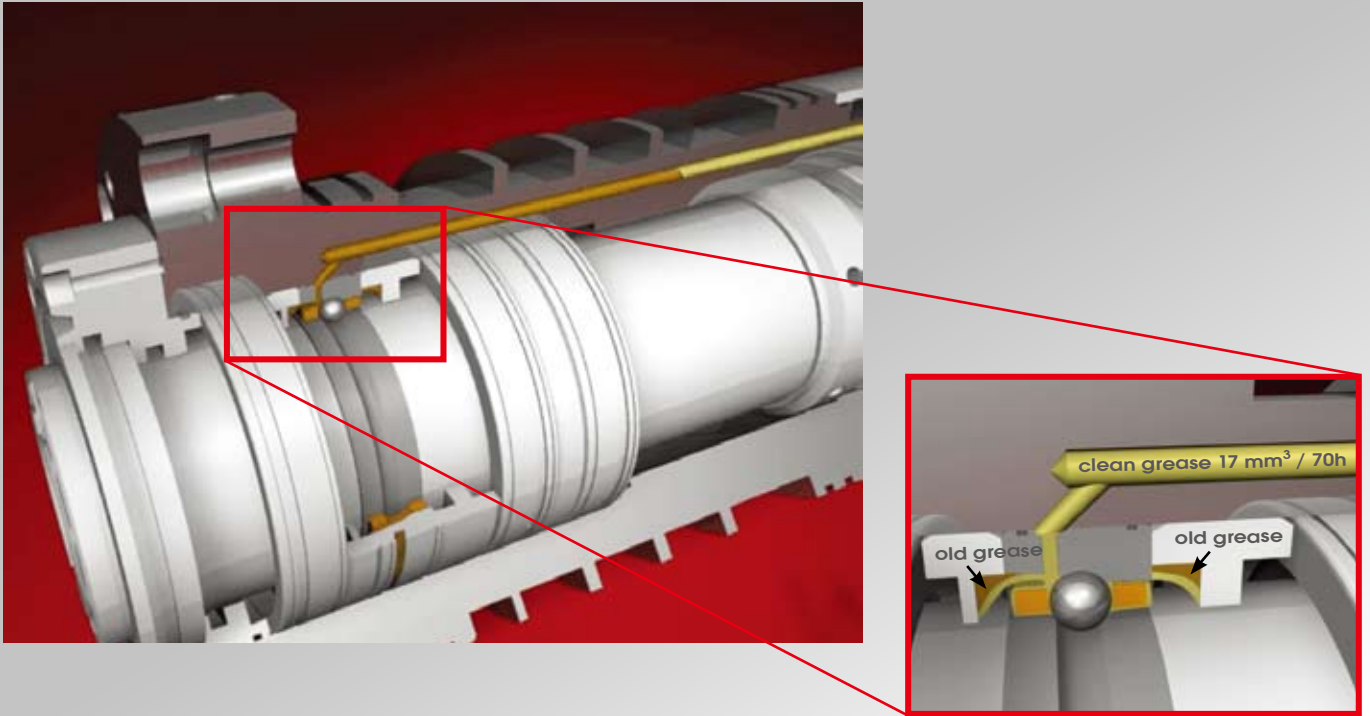




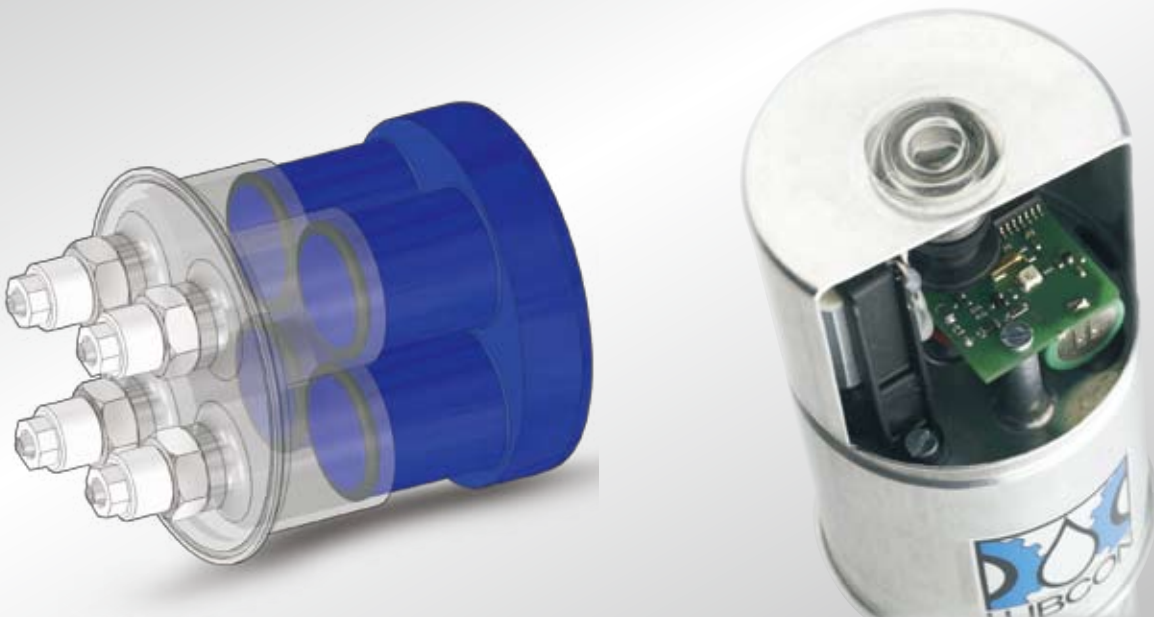
# Unique spindle technology

## Key principle

Use car industry re-greasing principle (by "LUBCON" GERMANY) to supply "clean grease" at 70 hr interval by  $17\text{mm}^3$  / shoot.



The grease chamber volume at  $7.5\text{cm}^3$  can support 28,840 hr.  
This LUBCON unit service life at 3 years as minimum is guaranteed.

