VU600-800 DOUBLE COLUMN FIVE AXES MACHINING CENTER

SKY MASTER
KRAFT

Version:TRJG-2017-A1

Supply the optimal solutions for customers by our professional technology

SKY MASTER
GK KRAFT

VU600/800 CONFIGURATION

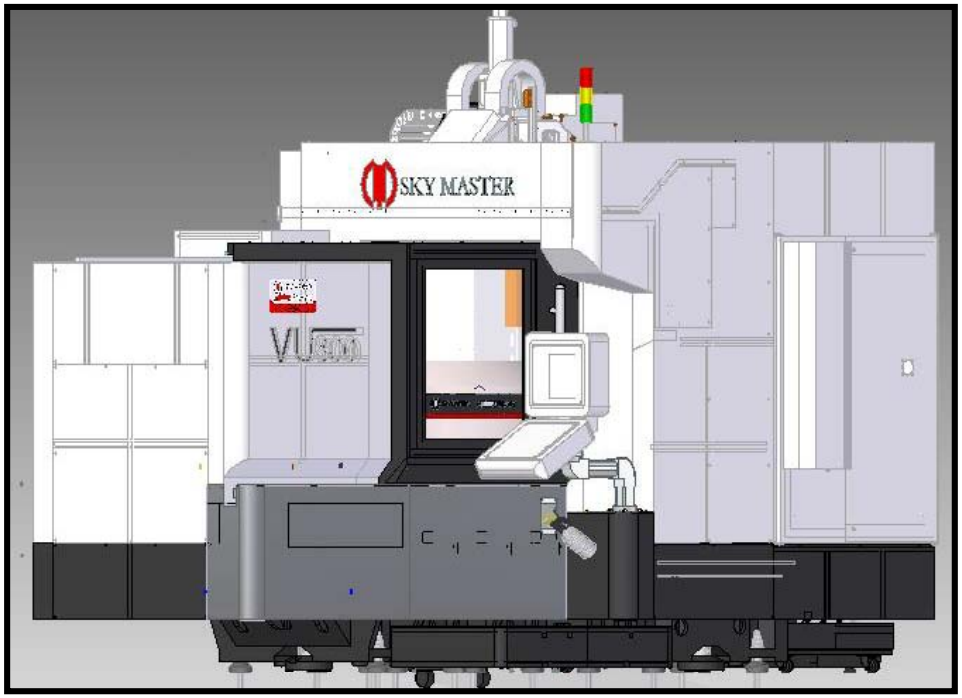
Items			Unit	VU600	VU800
CNC controller				HEIDENHAIN TNC640 (Five axes)	
Travel	X axis (worktable)		mm	925	925
	Y axis (saddle)		mm	1050+135(换刀)	1050+135(换刀)
	Z axis (spindle)		mm	600	700
	Distance from spindle nose to table		mm	120-720	160~860
Worktable	Worktable diameter		mm	Φ600	Φ800
	T slot (quantity×width)		mm	7×14	7×14
	Max. load		kg	850	1200
	Rotating angle	A axis		-120°—+120°	-120°—+120°
		C axis		360°	360°
	Max. speed	A axis	rpm	50	50
		C axis	rpm	100	100
Spindle	Taper			HSK-A63	HSK-A63
	Max. speed		rpm	15000	15000
	Motor power (continuously/ 30 minutes)		kW	10/17	10/17
	Torque		N.m	63.7/108.6	63.7/108.6
Axis	Rapid traverse (X, Y, Z)		mm/min	40000	40000
	Cutting feedrate(X, Y, Z)		mm/min	1~20000	1~2000
ATC	ATC type			Chain	Chain
	Tool capacity		pc	32	32
	Max. tool diameter		mm	Φ75/Φ130	Φ75/Φ130
	Max. tool length		mm	350	350
	Max. tool weight		kg	8	8
Accuracy	VDI/DGQ3441	Full travel positioning	mm	P0.010	P0.010
		Repeatability	mm	Ps0.008	Ps0.008
Air requirement			MPa	0.6-0.8	0.6-0.8
Phase & voltage & frequency				3/PE，AC380V，50Hz	
Power			kVA	80	80
Footprint(length/width/height)			Mm	5090×3250×3510	5090×3250×3510
Weight			kg	22000	22000

"VU" means "Double column five axes"

"600/800" means " rotating table diameter 600/800mm"

Remark: We reserve all the right of technical data modification for improving our products without notification

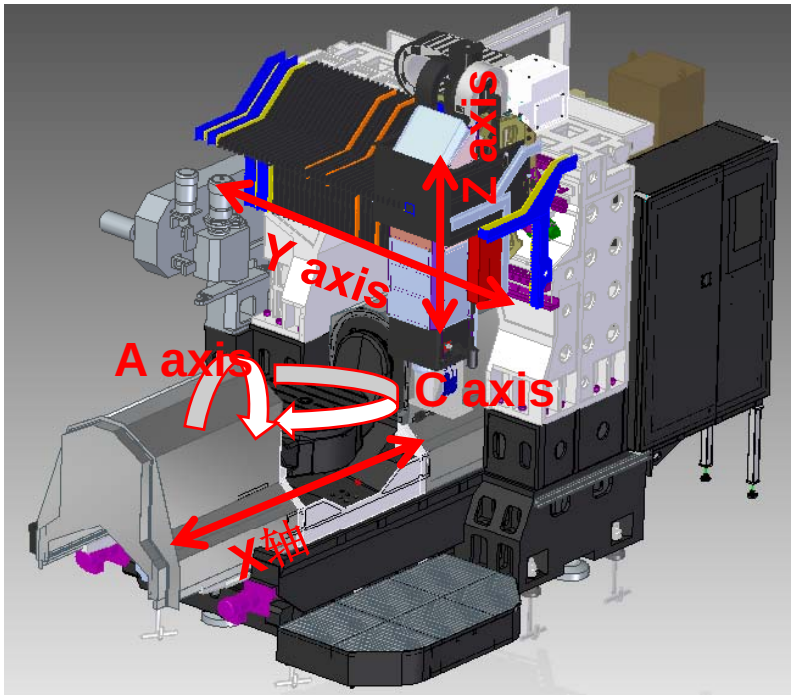
Machine features – whole machine



Mainly used for multi-species, high-precision batch parts

- **High speed** —Direct connection spindle 15000rpm
- High feedrate — Max. cutting speed is 20m/min
- **High response** — Equipped with super torque servo motor for three axes, the max. acceleration is 0.6G, max. worktable load is 1.2T, max. acceleration of X axis is 0.5G
- **High accuracy** — The positioning accuracy of three axes is 0.01, repeatability positioning accuracy is 0.008mm

Machine layout – main structure

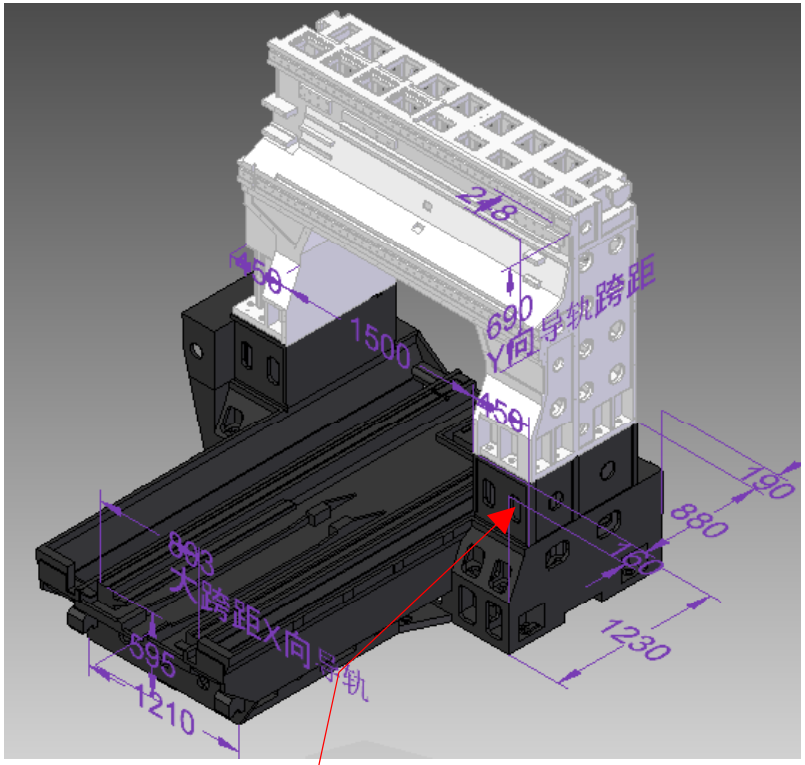


Worktable motion---X axis
Saddle motion-----Y axis
Headstock motion---Z axis
Rotate along X axis—A axis
Rotate along Z axis—C axis

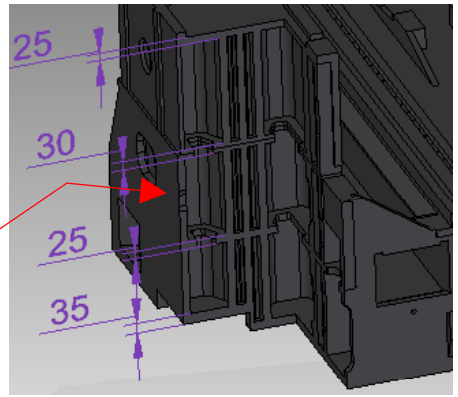
- ◆ Gantry type machine with fixed beam
- ◆ Beam and column were casted into one-piece
- ◆ Reasonable machine layout to make operate more easy
- ◆ Convenient for chip and coolant removal

★ Adopting Germany's unique ingredients for machine main structure, the procurement costs are increased by more than 30%.
★ Each casting is equipped with a test bar, through which the true material properties can be analyzed easily.
★ Adopting finite element analysis to ensure maximum rigidity of the machine 。

Structure feature - base

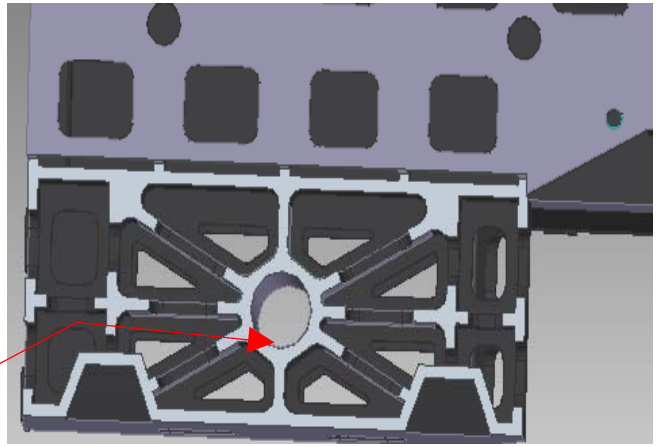


With a multi-layer design in the base and three-layer support rib design for joint surface of column and linear guide way to ensure a durable rigidity.



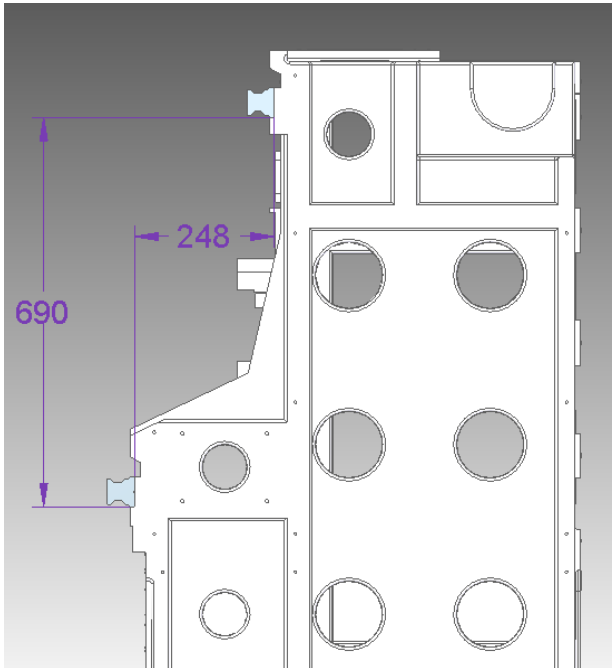
Large size gantry frame structure to provide a solid base

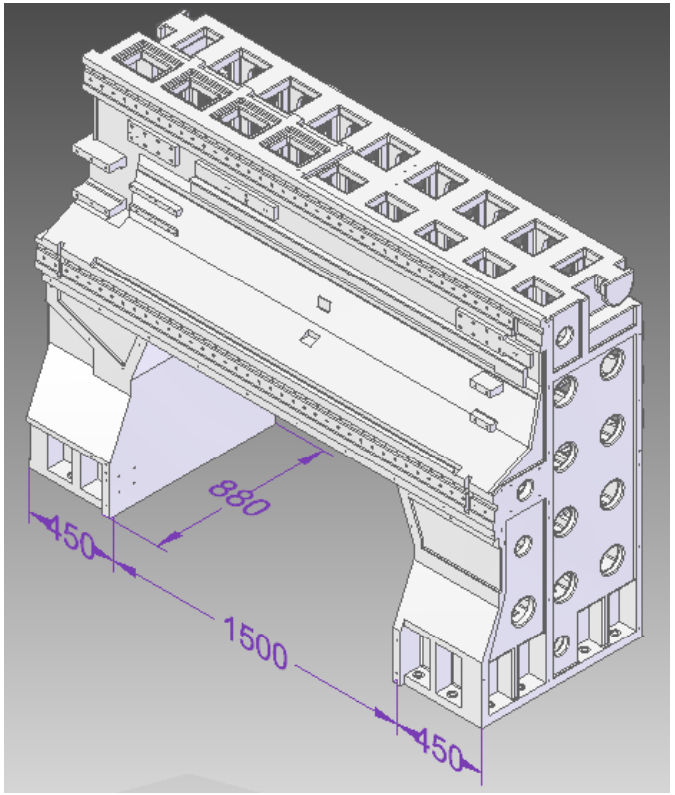
With cross type rib structure to keep stably dynamic and static rigidity



