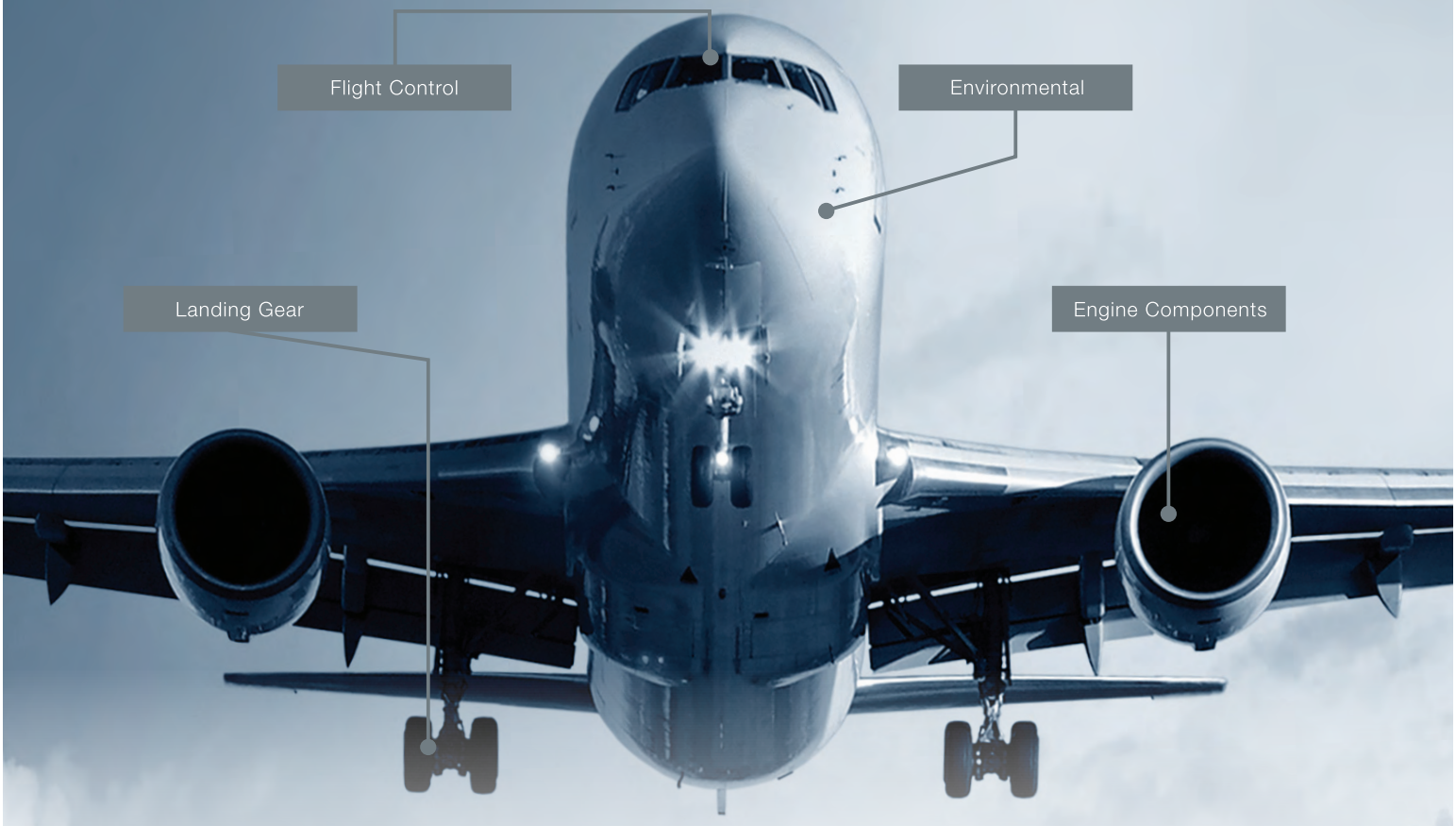
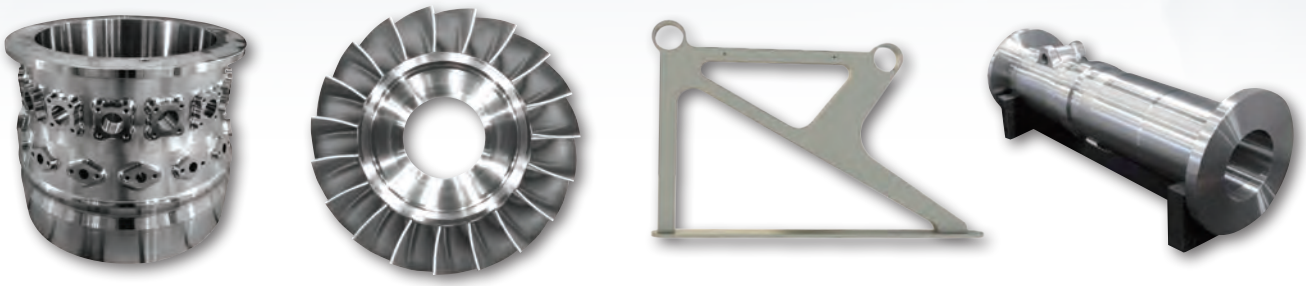
OKUMA