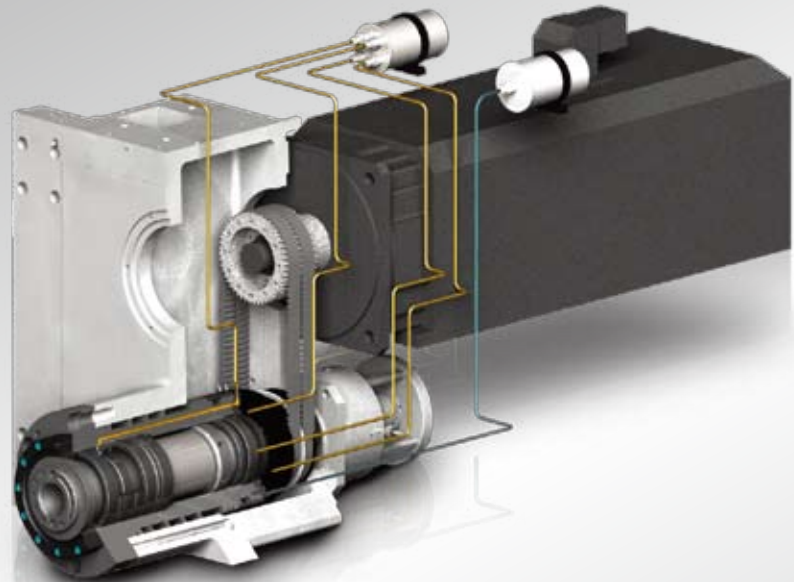




## 40 Taper

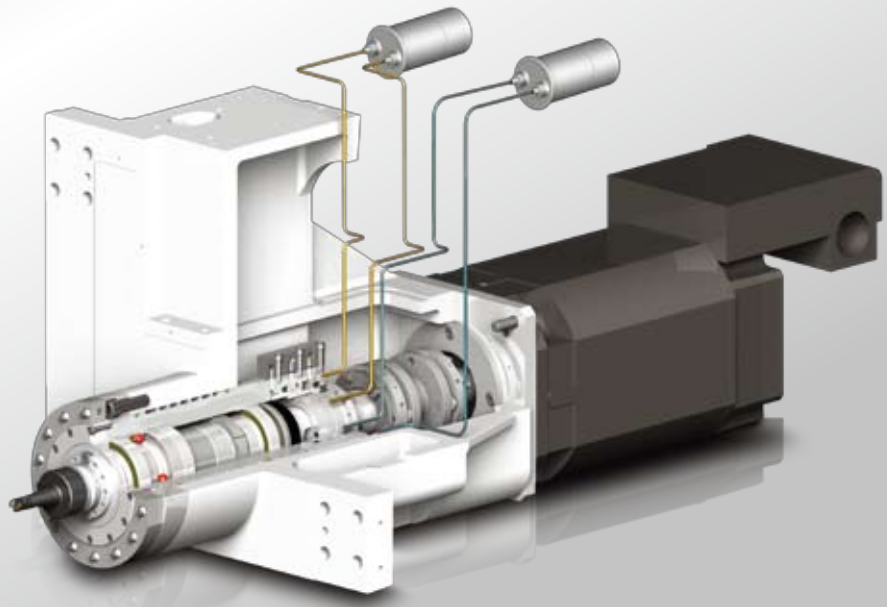
### Belt spindle

- 9,000 min<sup>-1</sup>
- 12,000 min<sup>-1</sup>
- 15,000 min<sup>-1</sup>



### Coupling spindle

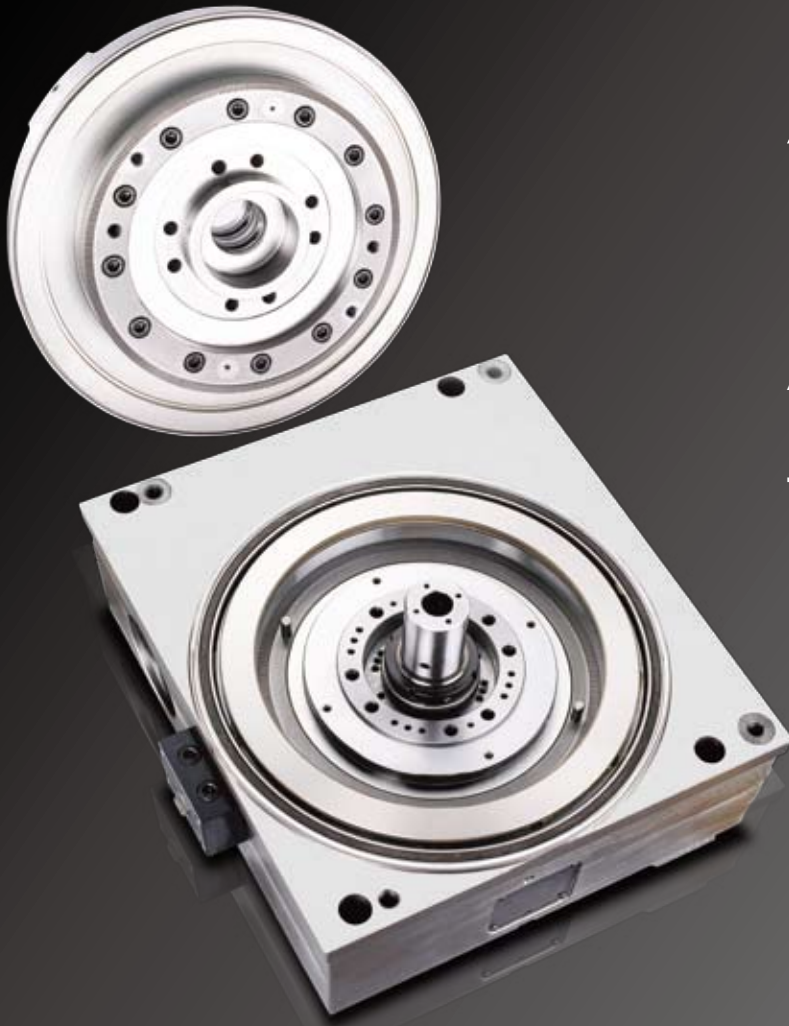
- 15,000 min<sup>-1</sup>



### BIG-PLUS double contact spindle as standard



## 4th axis table



### A type :

Indexing table

Hirth coupling (1°) table

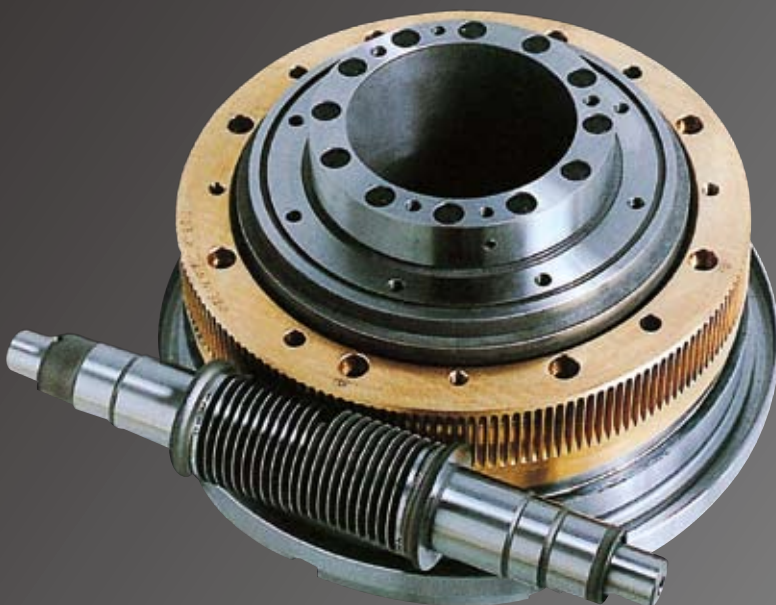
Pallet size: 500 x 500 mm

Accuracy:  $\pm 3$  sec