Structure feature - beam

Y axis’ s slide way uses a stepped design to get an excellent cutting rigidity

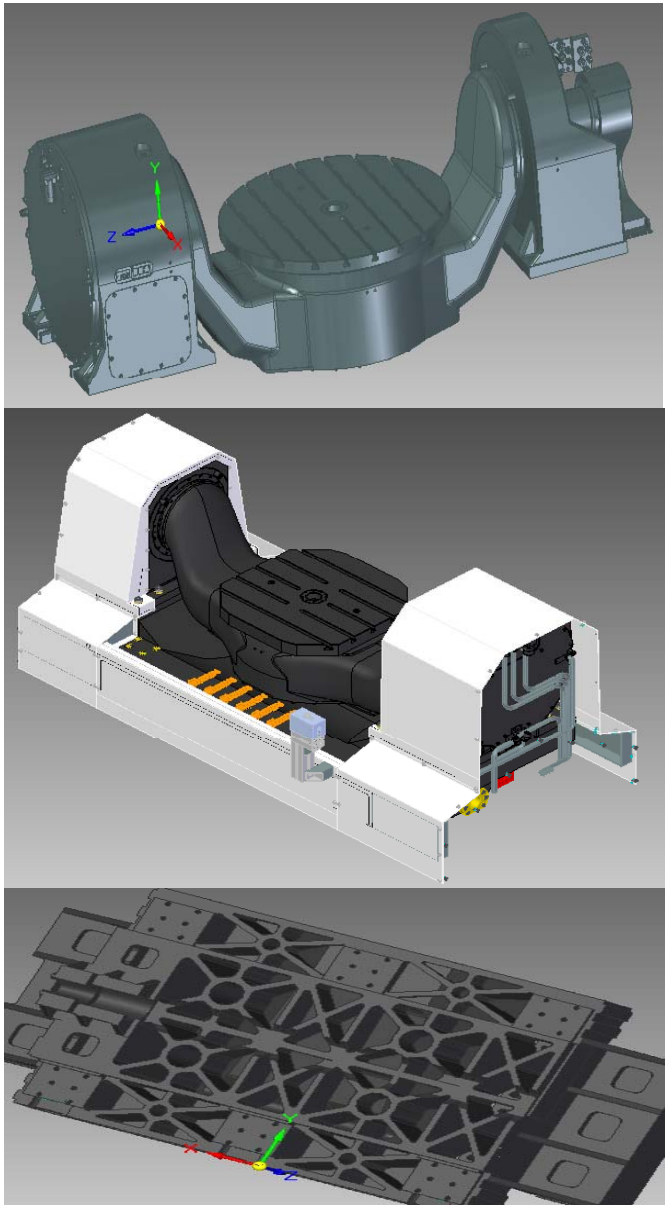




Beam and column were integrate casted, good anti-vibration ability, increase the stability for high-speed cutting

Structure feature - worktable

Italy LCM high-precision A /C cradle rotating table, with 6 heavy load and extension slide blocks for X axis under rotating table, each blocks can bear 165kg dynamic load, to ensure the excellent carrying capacity for A/C rotating table.



Rotating table parameter:

1.A/C axis rotating speed: 50r/min,100 r/min。

2.A/C axis swiveling travel: ±120° ; 360°

3.Load : φ800 (600) 1200(850) Kg

4.Accuracy : positioning≤ ±5 " ; repeatability≤ ±2 "

5.Min. index : 0.001 °

Turntable characteristic :

1.Multiple choice for table size to suit customer' s various needs.

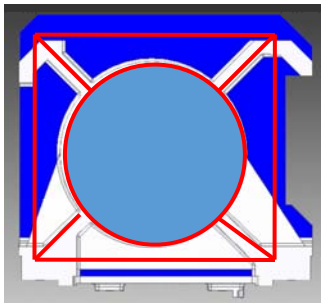
2. The A/C axes were powered by DD motor for fast reaction time, high rpm and high loading capability.

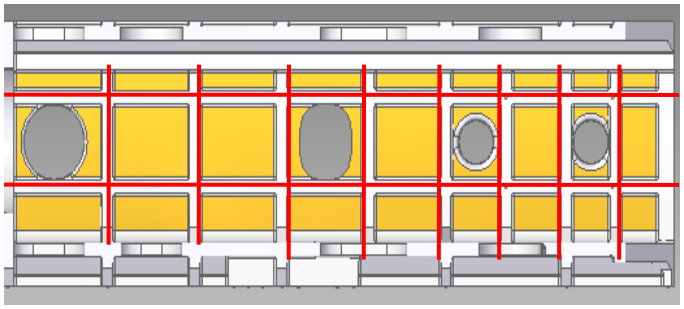
3. Double absolute type circular guide scales guarantees turning axis' s accuracy.

4. 6 large coolant spraying nozzles aside of the slide board can flush away the chip quick and effectively.

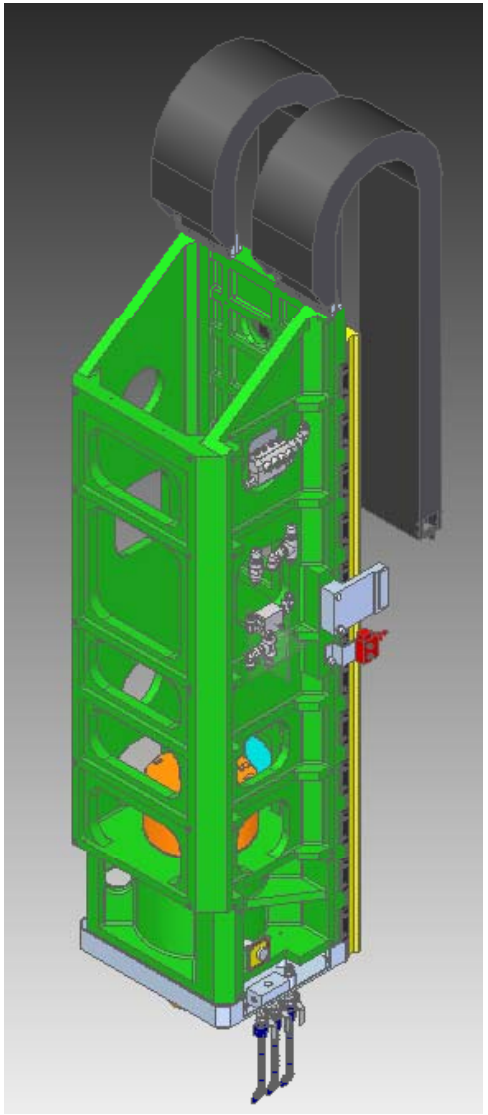
5.The interior of the slide board uses cross type structure that has stable carrying ability and great anti-torsion ability.

Structure feature- Spindle head





- The structure of the spindle head stems from KRAFT’ s technology and design experience, combine with FEM to ensure greater rigidity;
- Spindle option: 15000rpm、24000rpm、36000rpm，to suit customer’ s various needs
- Spindle taper: HSK-A63、HSK-E50、BBT40
- The spindle head uses a light weight design featuring thin side wall（wall thickness 15mm）and multiple strengthens. Can be 80kg lighter compare to other manufacturers, therefore better dynamic performance.



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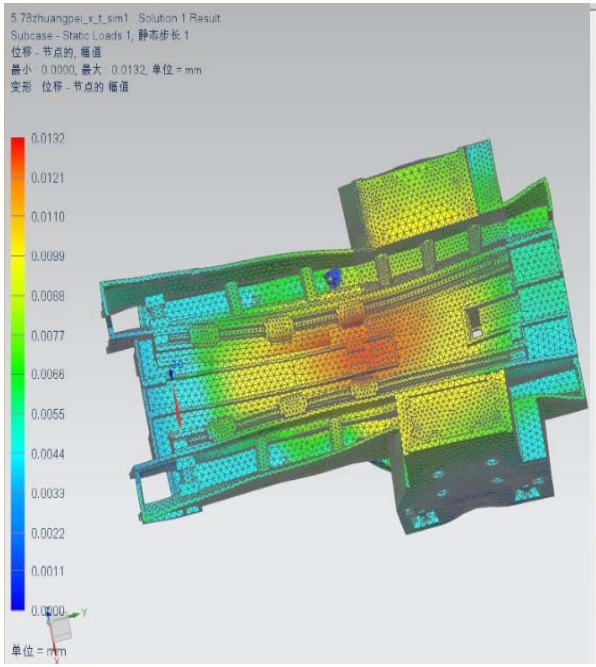
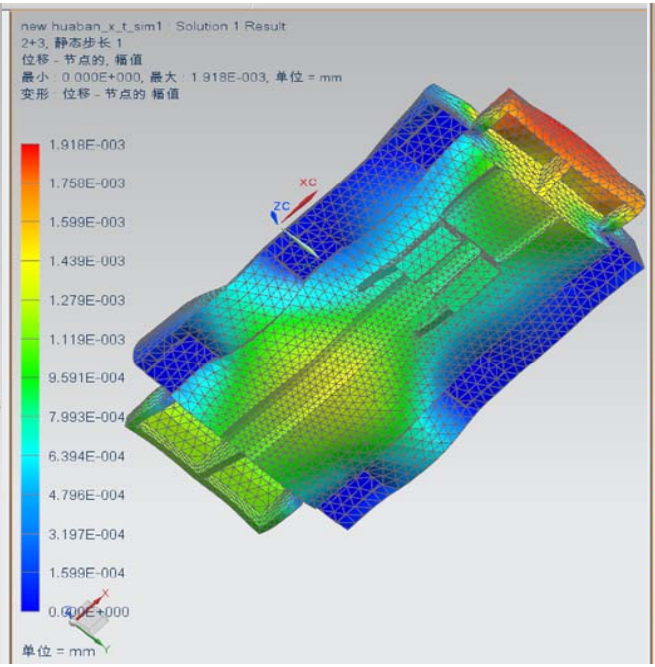
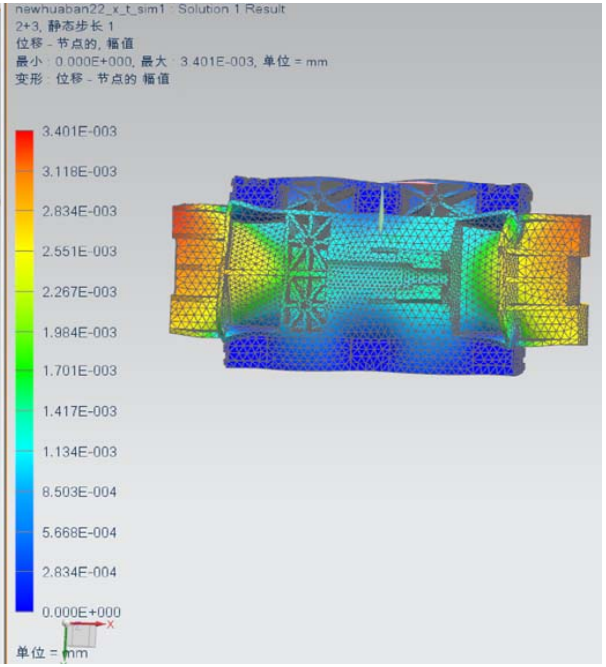
FEM---Machine bed & slide plate free body diagram analysis





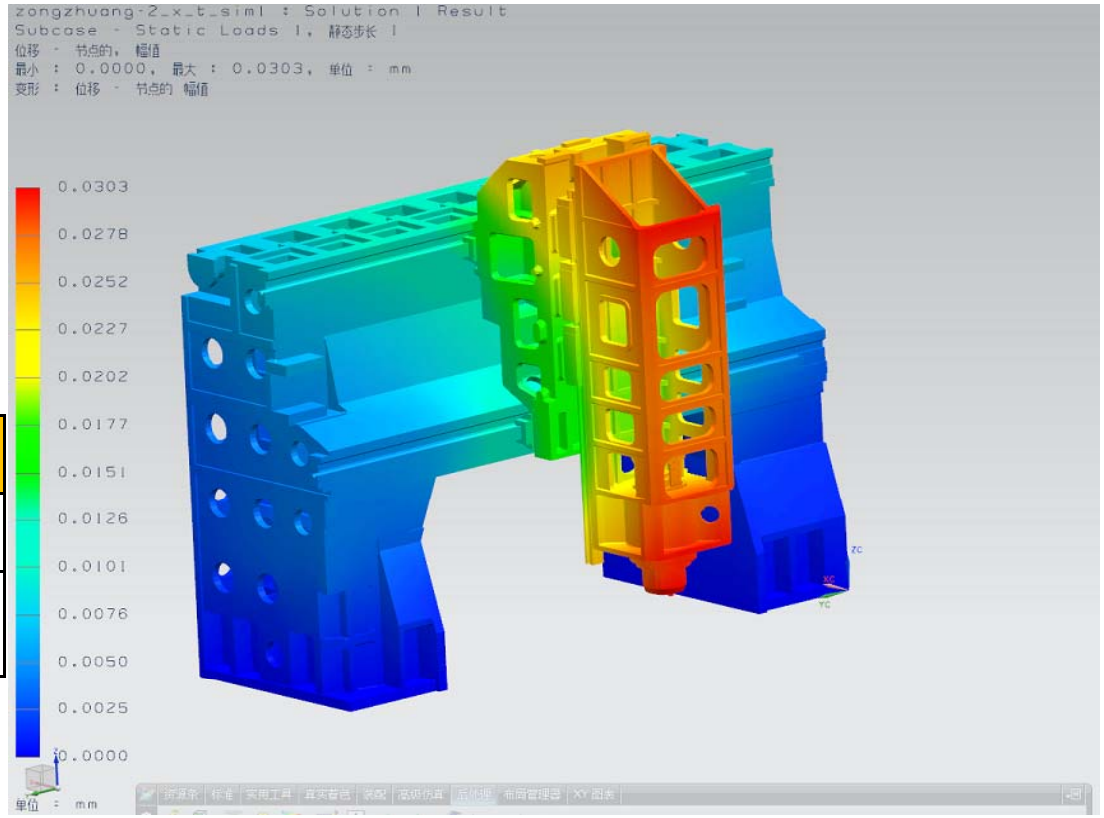


Max. deflection 0.0132mm	Max. deflection 0.0019mm	Max. deflection 0.0034mm
4 ton of load plus body weight were add on the machine bed while been tested	**3.5ton of load plus body weight were add on the VU600 slide plate while been tested**	**4 ton of load plus body weight were add on the VU800 slide plate while been tested**