Aerospace Solutions





Okuma technology supports the dreams of humankind

From the beginning of time humans have had a desire to fly like the birds. It's been more than a century since intelligence and technology combined to make this eternal dream come true. But development continues in the aerospace industry as safety, comfort and efficiency continue to evolve. And many aerospace suppliers rely on Okuma machine tools and technology to produce the high-quality, complex parts required to keep the iron birds flying.

High-accuracy machined parts and high-performance machines

Aircraft part manufacturing often involves complex shapes, large part sizes and the use of exotic metals – all features that complicate the production process. The use of 5-axis and multitasking machines can help address these issues while raising productivity levels. And today's highly intelligent machine tool controls help manage the business end of the operation by supporting the ever-growing need for information, manufacturing data, record keeping and quality control documentation.

With Okuma's open-architecture control and highly rigid and reliable machines, aerospace parts manufacturers can meet the stringent demands of the production team and the business office.

Preventing machine stoppages from machine collisions

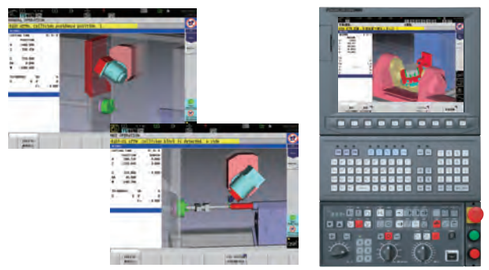
Collision Avoidance System

Collision prevention

See also
okuma.co.jp/english/onlyone/anti/index.html

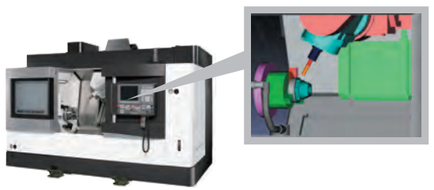
Allowing operators to focus on making parts

NC controller (OSP) with 3D model data of machine components—workpiece, tool, chuck, fixture, headstock, turret, tailstock—performs real time simulation just ahead of actual machine movements. It checks for interference or collisions, and stops the machine movement immediately before collision. Machinists (novice or pro) will benefit from reduced setup and trial cycle times, and the confidence to focus on maing parts.



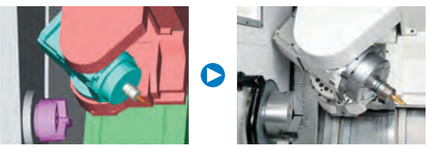
Collision prevention during automatic operation

NC program is read in advance and axial travel commands are checked for interference with consideration of zero point and tool compensation values set in NC. Axial travel movement is stopped temporarily before collision occurs.