Large tooth coupling:  $\text{Ø}360$

Tilting moment: 7,500 Nm

High clamping force: 50,000 N



### B type :

NC rotary table

unique OTT worm gear  
system (0.001°) table

Pallet size: 500 x 500 mm

Tilting moment: 4,000 Nm

Clamping torque: 3,700 Nm

Drive torque: 1,500 Nm



## A type:

Speed : 22.2 min<sup>-1</sup>

0 ~ 90° : 0.9 second (w/o clamping)  
2.2 second (w clamping)

## B type:

Speed : 33.3 min<sup>-1</sup>

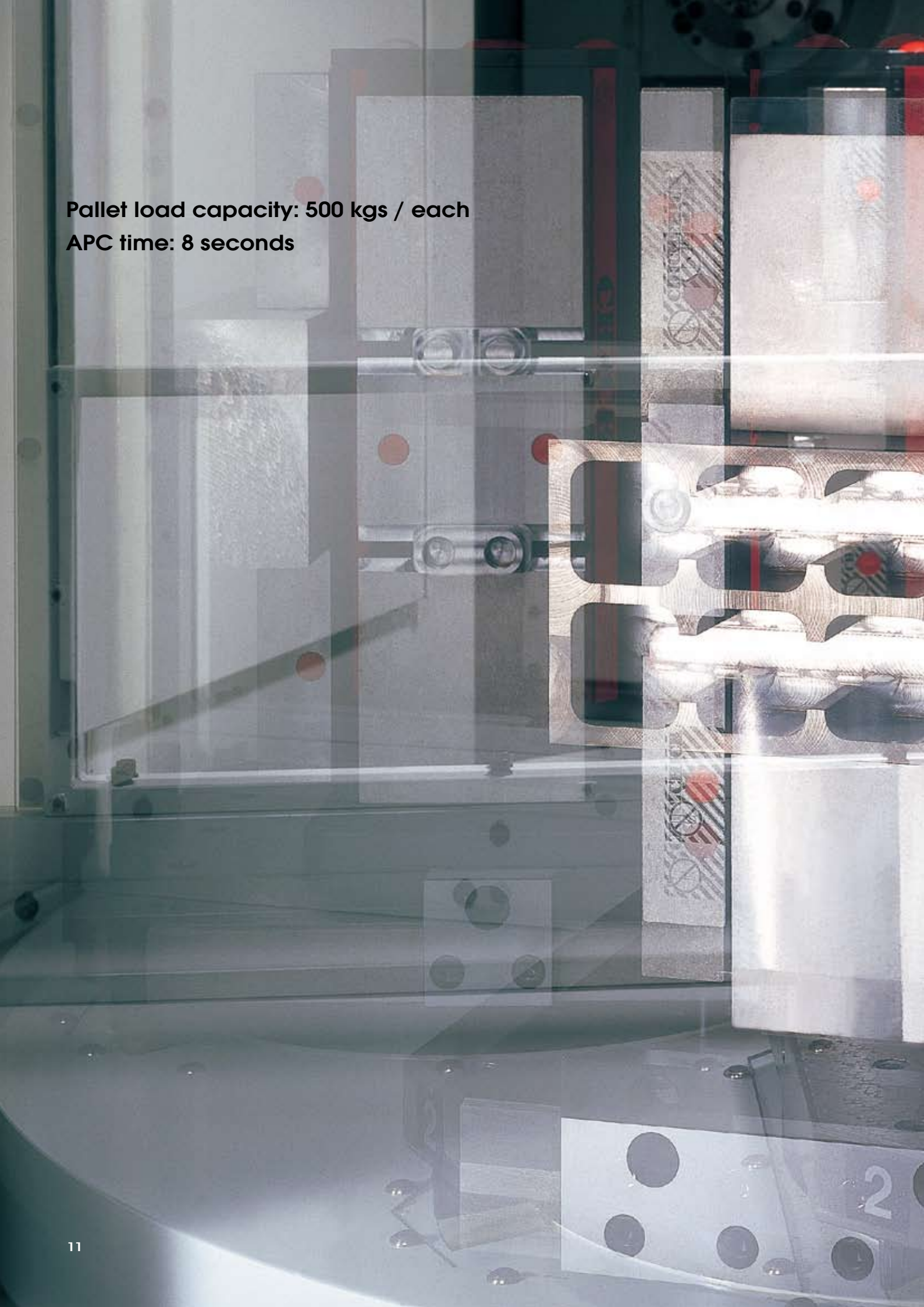
0 ~ 90° : 0.6 second (w/o clamping)  
1.2 second (w clamping)