FEM---Spindle head & beam free body diagram analysis

Analysis conditions :
Add force to the side of the spindle, while the spindle head at it’ s lowest position

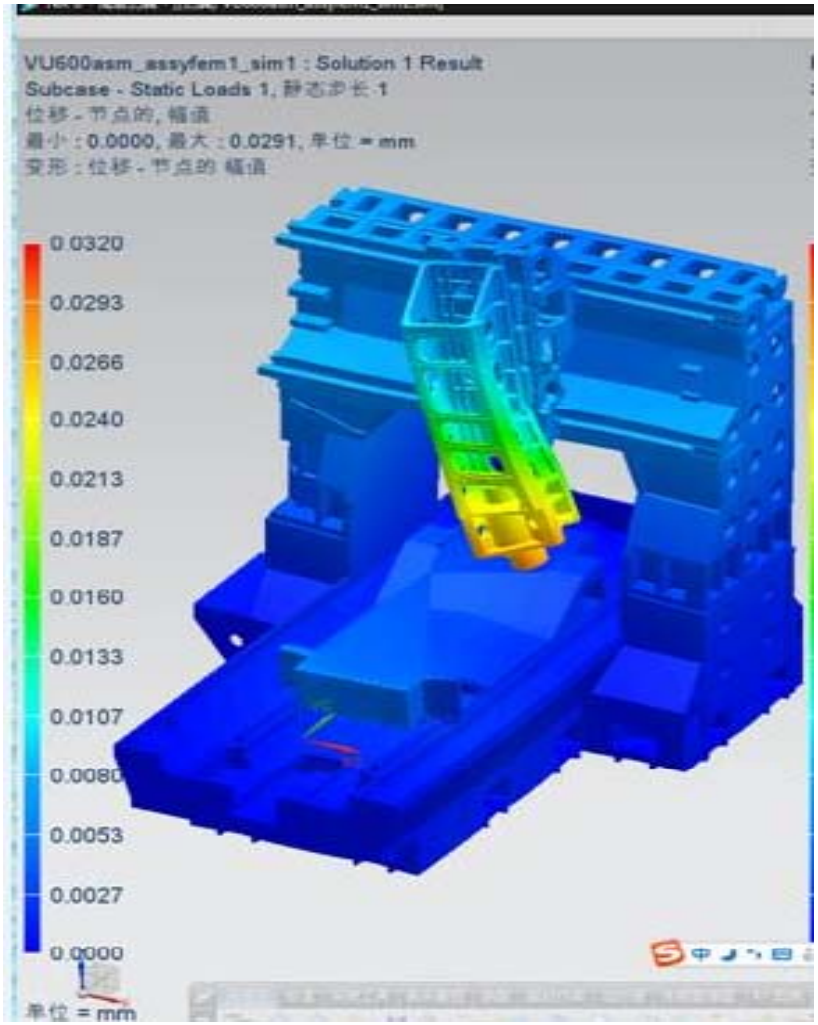
	Specified	Tested
Load	279kgf	1000kgf
Deflection	< 0.009mm	< 0.031mm



FEM---Whole machine body free body diagram analysis

Analysis conditions :
Add 1.2 ton on the work table, Add force to the side of the spindle, while the spindle head at it’ s lowest position

	Specified	Tested
Load	279kgf	1000kgf
Deflection	**0.02mm**	0.032mm

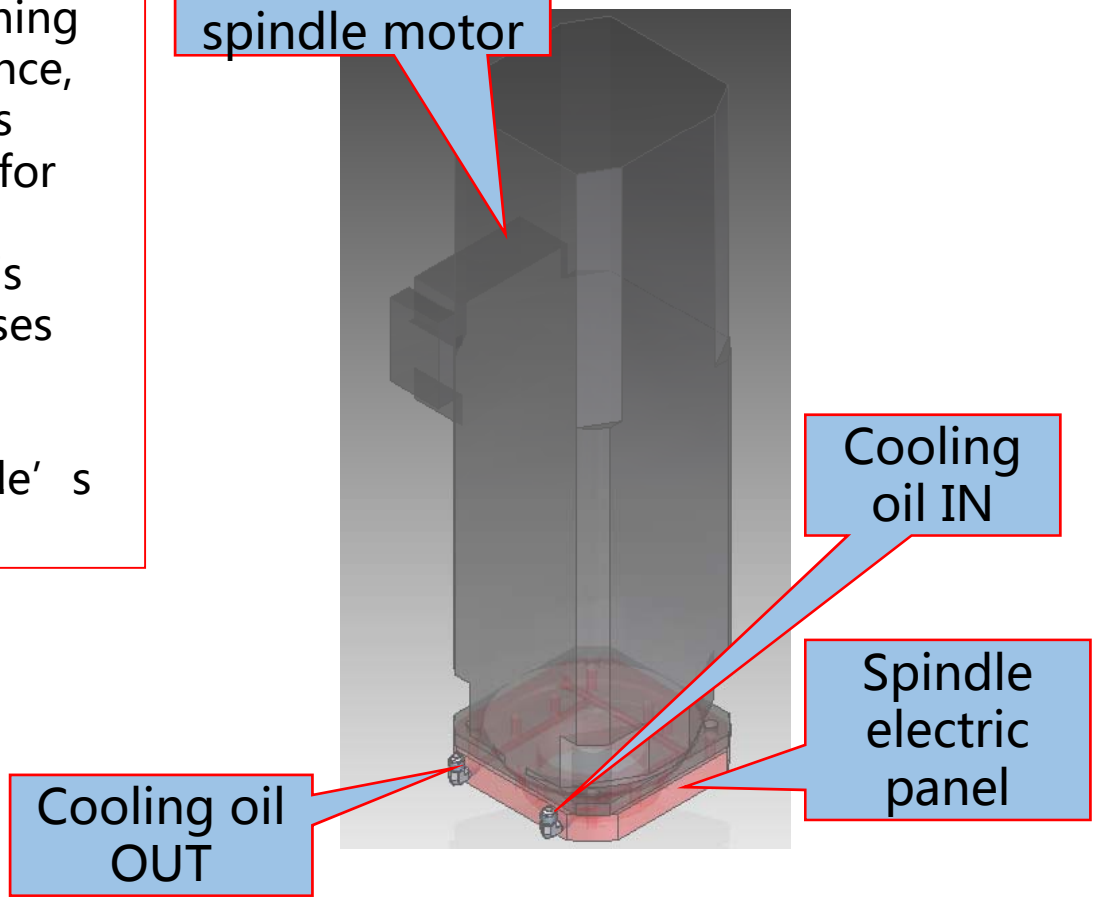


SETCO (USA) Direct driven spindle

★ SETCO (USA) focus on designing and manufacturing high performance, high precision spindle, improves its production technology constantly for better customer experience.

★The Max. rpm is 15000 for this direct driven spindle, its bearing uses ceramic rolling parts and grease lubrication, the bearing capable of reaching 20000rpm, ensures spindle’ s high speed performance.

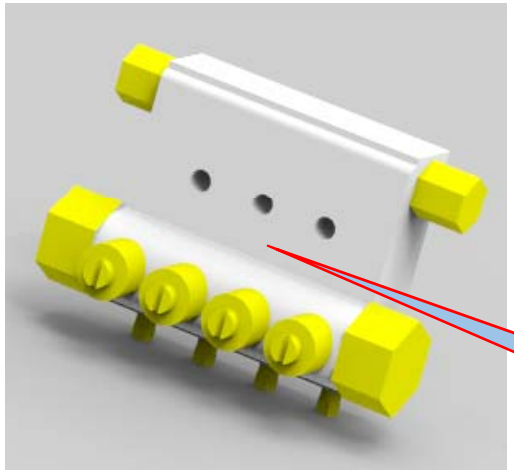
The spindle electric panel uses oil cooling machine to provide forced cooling. This method eliminates heat from the motor, to decrease high temperature deflection, ensures the accuracy stability when machining.



IBAG (Swiss) Electric spindle

★ IBAG build in high speed spindle was imported directly from Switzerland. Every spindle was manufactured, assembled and tested in Switzerland; ensures the quality and the performance of each spindle.

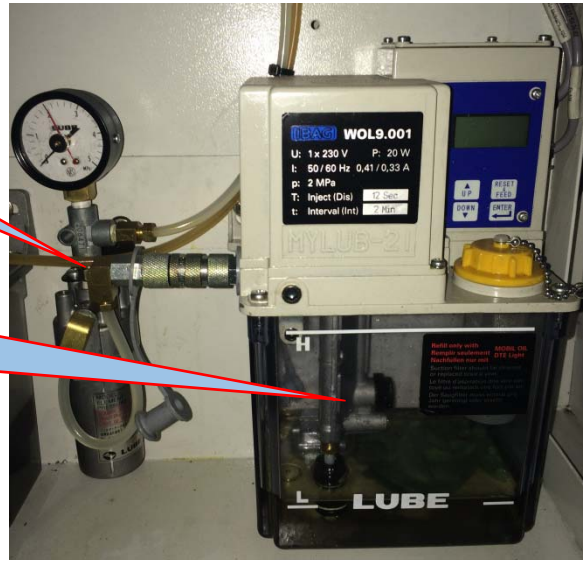
★ The spindle bearing uses oil-air type lubrication system. The system brand is LUBE from Japan , it distributes lubricate oil to the interior of the spindle bearing precisely through a distributor, ensures the bearing has great and effective lubrication.



Precise filter

Oil-air lubrication pump

Oil-air distributor



Electric spindle machining condition suggestion

★ Regular steel rough machining condition recommendation

Tool D.	φ20	
Vc	200	
S	3200	
Ad	0.3	0.5
F	6500	4000
Remark	Better with 3 blade edges	

※ HSK-E50 recommend Max. tool D. φ20

Tool D.	φ42	φ35	
Vc	200	200	
S	1500	1800	
Ad	0.5	0.5	1
F	3000	6500	3200
Remark	Better with 4-5 blade edges		

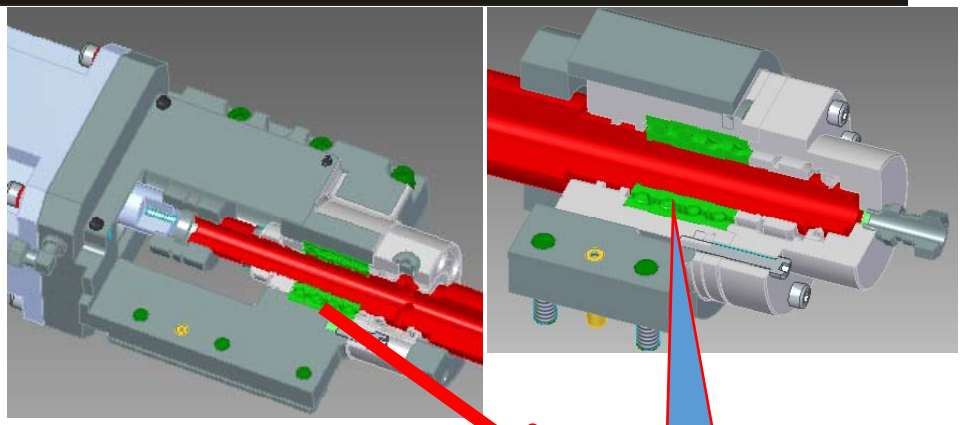
※ HSK-A63 recommend Max. tool D. φ35, φ42 tool for soft material only