Collision avoidance in manual operation

Especially useful for machine operators setting up a job, collision avoidance in manual mode provides collision-free confidence and faster machining preparations.

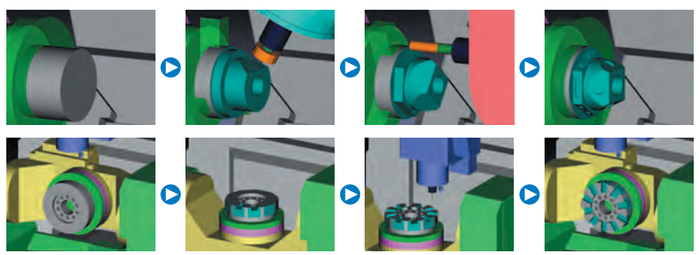


Interference check precedes actual movement

Stop before collision

Realistic simulation of workpiece cutting

Workpiece shape during machining is displayed accurately and interference checks are performed.



Maximizing tool life and performance through tool diagnostics

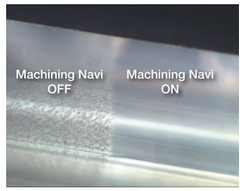
Machining Navi

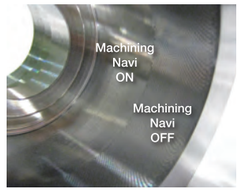
Cutting conditions search

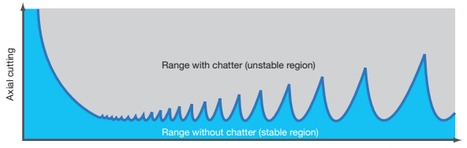
See also
okuma.co.jp/english/onlyone/process/index.html

Maximizing machine tool performance

Cost reduction—shorter cycle times and higher productivity—is required to compete in today's global market. Machining Navi, with clear visuals of complex cutting conditions, is a breakthrough tool that enables the machine operator to navigate the machine and tool capabilities to their best performance levels.







We know there is harmonic motion, or periodic vibration, related to machine tool spindle speed and chatter. As the wave cycles show, chatter occurs in the unstable region, while the stable region is chatter-free. Machining Navi helps the operator quickly find the optimum cutting conditions within the stable, chatter-free region.

For turning

Machining Navi L-*g*

(guided harmonic spindle speed control)

Chatter-free applications for lathes

Chatter in a lathe can be suppressed by changing spindle speeds to the ideal amplitude and wave cycle.

For milling

Machining Navi M-*i*

(intelligently optimized spindle speed control)

Simple, auto-mode—leave it to the machine, Finding optimum cutting conditions quickly

Chatter vibration is measured by built-in sensors, and spindle speed is automatically changed to the optimum speed. In addition, advanced graphics of the optimate cutting coniditions represent effective alternatives to suppress various chatter characteristics throughout the low to high speed zones.

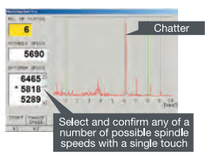
For milling

Machining Navi M-*g*

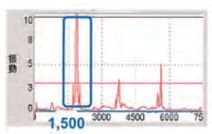
(guided optimization of spindle speed)

Adjust cutting conditions while monitoring the data

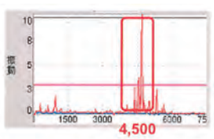
From chatter noise picked up by the microphone, Machining Navi will display the best options for chatter-free spindle speed. The operator can select a recommended speed and immediately confirm the result.