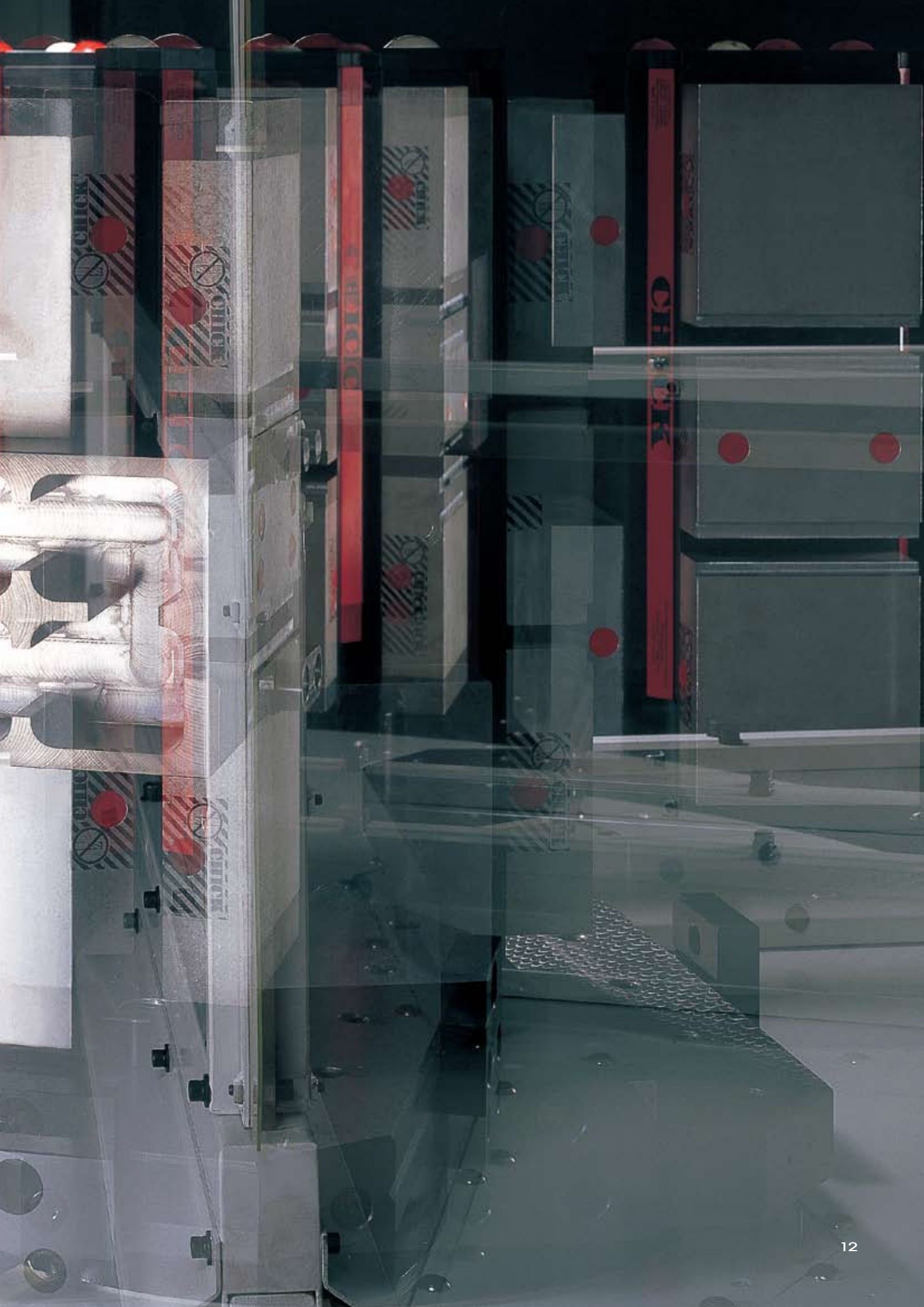
Four cones clamping system,  
clamping force at 45,000 N