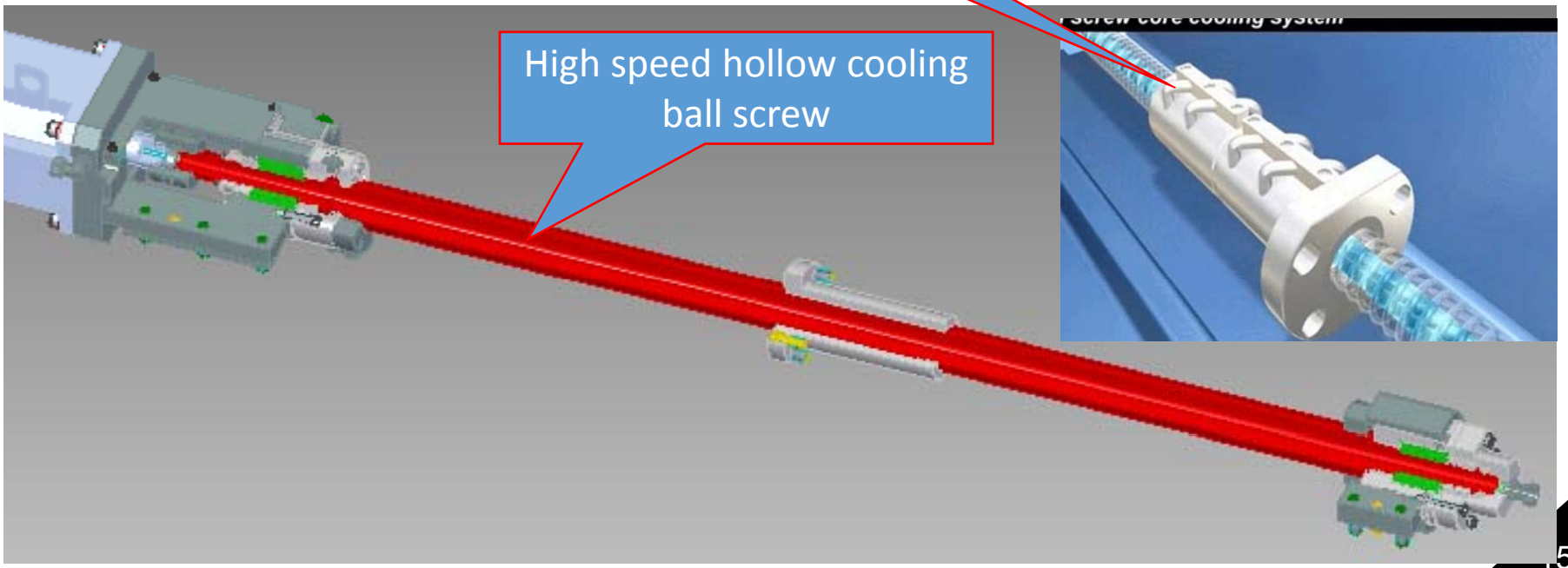
★ NAK80 die steel, φ0.6mm ball cutter machining condition suggestion

Vc=40 S=18000 Ad=0.02 F=900 2 blade edges

HIWIN Hollow cooling ball screw

Fully fixed pre-stretch structure design was used on all three axes; alongside with hollow cooling ball screw, controls high temperature deflection effectively, guarantees great machining accuracy; rapid traverse rate can reaches 40m/min.

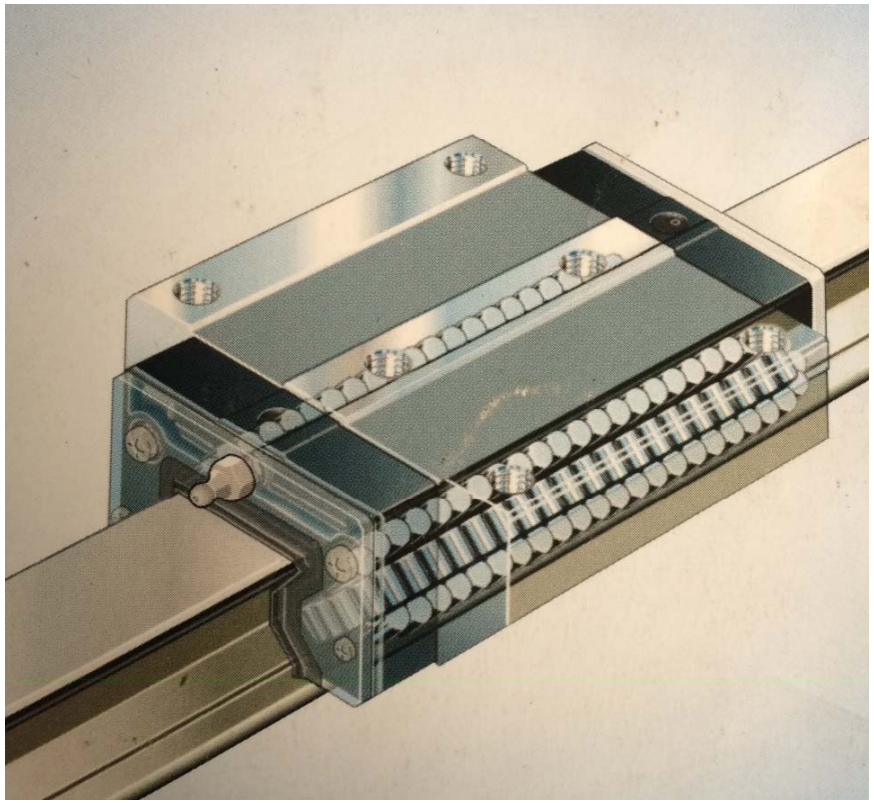




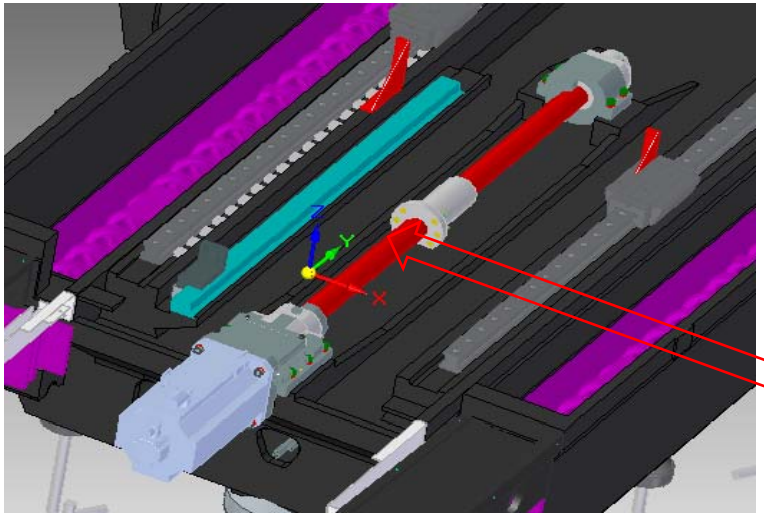
Rexroth (Germany) linear guide way

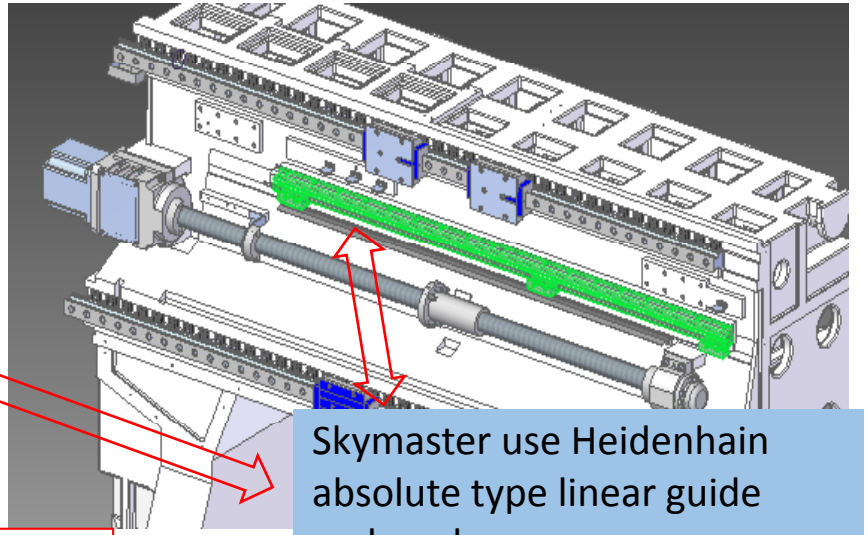
All three axis uses Rexroth high rigidity P grade roller type linear guide way, which features high carrying capacity, low wear & high precision. It also can bear load from all direction

Rexroth linear guide way & slider were produced by using high precision machining technology, either one of the guide way can be use for positioning, therefore each components are interchangeable, because they can be assembled in any combination. Other linear guide brands use single positioning technology, which makes the repairment inconveniently.



HEIDENHAIN (German) linear guide scale

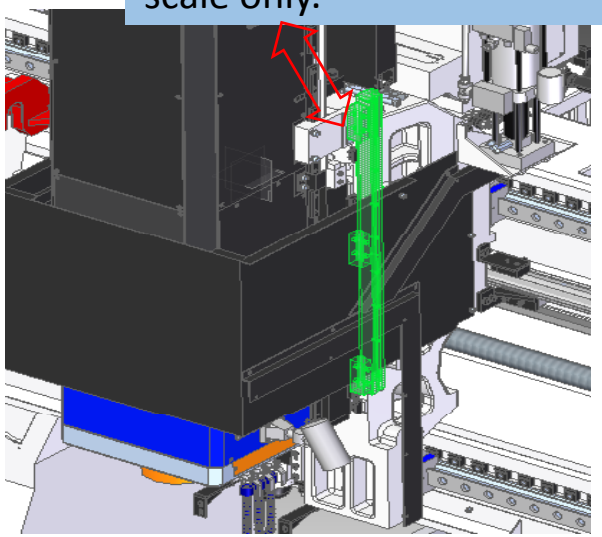




Skymaster use Heidenhain absolute type linear guide scale only.

The Heidenhain absolute type linear guide scale came as standard for all three axis, the minimum resolution is 0.05μm, can monitor all moving parts in real time, ensures positioning accuracy and repeatability accuracy.

	Absolute type	Incremental type
1	Get the positioning data immediately, no need to make the moving axis back to reference point	Must moving axis must move back to home position every time
2	The reading head use two couple seal side by side with good protection	The reading head use single seal only
3	Transmission by digital signal which has excellent anti-interference ability	Transmission by sine wave which is easier to interfere



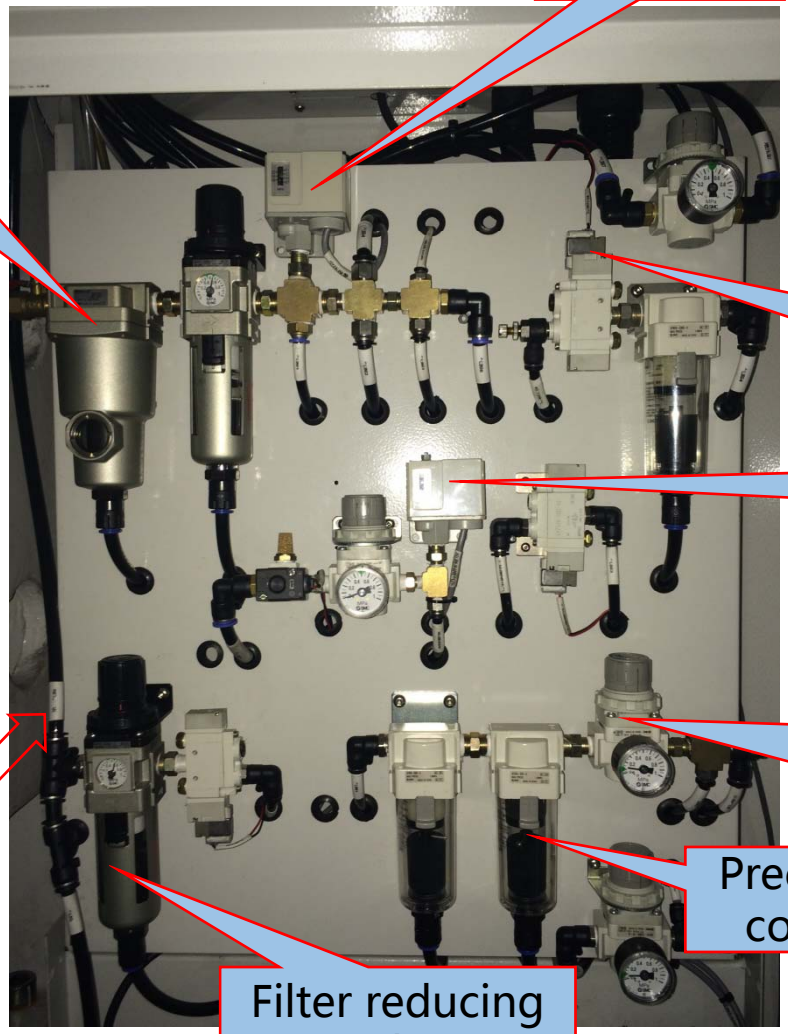
LUBE (Japan) grease lubrication system

The LUBE (Rube) lubrication unit is imported fully from Japan (including electric lubrication pump, oil pipe, joint, oil injector, etc.), it is available to preset the oil feed quantity and interval time for lubricating, with liquid level and pressure detection switch, ensure that the lubrication system is safe, stable and reliable in the process of working.