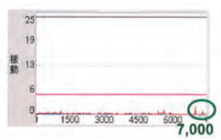
Machining Navi can be used to carry out tooling diagnostics



Tool holder vibration



Tool vibration

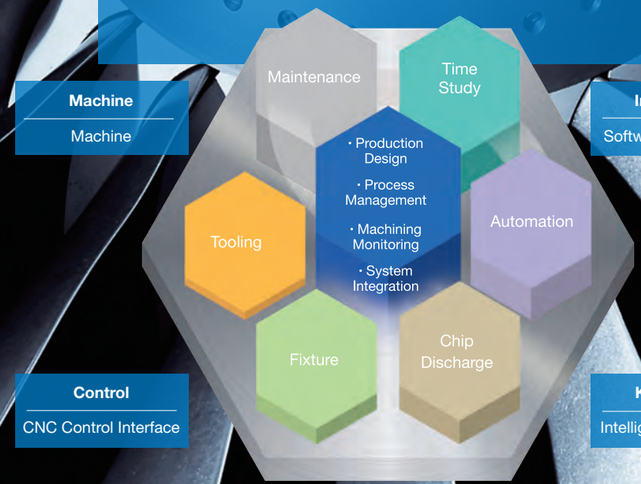


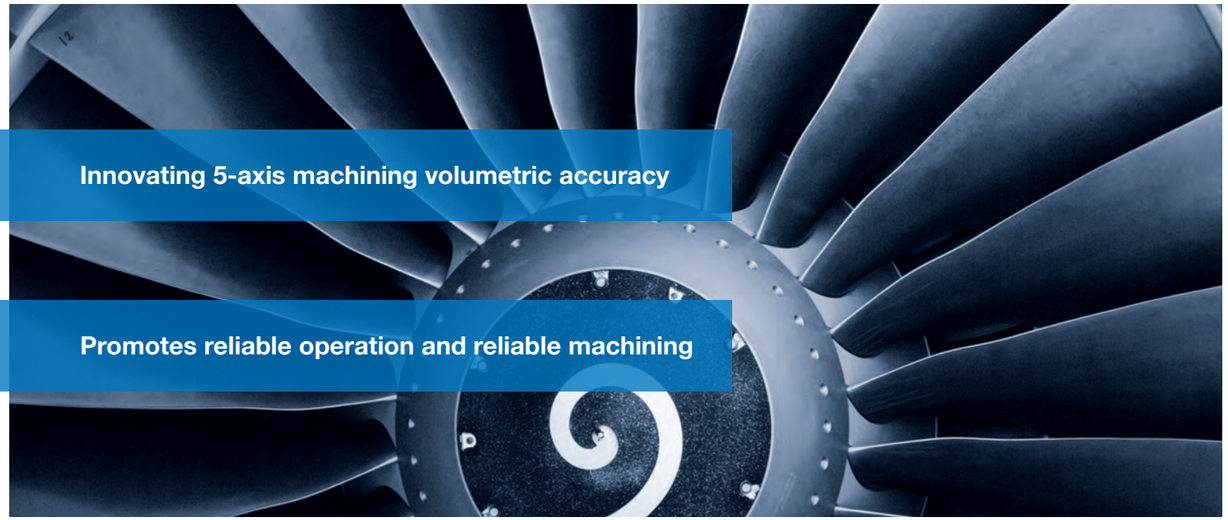
Collet vibration

Okuma Single Source and Turnkey Solutions

With Okuma's original advanced control technology and highly rigid structure, Okuma's highly functional machines, including 5-axis multitasking machines, large turning centers, and large machining centers contribute greatly to meeting the high accuracy machining demands of aircraft parts.

Moreover, Okuma's machines are not simply highly functional machines. Controllers developed in-house by Okuma also give superior control. By creating teams of specialists in various area, including easy-to-use applications, tooling, fixtures, chip discharge, and automation, Okuma machines and controls are built as turnkey solutions.