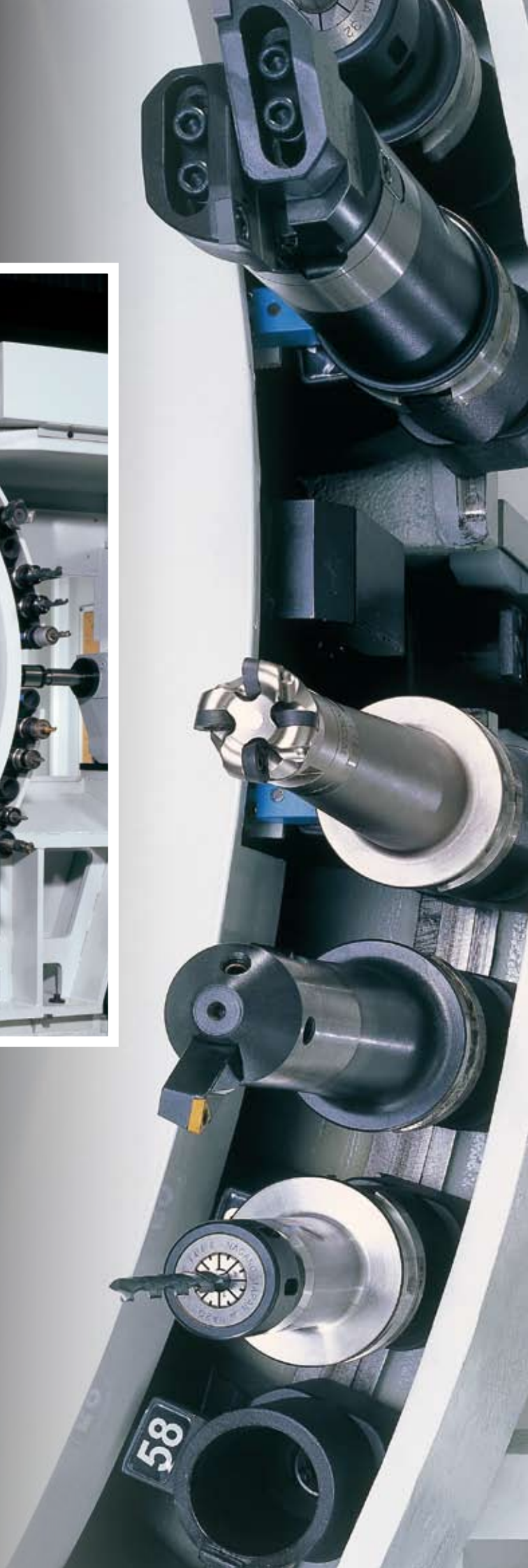


**Pallet load capacity: 500 kgs / each**  
**APC time: 8 seconds**













**Minimum moving parts & highest reliability**

**40 Taper:**

**Tool to tool: 2 seconds\***

**Chip to chip: 4.9 seconds**

**\* Tool weight under 6 kgs, 60Hz**

**(some covers removed for explanation)**

- a** Documentation & hand tool shelf
- b** Manual pallet rotation
- c** Powerful wash gun, 2.5 bar
- d** Ceiling wash down 3 bar at 60 L / min
- e** Better chip flow by augers direct to the rear
- f** Both scrapper or hinge type chip conveyor available
- g** Chip cleaning during machine running







**b**



**c**



**d**



**e**



**f**



**g**

# Cutting performance

ST 60 ALMGS1 1

Tool: Ø80 x 6 Blades

S=1,000 min<sup>-1</sup> S=7,000 min<sup>-1</sup>

F=1,800 mm/min F=10,000 mm/min

Q= 320 c.c/min Q=3,000 c.c/min

FACE MILLING

Tool: Ø40 x 5 Flutes

Ø40 W:25 D:50

S=240 min<sup>-1</sup> S=640 min<sup>-1</sup>

F=101 mm/min F=500 mm/min

Q=126 c.c/min Q=625 c.c/min

END MILLING

Tool: Ø54

Ø40 W:25 D:50

S=880 min<sup>-1</sup> S=2,000 min<sup>-1</sup>

F=180 mm/min F=380 mm/min

Q=412 c.c/min Q=870 c.c/min

DRILLING (W/T.S.C)

Tool: M36 x P4.0

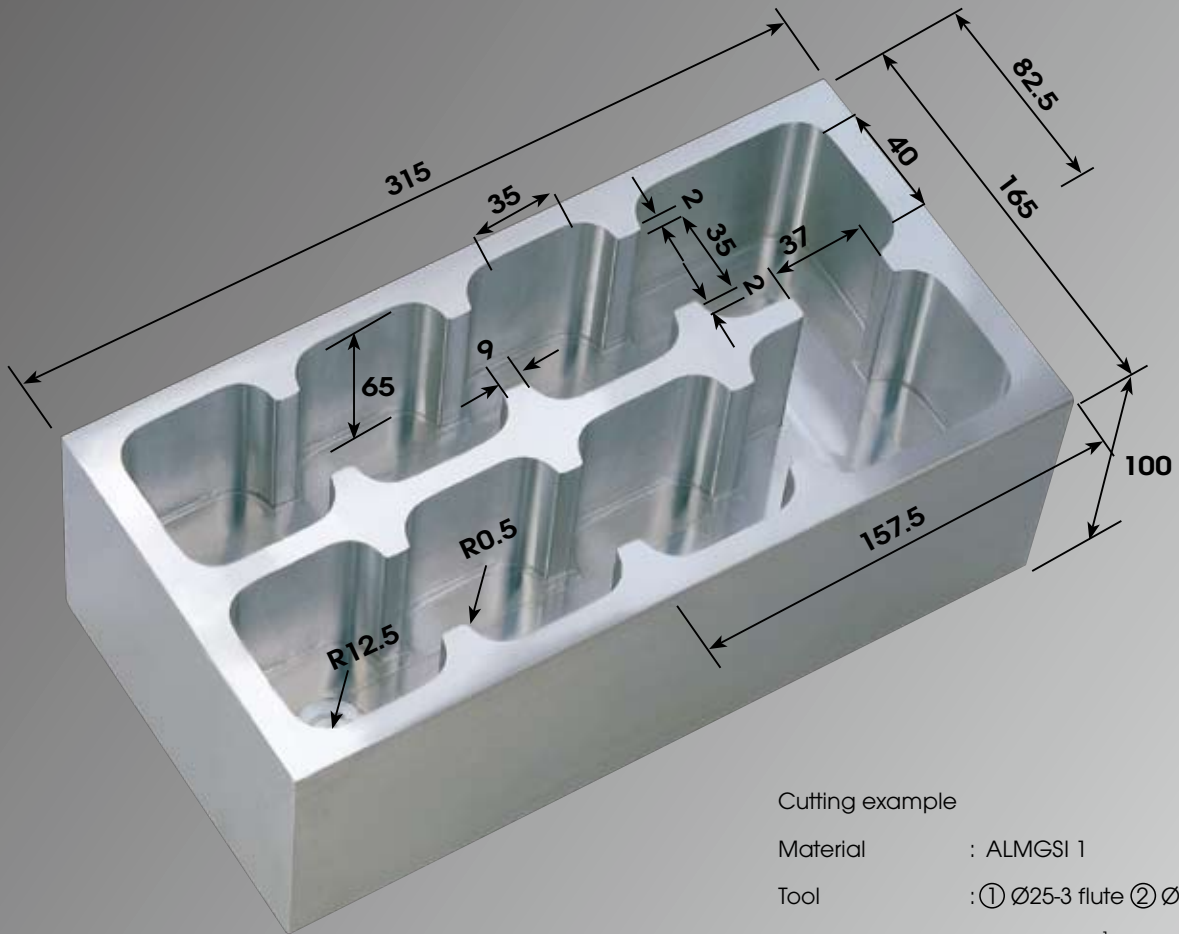
S=177 min<sup>-1</sup> S=186 min<sup>-1</sup>