SMC (JAPAN) pneumatic system

1. Imported SMC (Japan) pneumatic system ;
2. Keep the air source clean and dry ;
3. Extend air unit’ s life span ;
4. Well organized system distribution
5. Easy to observe & service

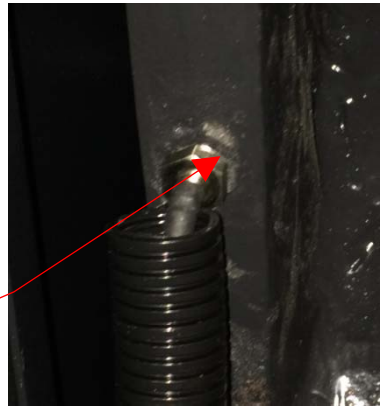
Phoenix labeling : Each self-made wire or cables are labeling in two side for convenience production and maintenance



TNP spindle chiller

VU600/800, 3kW cooling capacity, temperature increase by 2 ℃ only, force cooled the spindle, takes away the heat rapidly, controls spindle heat extension, increases machining accuracy and surface finishing quality.

The temperature sensor was placed on the body casting to give a true temperature reading, ensures the accuracy of the cooling.



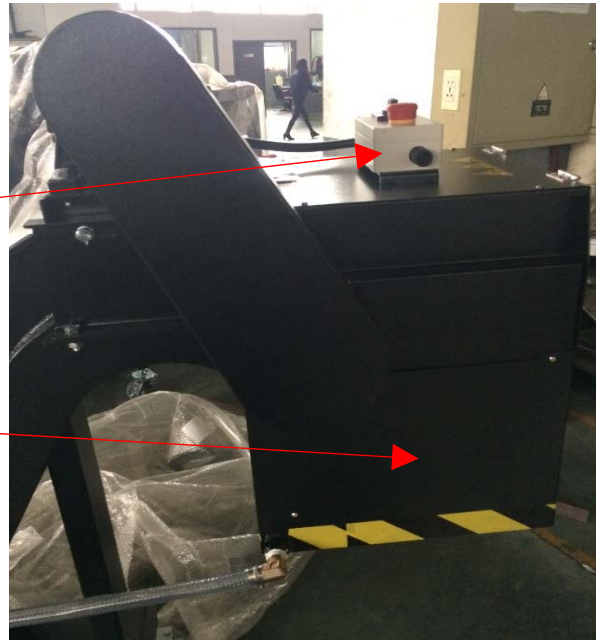
Temperature sensor

Spindle chiller

TNP fluid cooling machine

VU600/800 equipped with a 4.5kw, high precision cooling machine, pair with cooling fluid specially for the turntable, the fluid temperature can be controlled within 0.2℃

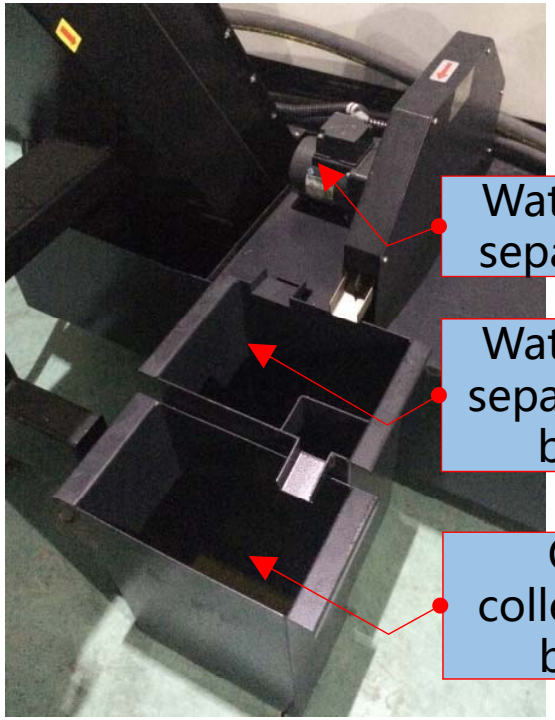
Taiwan Keyarrow Chain chip conveyor



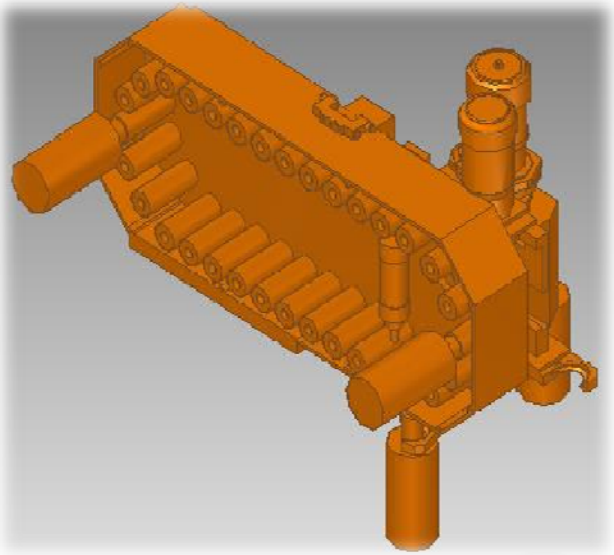
Chain chip conveyor for safer, more efficient chip transfer.
★ Sheet metal around the chip exit point with warning sign to protect operator’ s safety.
★ The emergency button was placed on top of the chain chin conveyor for easier reach when emergencies occur.
(CE certified by TUV Germany)

W&B oil water separator

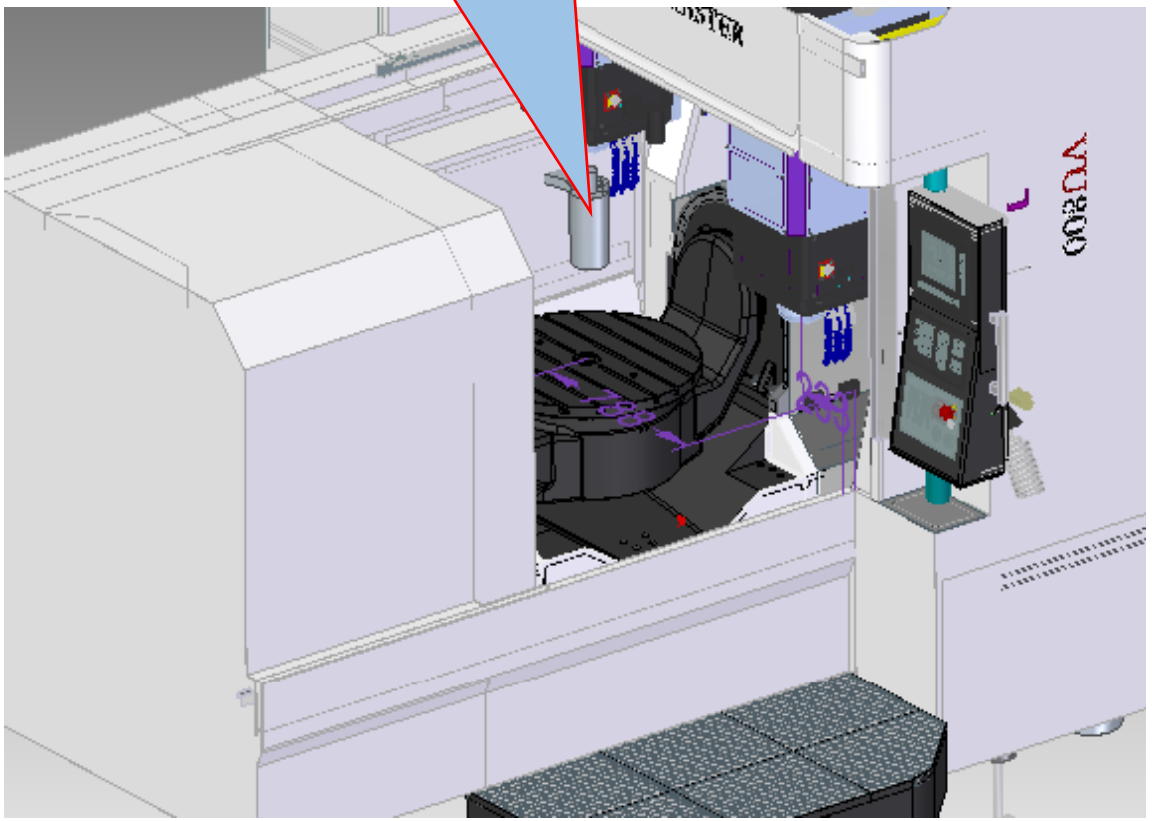
Separate the oil from the water box effectively, prolong the life span of the cutting fluid.



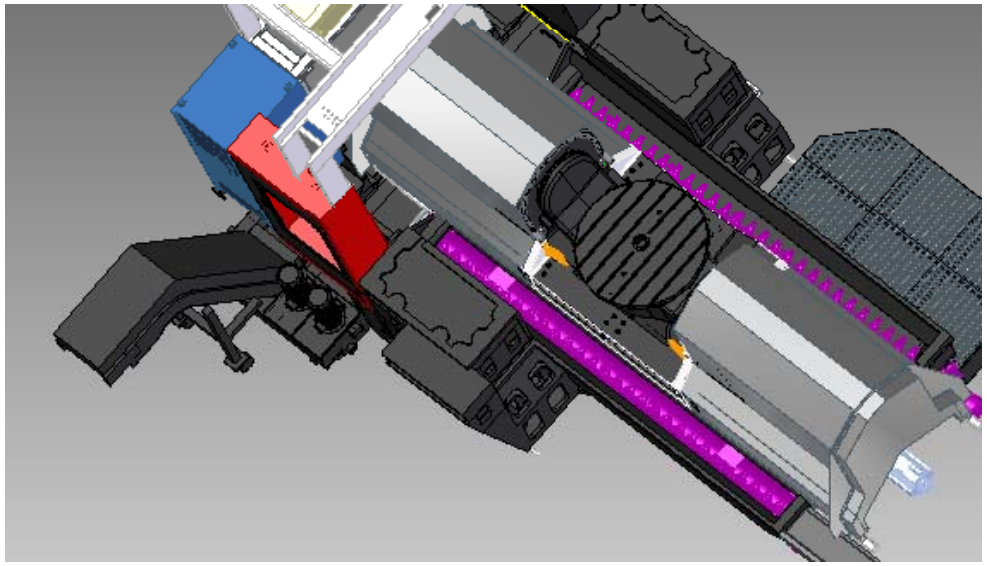
GIFU Tool Magazine



Gifu chain type tool magazine imported from Taiwan，tool capacity is 32/40/60 ， maximum tool diameter φ130mm，the tool can be choose both clockwise and anti-clockwise.



Protection shield characteristics



HEMAZHAO(German) armor type organ shield was used aside the Y-axis, very good looking, provide protect for cloth organ shield inside the machine

Armor type organ shield

Coil type chip conveyor place on both sides of the work table, one piece tilted protection shield , chain type chip conveyor for exterior chip transfer.
Merit: 1、large hole great for chip and water exit.
2、eliminate heat effect on machine bed cause by high temperature chip

TNC640 controller

Versatile

– The TNC contouring control for milling and milling/turning machines

Universally applicable

The TNC 640 is particularly well suited for milling, turning, HSC and 5-axis machining on machines with up to 18 axes. The TNC 640 is especially attractive for the following areas of application:

Five-axis machining with swivel head and rotary table

- Tilting the working plane
- Cylinder surface machining
- Tool Center Point Management (TCPM)
- 3-D tool compensation
- Fast execution through short block processing times

TNC640 controller

Quick and reliable machining with high contour accuracy
– Uniformly digital control design

Digital drive technology
The position controller, speed controller and, if required, the current controller are integrated in the TNC 640. The digital motor control makes it possible to attain very high feed rates. And the TNC 640 interpolates simultaneously in up to five axes. To attain the required cutting speeds, the TNC 640 control spindle speeds up to **60 000 min^{-1}** digitally.

Highest contour accuracy and surface quality
The TNC 640 dynamically calculates the contour in advance. This enables it to adapt the axis velocities early enough to the contour transitions. It controls the axes with special algorithms that ensure path control with the required limits to velocity and acceleration.

Special filters specifically suppress machine-specific natural vibration. The desired accuracy and a very high surface quality are attained. Thanks to the short block processing time of 0.5 ms, even highly accurate contours with very high resolution are not a problem.

TNC640 controller

Quick and reliable machining with high contour accuracy
– Uniformly digital control design

Fast machining at specified accuracy
You as user specify the accuracy of the machined contour—apart from the NC program. You simply enter in the control through a cycle the maximum permissible deviations from the ideal contour. The TNC 640 automatically adapts the machining to the tolerance that you define. No contour damage occurs with this method.

High availability
In the uniformly digital control concept of the TNC 640, all components are connected to each other via purely digital interfaces: The control components are connected via HSCI (HEIDENHAIN Serial Controller Interface), the real-time protocol from HEIDENHAIN for Fast Ethernet, and the encoders are connected via EnDat 2.2, the bidirectional interface from HEIDENHAIN.

TNC640 controller

Quick and reliable machining with high contour accuracy – Dynamic Precision

The hypernym **Dynamic Precision** stands for a number of HEIDENHAIN solutions for milling that can dramatically improve the dynamic accuracy of a machine tool. It is the result of a new perspective on the competing demand for accuracy, high surface quality and short machining times. The dynamic accuracy of machine tools can be seen in position errors at the Tool Center Point (TCP), which depend on the motion quantities such as velocity and acceleration (also jerk) and result from vibrations of machine components and other causes.