Innovating 5-axis machining volumetric accuracy

Promotes reliable operation and reliable machining

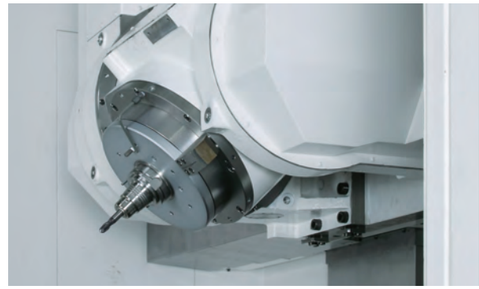
Thermo-Friendly Concept

Manageable Deformation—Accurately Controlled

See also
okuma.co.jp/english/onlyone/thermo/index.html

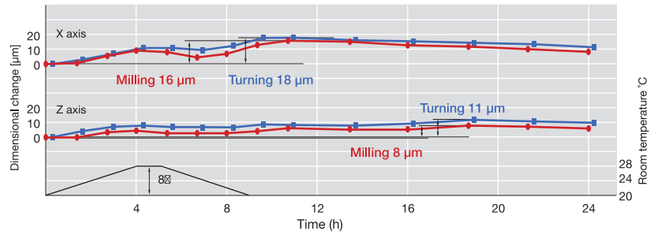
For superb accuracies in "normal" manufacturing environments. The unique approach of "accepting temperature changes"

Machining accuracy of the workpiece changes significantly due to ambient temperatures around the machine, heat generated by the machine, and heat generated in machining. The Thermo-Friendly Concept is the unique concept of "accepting" these temperature changes so that high accuracy can be achieved in normal factory environments with no special measures by the user.



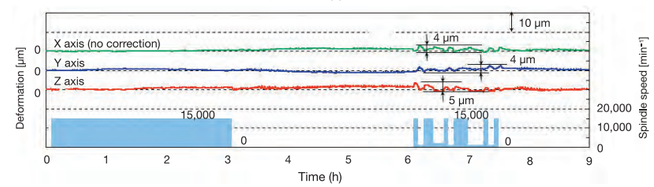
Machining dimensional change over time
(actual result value)

Actual multitasking data for turning and milling with room temperature change of 8°C



Spindle thermal displacement
(actual result value)

Spindle thermal deformation from spindle speed changes



Manageable Deformation—Accurately Controlled

The main focus of the Thermo-Friendly concept is machine design. The temperature changes are accommodated with Manageable changes to the machine, controlling complex twisting and tilting while allowing for prediction of thermal deformation. In addition, the Okuma developed controller OSP thermal deformation control accurately controls thermal deformation and other factors resulting from ambient temperature changes in addition to thermal deformation from frequent rotation speed changes and cutting fluid temperature. The Thermo-Friendly Concept realizes dimension stability that is impossible for other companies to imitate by "accurately controlling" "Manageable thermal deformation."

TAS-C (Thermo Active Stabilizer—Construction
TAS-C accurately controls the machine's structural thermal deformation; by taking into consideration the machine's thermal deformation characteristics, termperature data from properly placed sensors, and feed axis positioning information.

TAS-S (Thermo Active Stabilizer—Spindle)
TAS-S takes into account various conditional changes such as the spindle's temperature data, modification of the spindle rotation and speed, as well as spindle stoppage. The spindle's thermal deformation will be accurately controlled, even when the rotating speed changes frequently.

Thermo-Friendly Concept applicable models

[TAS-S, TAS-C standard equipped models]:	MULTUS series, MCR-BII (TAS-S, TAS-T)
[TAS-S, TAS-C optionally equipped models]:	MU-6300V, MU-5000V/8000V, MU-400VII/500VII, VTM-1200YB/2000YB, MU-10000H, VTR-160A/350A, BLADE T400

Innovation of 5-Axis Machining Volumetric Accuracy—Okuma Original Technologies

5-Axis Auto Tuning System

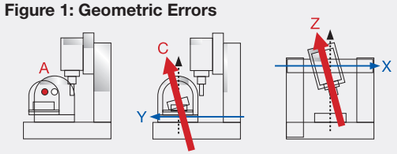
Taking 5-axis machining accuracy to the next level

See also
okuma.co.jp/english/onlyone/fivetuning/index.html

Automatic tuning with no geometric error, able to be carried out quickly and easily by anyone

Five-axis machining accuracy is greatly affected by rotary axis misalignment and other “geometric errors” (see Figure 1). Okuma's 5-Axis Auto Tuning System measures geometric error using a touch probe and datum sphere, and performs compensation using the measured results to tune motion accuracy on 5-axis machines. In this way 5-axis machining accuracy on a higher level is achieved.