F=708 mm/min F=744 mm/min

TAPPING



# Heavy duty & high Speed

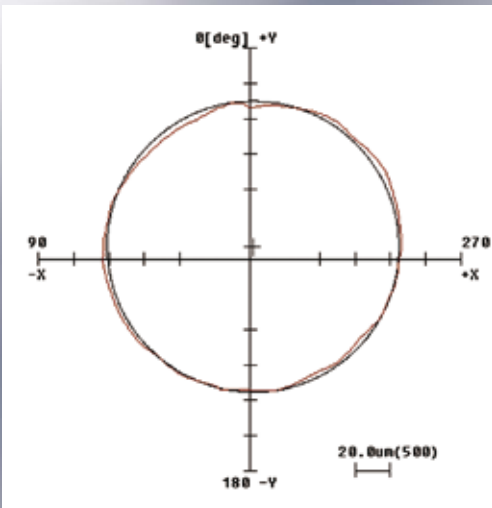


### Cutting example

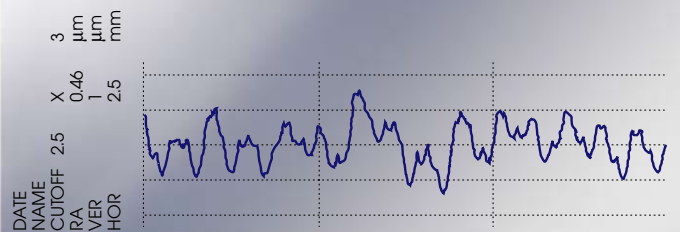
- Material : ALMGSI 1
- Tool : ① Ø25-3 flute ② Ø16-3 flute
- Spindle speed : 15,000 min<sup>-1</sup>
- Cutting speed : 1,178 m/min
- Feed : 6,500 mm/min
- Time : 7.5 min

# High Accuracy

## Roundness : 4 μm (with standard scales)



## Surface roughness : 2.2 μm (Rmax.)



### MITUTOYO SURFTTEST 201

- Material : ALMGSI 1
- Tool : Face cutter Ø80 x 3 blades
- Spindle speed : 10,000 rpm
- Cutting speed : 2,513 m/min
- Feed : 4,000 mm/min

# HX504 series

Technical data		HX504							
		A / B							
		E			P				
		/9B	/12B	/15B	/9B	/12B	/15B	/15C	/15D
<b>Work range</b>									
Pallet size (mm)		500 X 500							
Max. work swing diameter (mm)		Ø680 / Ø760							
Max. work piece height (mm)		710							
Pallet load capacity (kg)		500							
Travel X / Y / Z (mm)		710 / 610 / 650							
Min. incremental on table (degree)		1° / 0.001°							
Pallet surface to spindle center (mm)		85 ~ 695					105 ~ 715		
Spindle nose to pallet center (mm)		150 ~ 800							
Pallet surface configuration		24 - M16@ Pitch 100 mm grid							
<b>Feed drive</b>									
Feed force	X (N)	6,283			8,639 (F) 10,249 (T)				
	Y (N)	11,519			8,639 (F) 10,249 (T)				
	Z (N)	6,283			8,639 (F) 10,249 (T)				
Rapid movement	X / Y / Z (m/min.)	32			48				
	B (sce. / 90°)	2.5 / 1.2							
Acceleration	X / Y / Z (m/s <sup>2</sup> )	3 / 4 / 4			4 / 5 / 6				
Dia. / Pitch of ball screw (mm)		Ø45 / 12			Ø45 / 16				
<b>Main spindle</b>									
Spindle taper ISO		40 Taper							
Max. spindle speed		9,000	12,000	15,000	9,000	12,000	15,000	15,000	15,000
Spindle base speed	F	1,125	1,500	1,875	1,125	1,500	1,875	-	600(460*)
	T	-	-	-				1,500	-
Spindle output kW (S6-40%)	F	22*			30			-	30(37*)
	T	-			30			25	-
Spindle output torque Nm (S6-40%)	F	187*	140*	112*	255	191	153	-	350(456*)
	T	-	-	-	255	191	153	159	-
Spindle transmission		Belt			Belt			Couping	
Spindle diameter (mm)		Ø70							
<b>Position accuracy</b>									
ISO230-3 / JIS (mm)		w/o linear encoder			0.015 / 0.008				
		W linear encoder			0.008 / 0.004				
<b>Tool changer</b>									
Tool selection		Random							
Magazine position		60							
Max. tool dia. / without adjacent (mm)		Ø80 / Ø150							
Max. tool length (mm)		350							
Max. tool weight (kg)		10							
Max. tool moment from gauge line (Nm)		18							
Tool to tool time (sec.)		2							
Chip to chip time (sec.)		5.8			4.9				
<b>Pallet changer</b>									
Number of pallet		2							
Method of pallet change		Swing arm							
Pallet change time (sec.)		8							
Repeatability of pallet changing (mm)		0.02							

Note: 1) All the specification is based on power at 60 Hz

2) \* At S3-25%

3) \*\* Available from 2008



## Main spindle

40 Taper Belt spindle - 9,000 min<sup>-1</sup> & 12,000 min<sup>-1</sup> & 15,000 min<sup>-1</sup>  
 Coupling spindle - 15,000 min<sup>-1</sup>