The machine tool builder can use the options comprised by **Dynamic Precision** either individually or in combination:

- **CTC** – Compensation of position errors through compliance between the machine and TCP, thereby increasing accuracy during acceleration phases
- **AVD** – Active vibration damping improves surfaces
- **PAC** – Position-dependent adaptation of controller parameters
- **LAC** – Load-dependent adaptation of control parameters enhances accuracy regardless of load and aging
- **MAC** – Motion-dependent adaptation of control parameters

TNC640 controller

Machining with five axes

– The TNC 640 permits optimum tool movement

Modern machines often work with four or five positioning axes. This makes it possible to machine complex 3-D contours. The required programs are usually created on external CAM systems and comprise a large number of very short line segments that are transferred to the control. Whether the workpiece is actually machined according the program's instructions depends essentially on the geometric behavior of the control. With its optimized path control, its precalculation of the contour and its algorithms for jerk limitation, the TNC 640 has the right functions for a perfect surface in the shortest possible machining time. See for yourself. In the end, it's the quality of the workpiece that proves the performance of the control.

3-D contour machining at its finest
The TNC 640's **short block processing time** of only 0.5 ms for a 3-D line segment without tool compensation permits high traversing speeds even on complex contours. This enables you, for example, to mill molds or dies approximated with 0.2 mm line segments at feed rates as high as 24 meters per minute.

The particularly **jerk-smoothed path control** when machining 3-D figures and the **defined rounding** of series of straight-line segments provide you with smoother surfaces as well as high dimensional accuracy.

TNC640 controller

Regardless of what type of 5-axis programs you wish to run, the TNC 640 makes all the compensating movements in the linear axes that result from movements in the tilting axes. The TNC 640's **Tool Center Point Management** feature (TCPM)—an improvement upon the proven TNC function M128—provides optimal tool guidance and prevents contour gouging.

TCPM defines the **interpolation between the start and end positions:**

- During **face milling**—machining mainly with the face of the tool—the tool point moves on a straight line. The path of the tool's cylindrical surface is not defined, but rather it depends on the machine geometry.
- During **peripheral milling**, machining is mainly by the side of the tool. The tool tip also travels on a straight path, but additionally the tool's circumference machines an explicitly defined plane.

Machining with five axes – Guided tool tip

TCPM defines the effect of the programmed feed rate as desired either:
• as the actual velocity of the tool tip relative to the workpiece. Very high axis feed rates can result from large compensating motions during machining near the center of tilting.
•As contouring feed rate of the axes programmed in the NC block. The feed rate is usually lower, but you attain better surface quality during large compensating movement.

With TCPM you can also define thee effect of the inclination angle for more uniform cutting passes when working with an inclined radius cutter:
•Angle of inclination defined as axis angle
•Angle of inclination defined as spatial angle
The TNC takes the inclination angle into account in all 3D machining--even with 45° swivel heads or tilting tables. You either specify the angle of inclination in the NC program via a miscellaneous function, or adjust it manually with an electronic handwheel. The TNC 640 makes sure that the tool remains on the contour and does not damage the workpiece.

TNC640 controller

Inspecting and optimizing machine accuracy
– Easy calibration of rotary axes with KinematicsOpt

The new TNC function KinematicsOpt is an important component to help you meet these high requirements: With a HEIDENHAIN touch probe inserted, a 3D touch probe cycle measures your machine's rotary axes fully automatically.
The results of measurement are the same regardless of whether the axis is a rotary table, a tilting table or a swivel head.
To measure the rotary axes, a calibration sphere is fixed at any position on the machine table and probed with the HEIDENHAIN touch probe. But first you define the resolution of the measurement and define for each rotary axis the range that you want to measure.
From the measured values, the TNC calculates the static tilting accuracy. The software minimizes the spatial error arising from the tilting movements and, at the end of the measurement process, automatically saves the machine geometry in the respective machine constants of the kinematics description.

TNC640 controller

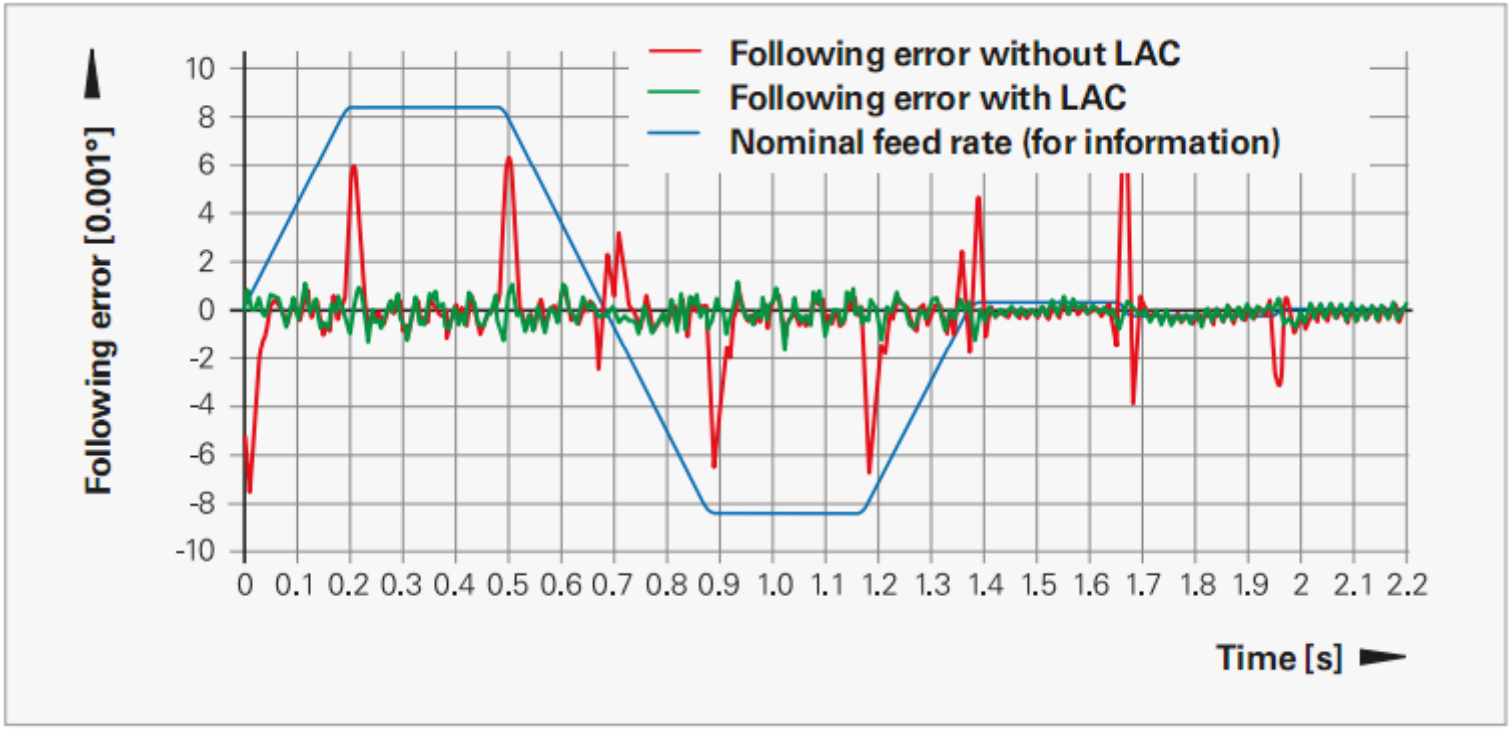
Intelligent machining
– Adaptive Feed Control option (AFC)

Machine accuracy
LAC – load-dependent adaptation of control parameters

The dynamic behavior of machines with moving tables can vary depending on the mass or mass moment of inertia of the fixed workpiece.

The **LAC** option (Load Adaptive Control) enables the control to automatically ascertain the workpiece's current mass, mass moment of inertia and the friction forces. In order to optimize changed control behavior at differing loads, adaptive feedforward controls can exploit data on acceleration, holding torque, static friction and friction at high shaft speeds. During workpiece machining, the control can also continuously adjust the parameters of the adaptive feedforward control to the current mass of the workpiece.

TNC640 controller



Additional load changed

- Without LAC: When the feedforward control is unchanged, the following error is outside of the tolerance band (± 0.008°)
- With LAC: When LAC is active in the feedforward control, the following error is within the tolerance band (± 0.001°)

TNC640 controller

Programming and operation

Advanced programming functions – FK free contour programming, fixed cycles

FK free contour programming

Not all workpieces are dimensioned for conventional NC programming. Thanks to FK, the control's free contour programming feature, in such cases you simply type in the data from the drawing—without first having to convert or calculate your data! It does not matter if individual contour elements are not completely defined as long as the complete contour has been. If the given data result in more than one mathematical solution, the helpful TNC programming graphics present the possible variants for your selection.

Standard cycles

Besides the fixed cycles for drilling and tapping (with or without floating tap holder), with option 19 there are cycles for thread milling, reaming, boring and for hole patterns, as well as milling cycles for clearing plane surfaces, and for roughing and finishing pockets, slots and studs.

TNC640 controller

Programming and operation

Program-verification graphics, program-run graphics

Program verification graphics

To be on the safe side before running a program, the TNC can graphically simulate the machining of the workpiece.
The TNC can display the simulation in the following ways:

- In a plan view with different shades of depth
- In three planes (as in the workpiece drawing)
- In a solid model, 3-D view

Details can be displayed in magnification. In addition, the TNC indicates the calculated machining time in hours, minutes and seconds.

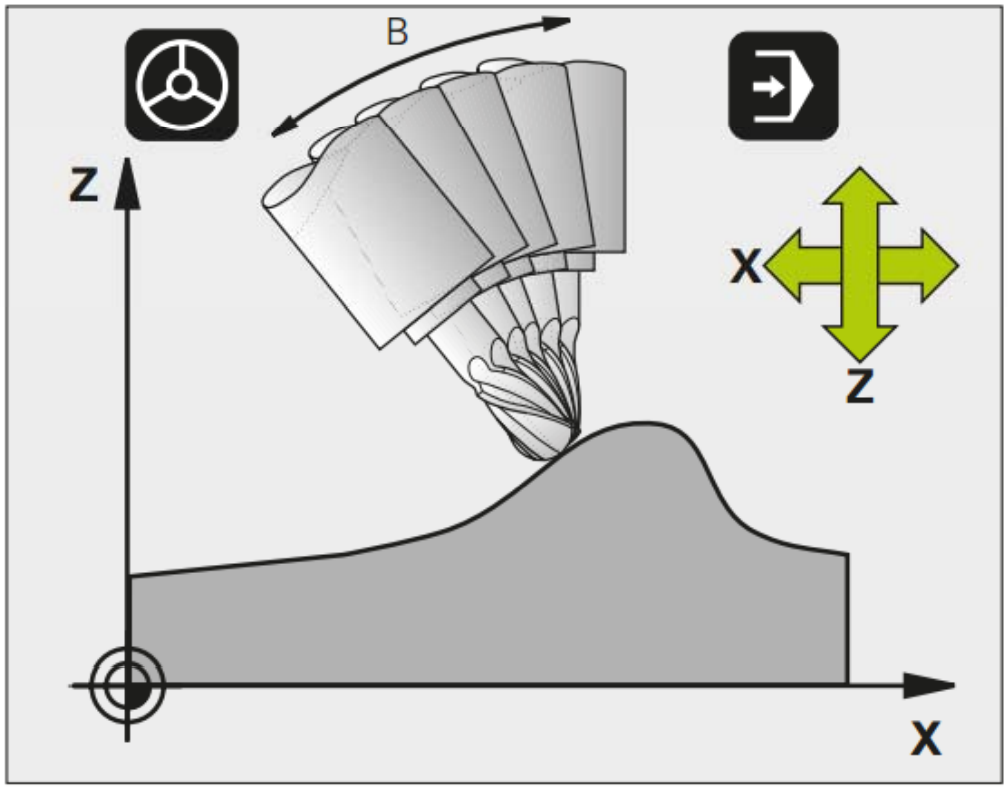
Program-run graphics

The TNC shows a real-time graphic of the machining progress. Coolant spray and protective enclosures usually obstruct any direct view of the actual workpiece. You can get around this with a simple keystroke to see the simulated progress of workpiece machining.

TNC640 controller

Machining functions

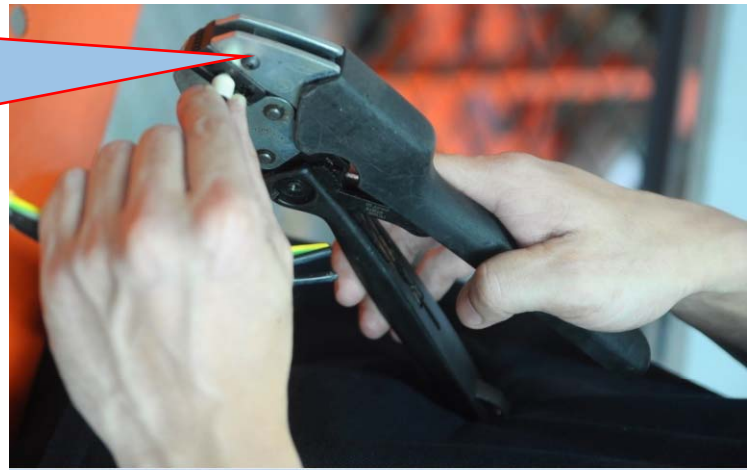
Handwheel superimpositioning – superimposing handwheel positioning during program run



The **handwheel superimposition** function (M118) enables you to make manual corrections by handwheel during program run. This is particularly helpful if you want to change inclination angles of rotary axes in externally written programs, since these often result in collisions between the tilting head and the workpiece. You can also use handwheel superimpositioning to adjust the offset compensation in linear axes without having to change the NC program.