Figure 1: Geometric Errors



A-axis misalignment in Y-axis direction | Perpendicularity of C and Y axes | Perpendicularity of Z and X axes

*Rotary axis misalignments and eight other errors, 11 types of geometric error all together can be automatically tuned.

Approximately 10 minutes automatically carried out by the machine* The "Easy Operation" OSP makes things surprisingly easy.

Set a datum sphere on the table and move probe directly above it | Press START MEASURE key and cycle start button | Auto measurement → Auto setting of compensation parameters

*Measurement time is for tuning of 11 types of geometric error in "full" mode. Measurement time will vary for different measurement modes. In "simple" mode 4 types of geometric error are tuned taking approximately 5 minutes.

"High accuracy tuning" achieved only through Okuma's Machine & Control

In multi surface machining, where the tool (table) is tilted at a variety of angles and each surface is machined, when tuning of 4 types of geometric error is carried out manually the machining surface level difference is a maximum of 12 µm but with 5-axis Auto Tuning this is reduced to a maximum of 3 µm, with a level different of 0 for most surfaces.

Models which can support 5-Axis Auto Tuning

- MU-6300V
- MU-400VII
- MU-500VII
- MU-10000H
- MU-6300V-L
- MU-500VII-L
- MU-5000V
- MU-8000V

Okuma Intelligent Technologies fully support the machining environment

5-Axis Auto Tuning System

Automatic tuning with no geometric error, able to be carried out quickly and easily by anyone

GEOMETRIC ERROR CORRECTION | HIGH ACCURACY TUNING

Collision Avoidance System

Allows operators to focus on making parts

COLLISION PREVENTION DURING AUTOMATIC OPERATION | COLLISION AVOIDANCE IN MANUAL OPERATION

Thermo-Friendly Concept

For superior accuracies in "normal" manufacturing environments

THERMO ACTIVE STABILIZER—CONSTRUCTION | THERMO ACTIVE STABILIZER—SPINDLE

Machining Navi

Maximizes machine tool performance

ALLOWS THE MACHINE TO AUTOMATICALLY ACHIEVE OPTIMAL MACHINING CONDITIONS | OPTIMIZATION OF TOOLING WHILE VIEWING ANALYSIS RESULTS

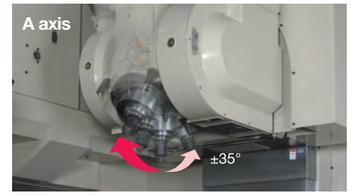
Okuma's superior processing machinery is perfect for high accuracy machined parts and special-shaped workpiece machining.

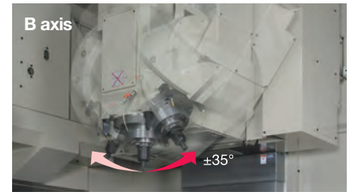
Reduced machining lead time through high quality and process-intensive machining

MILLAC 853PF

Spindle tilt type 5-axis vertical machining center

Spindle speed:	2 gear spindle 12,000 min^{-1} 7/24 taper No.50 55/45 kW
Spindle tilt:	A axis (spindle forward and back swing) 70° B axis (spindle left and right swing) 70°
Rapid feedrate:	X/Y axis 30,000 mm/min Z axis 24,000 mm/min
Table load maximum mass:	3,000 kg





Suitable for powerful cutting of large, complex parts

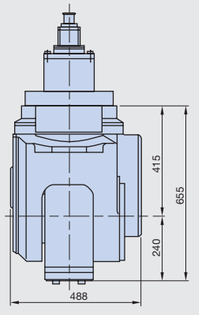
MCR-BIII

Universal index head (B-/C-axis), NC-BC Universal head

High quality, highly efficient machining from sloped surfaces and multi-sided machining to dies and other curved surfaces