## Control

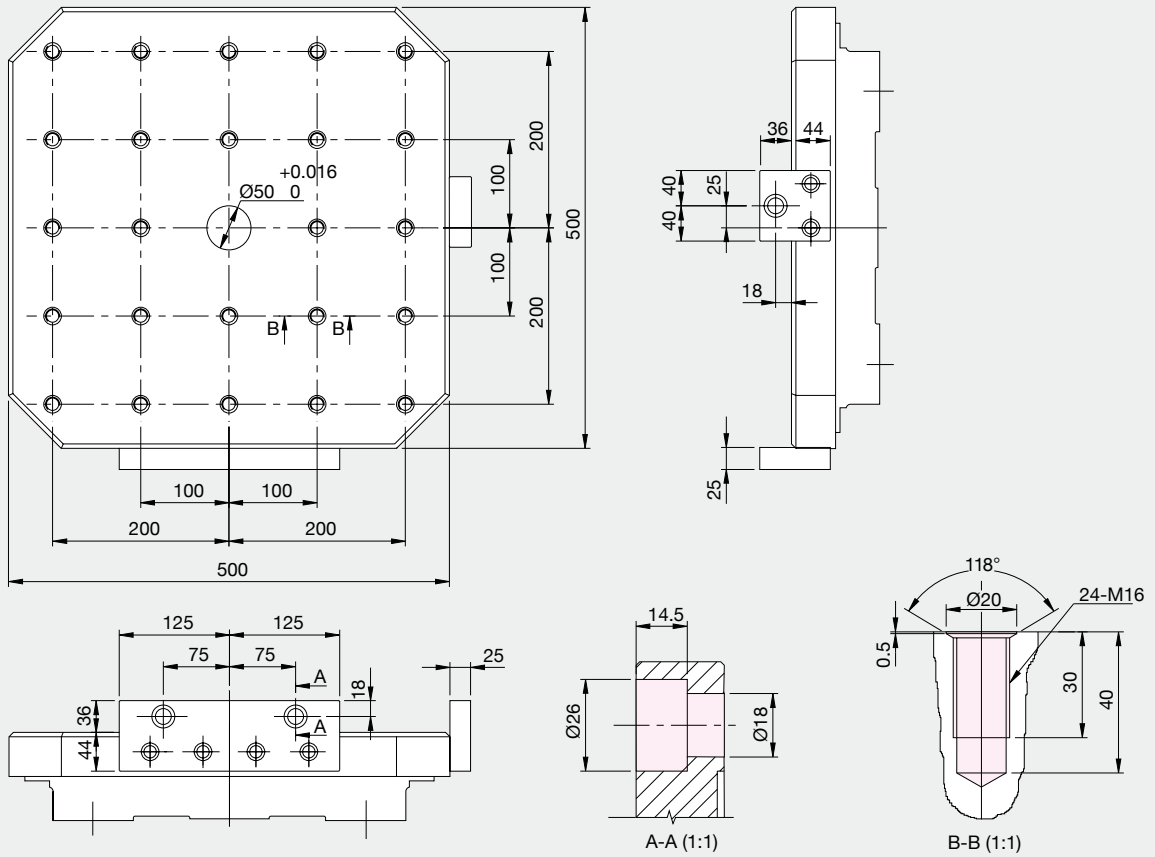
(F): QUASER mill i (For E type)  
 FANUC 18iMB (For P type)  
 (T): HEIDENHAIN iTNC530 (For P type)\*\*

Technical data	HX504								
	A / B								
	E			P					
	/9B	/12B	/15B	/9B	/12B	/15B	/15C	/15D	
<b>Coolant system</b>									
Coolant tank capacity (liter)	685 (650 + 35)								
Pump capacity	3 bar @ 60 L / min.								
- Nozzle coolant	20 bar @ 25 L / min.								
- Through spindle coolant	3 bar @ 60 L / min.								
- Wash down coolant	3bar @ 60 L / min.								
- Ceiling coolant									
<b>Machine size</b>									
Floor space W x D (mm)	3,675 x 4,680								
Height (mm)	3,100								
Weight (kg)	13,000								
<b>Connections</b>									
Main power	220 V or 400 V								
Power consumption (KVA)	35			40			45		
Pneumatic air consumption	6 ± 1 bar, 550 NL / min.								

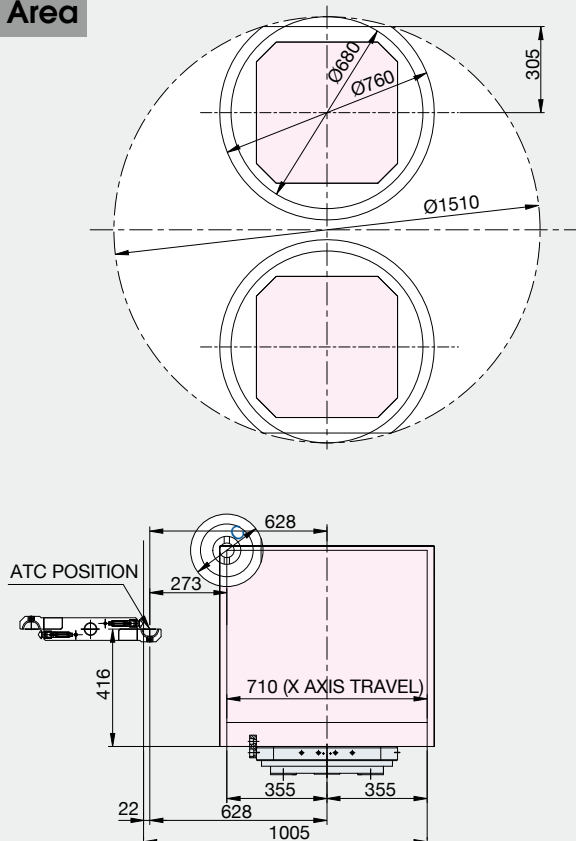
● = Standard ○ = Option ✕ = N / A

Standard / option accessories	HX504								
	A / B								
	E			P					
	9B	12B	15B	9B	12B	15B	15C	15D	
■ QUASER mill i	●	●	●	✕	✕	✕	✕	✕	
■ FANUC 18iM-B	✕	✕	✕	●	●	●	✕	●	
■ HEIDENHAIN iTNC530	✕	✕	✕	○	○	○	●	✕	
■ Spindle oil chiller	●	●	●	●	●	●	●	●	
■ Through ball screw cooling	●	●	●	●	●	●	●	●	
■ Linear scale on X / Y / Z (Absolute 0.05 μm)	○	○	○	○	○	○	○	○	
■ 1° index table	●	●	●	●	●	●	●	●	
■ 0.001° rotary table	●	●	●	●	●	●	●	●	
■ 40 taper / 60 position tool magazine	●	●	●	●	●	●	●	●	
■ 40 taper tooling system ~ Shank / Pull stud	MAS-403 BT40 / PS-G51	○	○	○	○	○	○	○	
	ISO-7388/1 / ISO-7388/2	●	●	●	●	●	●	●	
	DIN-69871 / DIN-69872-A	○	○	○	○	○	○	○	
■ 2 Pallets station	●	●	●	●	●	●	●	●	
■ Extra pallet	○	○	○	○	○	○	○	○	
■ Tool length measurement	BLUM	○	○	○	○	○	○	○	
	RENISHAW NC-4	○	○	○	○	○	○	○	
	RENISHAW TS-27R	○	○	○	○	○	○	○	
■ Work probe	RENISHAW OMP-40	○	○	○	○	○	○	○	
■ Coolant system	Nozzle coolant	●	●	●	●	●	●	●	
	Base wash down	●	●	●	●	●	●	●	
	Ceiling wash down	●	●	●	●	●	●	●	
	Coolant wash gun	●	●	●	●	●	●	●	
■ Coolant through spindle	20 bar	●	●	●	●	●	●	●	
	50 bar	○	○	○	○	○	○	○	
■ Dual chip augers	●	●	●	●	●	●	●	●	
■ Chip conveyor	Scrape type	●	●	●	●	●	●	●	
	Hinge type	○	○	○	○	○	○	○	
■ Work light	●	●	●	●	●	●	●	●	
■ Machine status light	●	●	●	●	●	●	●	●	
■ CE & EMC	●	●	●	●	●	●	●	●	