Wire tools: PHOENIX brand tools imported from Germany

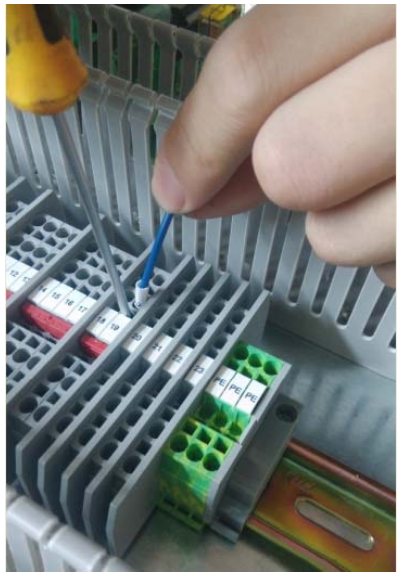
Sleeve Crimping pliers: Can crimp the maximum cross-section of 50mm2 casing terminals, compared with ordinary crimping pliers, the price is increased by more than 5 times, with excellent crimping effect to avoid poor circuit connection



PHOENIX mark ring：Each cables are affixed with the cable name at both ends, easy to produce and after-sales maintenance

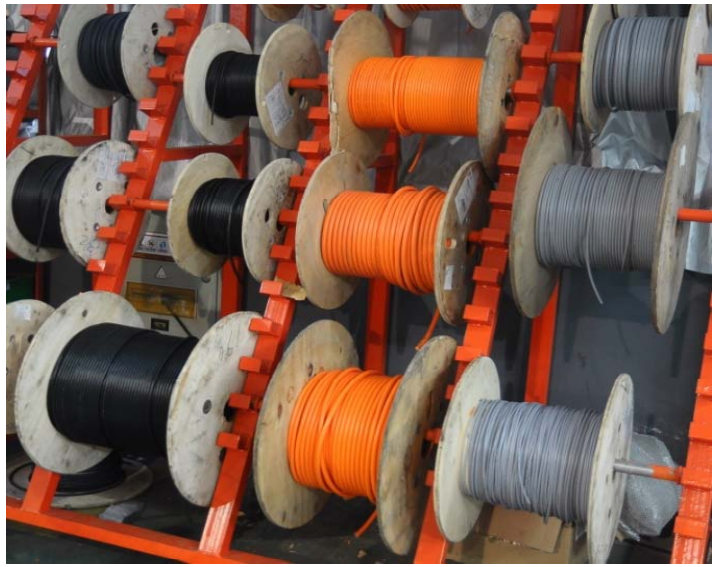
Stripping tool: suitable for cable with 4.5-40mm diameter, compared with the ordinary stripping tool, it will not hurt the inner copper wires

Germany PHOENIX terminal blocks



Rail-mounted terminal blocks with the spring cage clamp with excellent quality, it is very convenient for wire connection, the price is ten times than ordinary terminal blocks.

Germany brand IGUS cable and drag chain



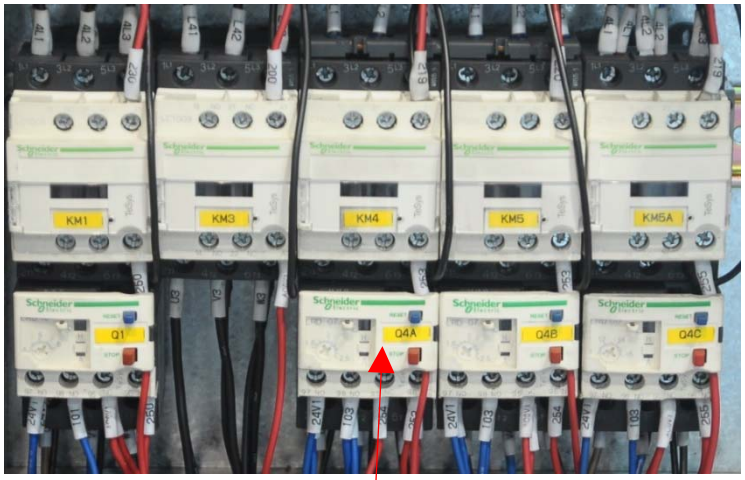
The interior of the Igus drag chain is separated by a septum so that each cable moves on a specified track, it will not cause wear due to mutual extrusion

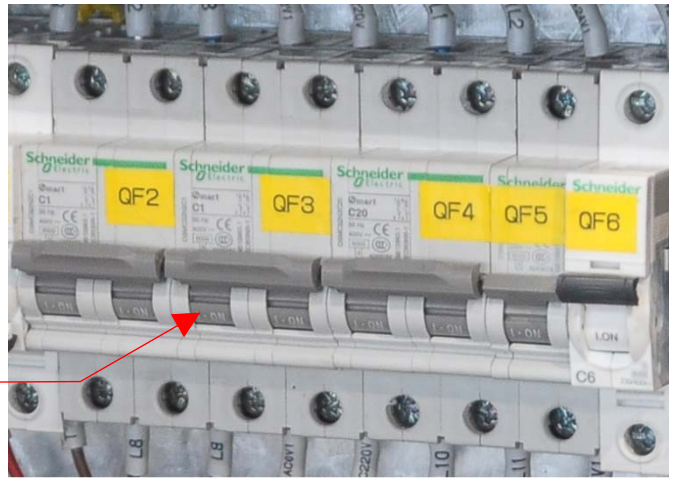
Meet TUV European standard , classified according to the color.

System signal cable	Green
System power cable	Orange
Alarm cable	Yellow
Motor and inlet cable	Black
Solenoid valve	Grey
Grounding	Yellow/green

Main electrical components in electric cabinet

Japan OMRON intermediate relay





France Schneider AC contactor

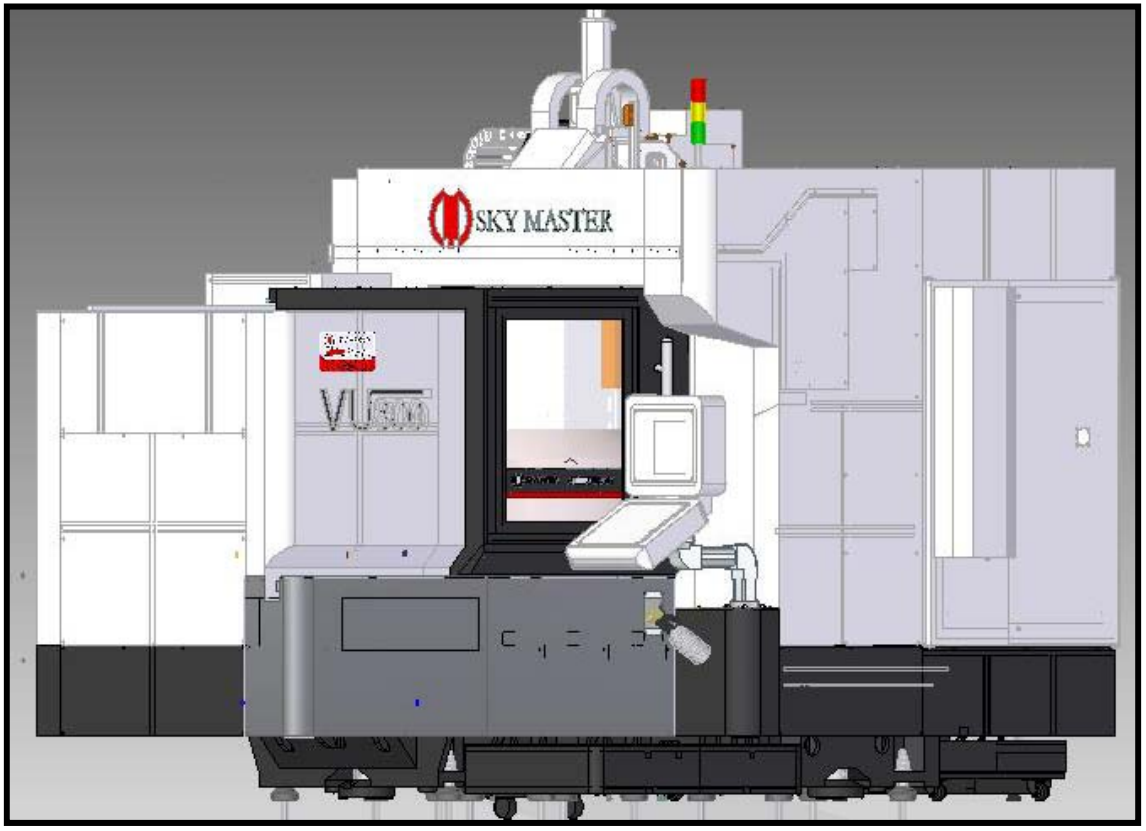
France Schneider circuit breaker

Advantage of configuration

No.	Name	Specification	Amount	Remark
1	Controller	HEIDENHAIN TNC640	1 set	HEIDENHAIN (Germany)
2	Ball screw bearing	35TAC72BSUC10PN7B	24 sets	NSK(Japan)
3	X axis ball screw	Diameter 55mm, pitch16mm	1 set	HIWIN (Taiwan)
4	Y axis ball screw	Diameter 55mm, pitch16mm	1 set	HIWIN (Taiwan)
5	Z axis ball screw	Diameter 50mm, pitch16mm	1 set	HIWIN (Taiwan)
6	X/Y/Z linear guide way	55 grade roller guide way	3 sets	REXROTH(Germany)
7	Spindle unit	HSK-A63-15000rpm	1 set	SETCO(USA)
8	Linear/round linear guide scale	LC195 absolute/RCN2380	3 /2sets	HEIDENHAIN(USA)
9	Pneumatic unit	AW30-03D-A accessory	1 set	SMC(Japan)
10	Lubrication unit	P-207F (Lube) and accessory	1 set	LUBE(Japan)
11	Organ flexible shield	Armor type organ flexible shield	2 sets	HEMAZHAO(Germany)
12	Air conditioner	TA-15F	1 set	TNP (Foreign)
13	Oil cooler	TO-30PT	1 set	TNP (Foreign)
14	A/C cradle type rotating table	BRCTT600/BRCTT800	1 set	LCM(Italy)
15	Water cooler for rotating table	TW-45PTHB	1 set	TNP (Foreign)
16	Diaphragm type coupling	RADEX-NC35-EK/φ32-φ32	2 sets	KTR(Germany)
17	Diaphragm type coupling	RADEX-NC35-EK/φ32-φ38	1 set	KTR(Germany)
18	Operation box	XQ15SL35-026	1 set	MECANO (Germany)
19	Coolant pump	CDLKF4-50/5 (3 phases 220V 50Hz)	2 sets	CNP (Foreign)
20	Chain chip conveyor	TR01A00170	1 set	KEYARROW (Taiwan)
21	Small relay	MY2N-D2-J 24VDC	4 sets	OMRON(Japan)
22	AC contactor	LC1D09M7C	8件	SCHNEIDER (France)
23	Breaker	DPNK10A2P	3件	SCHNEIDER (France)

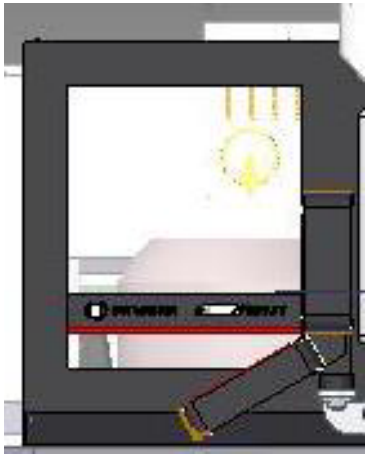
Remark: According to the actual situation, SKY MASTER retains the final interpretation to adjust and change the number and configuration of the these parts.

Protection guard feature

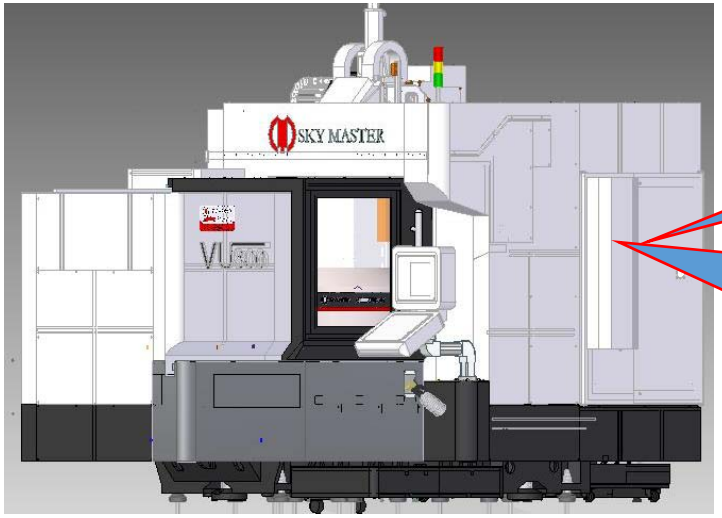


Equip with fully- enclosed splash guard
◆Safety
◆Elegant
◆Convenient & fast operation

The safety glass on the front door is 18mm thick, stop the chip fly out effectively, ensure the safety of the operator **(TUV and CE approve)**



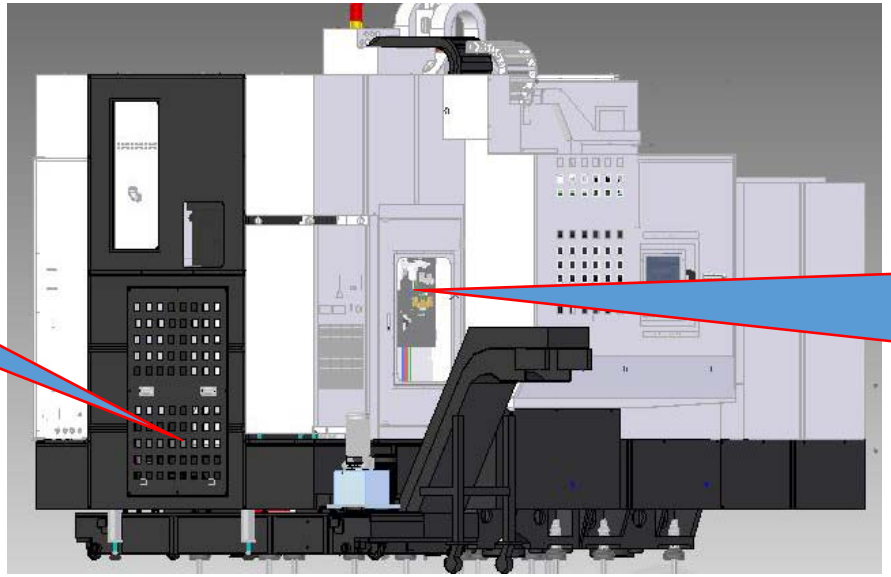
Protection guard feature



Keep the electric cabinet above the ground eliminate moist air get into the cabinet

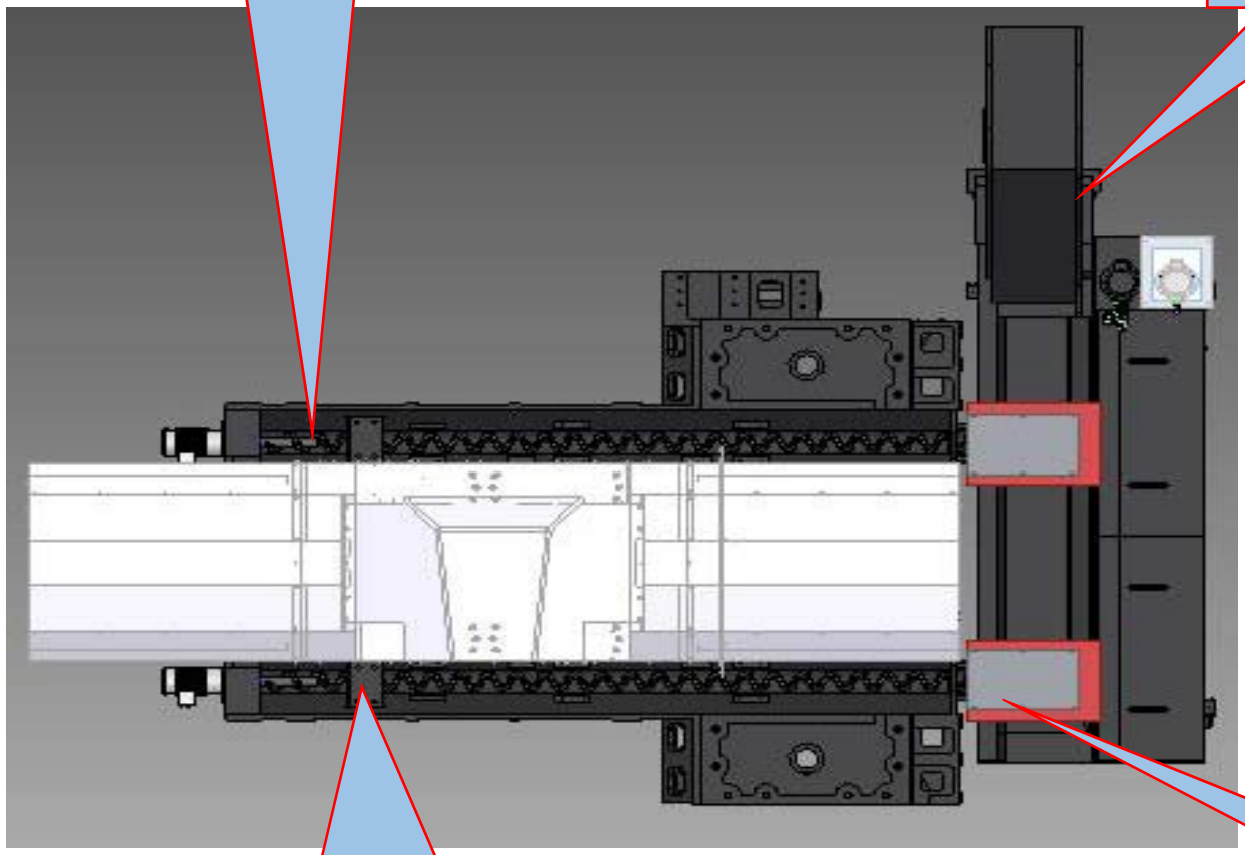
The AC can transfer the heat from the electric cabinet rapidly, extend the service life of the electric components

Protection door ate the rear of the machine easier for maintenance and observe



Pneumatic and lubrication unit, easy to observe and maintenance

Protection guard feature



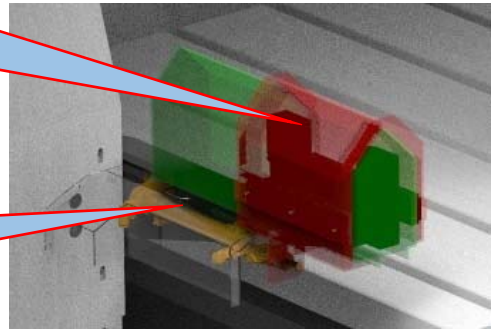
Option- Measuring accessory

Tool setting gauge protection cover

Japanese Metrol contact type tool set

Aluminum support rack, light and nice looking

Automatic door for tool setting gauge



BLUM (German) laser type tool setting gauge

Tool setting gauge air cylinder

Option-Oil mist recycle machine

LOSMA(Italy) oil mist recycle machine, have special designed turbine can suck the oil mist and other pollutant within the working environment, then use centrifugal machine to liquefy the oil mist, then use oil outlet system to reuse the oil

There is a filter device built in can absorb micro pollutant molecules, stop pollutant rerelease to the working environment, provide a comfortable working environment for workers

SKY MASTER

GK KRAFT

STANDARD

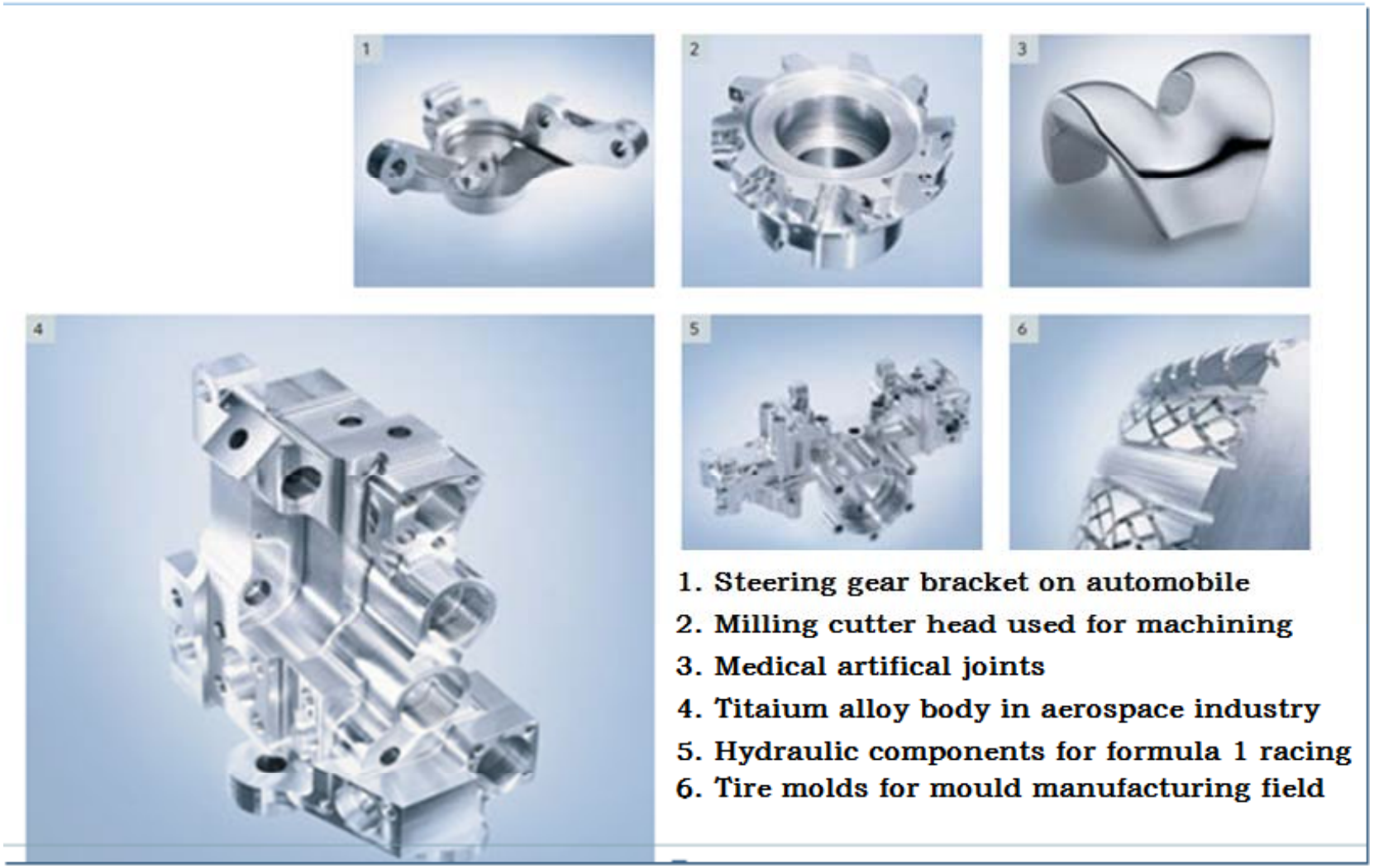
HEIDEHAIN TNC640 5 axis in synchronization absolute type controller	
Controller function : coordinate switch : Tilted surface (option 8) ; 5 axis in synchronization machining : TCMP , 3D tool compensation, etc (option 9)	
Automatic power off	3 color warning light
Work area light	MPG
Safety door switch	Heidenhain linear guide
Direct driven spindle 15000rpm HSK-A63	Spindle chiller
Spindle air tight	Pneumatic system
Spindle cooling by external pipe	Rigid tapping
Air blowing device	Cutting fluid unit
32 pc chain type ATC	Grease lubrication system
3 axis ball screw hollow cooling	Water/air gun flush function
Electric cabinet AC	Oil water separate machine
Fully enclosed splash guard	Adjustable level bolts and foundation blocks
Chain type chip conveyor	Coil type chip conveyor
Operation manual	Tool box

OPTION

Tool/work piece measuring system
Voltage stabilizer
Direct connected spindle , 15000rpm , BBT40
Build in spindle , 24000rpm , HSK-A63 (IBAG)
Build in spindle , 36000rpm , HSK-E50 (IBAG)
Coolant through spindle
Chain type ATC 32pc
Large flow chip flushing function
Roof spray system
Machining observation window
Oil mist recycle machine (LOSMA)
Dryer
Fully enclosed iron box packaging
Extended one year warrantee

※ We reserve the right to change technical parameter without giving notice to customers.

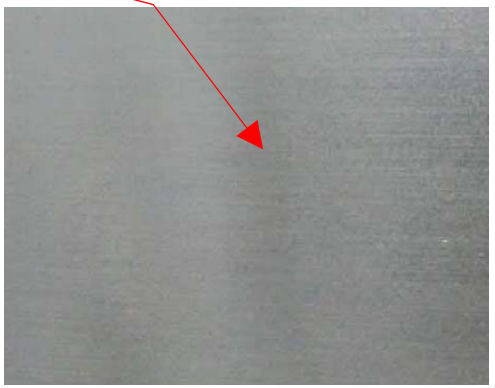
Application field



1. Steering gear bracket on automobile
2. Milling cutter head used for machining
3. Medical artifical joints
4. Titaium alloy body in aerospace industry
5. Hydraulic components for formula 1 racing
6. Tire molds for mould manufacturing field

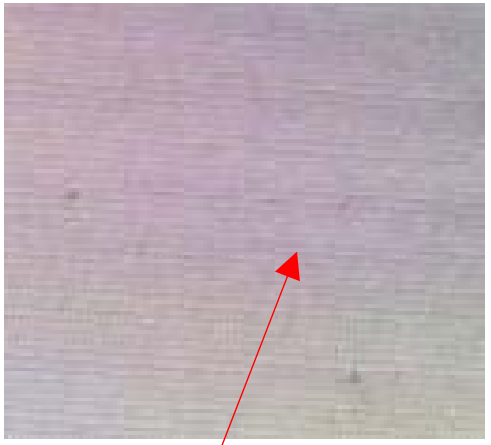
Application field

The surface of the mould is blurry and the grains are not clear when use regular cutting fluid



SKYMASTER strongly recommend BLASER from Switzerland for our VU 5 axis series

- BLASER cutting fluid can improve the surface smoothness of the mould
- BLASER cutting fluid can extend the service time of the cutting tool
- BLASER cutting fluid is suitable for high precision mould and product machining



The mould’ s surface is shinier, gains are better when Swiss BLASER brand cutting fluid being used

THANKS

SKY MASTER KRAFT

Many thanks for your time for
SKYMASTER machine PPT introduction

※ SKYMASTER reserve the right to change technical parameter for improvement of our products without giving notice to customer