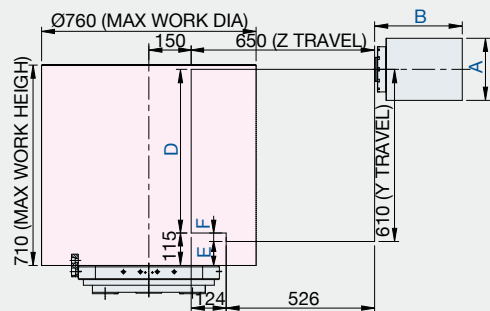
## Pallet dimension



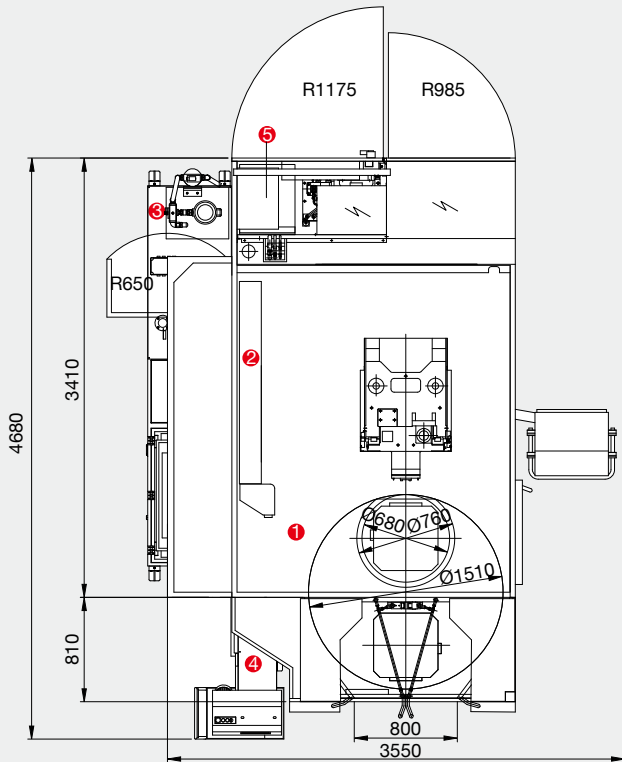
## Cutting Area



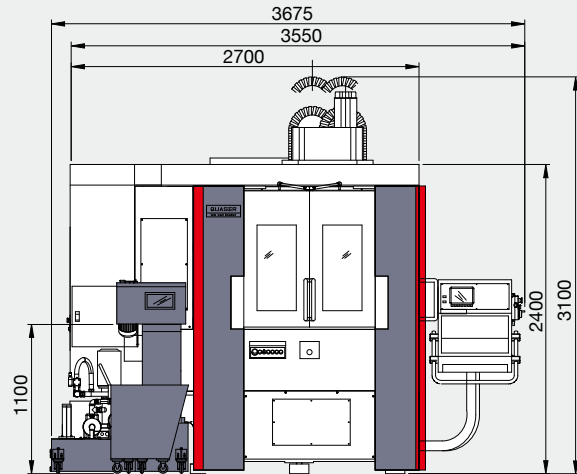
	HX504	
	Belt	Coupling
<b>A</b>	$\varnothing 220$	$\varnothing 220$
<b>B</b>	220	220
<b>C</b>	$\varnothing 150$	$\varnothing 150$
<b>D</b>	580	600
<b>E</b>	85	105
<b>F</b>	30	10



## Installation dimension

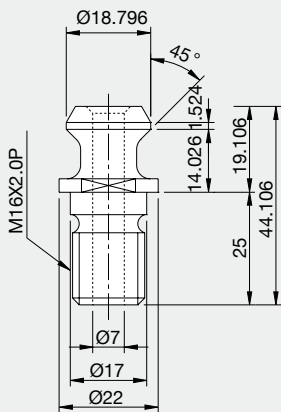


- 1** Standard machine
- 2** Magazine unit
- 3** Coolant supply unit
- 4** Chip conveyor
- 5** Spindle cooling unit & Hyd. tank unit

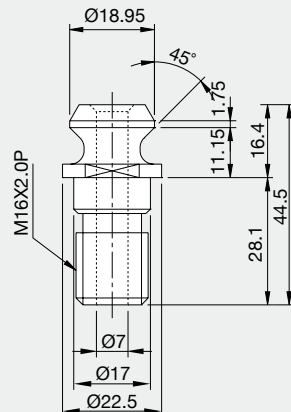


## Pull stud and applicable tools

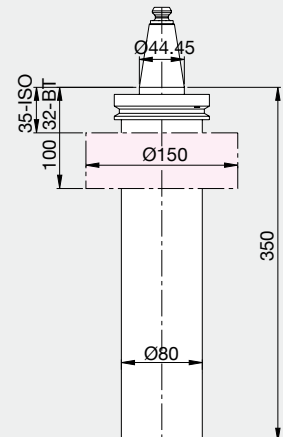
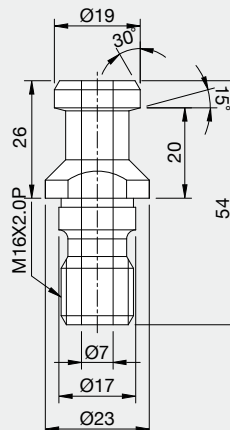
BT 40 (QUASER SUPPLY)



ISO (7388-B)



DIN (69872-A)







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**Fold here for filing!**

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