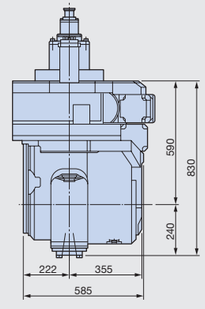
Universal index head (B-/C-axis)

2,000 min^{-1}, 10 kW
6,000 min^{-1}, 7.5 kW

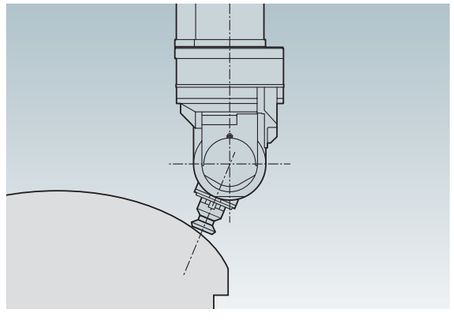


NC-BC Universal head

20,000 min^{-1}, 15 kW
6,000 min^{-1}, 26/22 kW

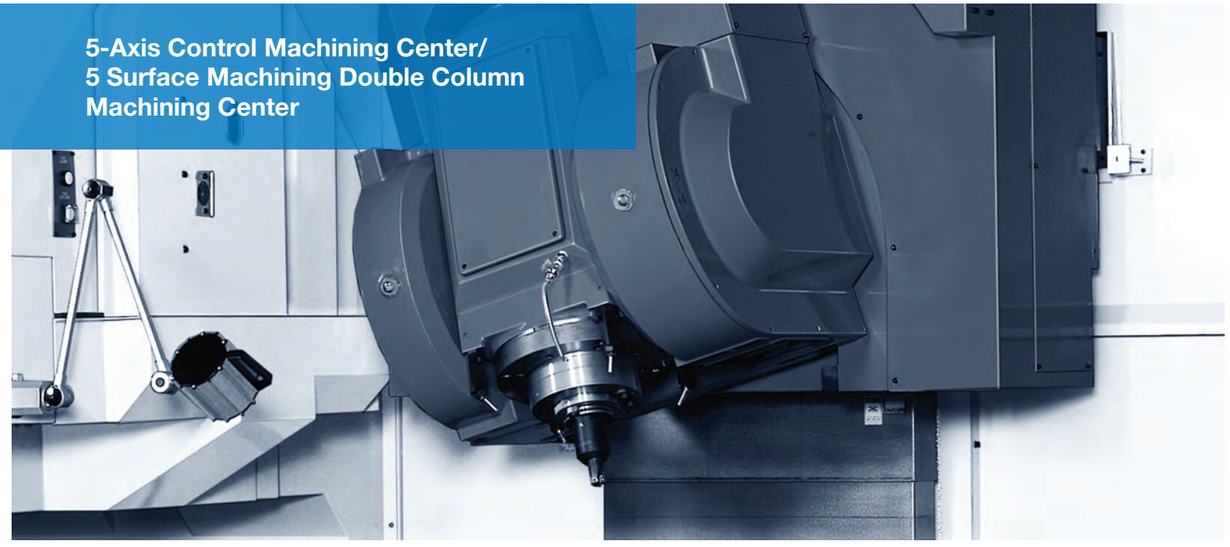


* Machine requires 8,000 min^{-1} spindle



Machine Specifications

Type	5-Axis Control Machining Center	5 surface machining double column machining center
Model	MILLAC 853PF	MCR-BIII
Table dimensions mm	3,200 × 850	1,500 x 2,800 to 3,000 x 11,800
Travel (X × Y × Z) mm	3,050 × 850 × 700	3,000 to 12,000 x 2,700 to 4,200 x 800
Spindle speed min^{-1}	12,000	4,000
Spindle motor kW	VAC 55/45	VAC 30/22



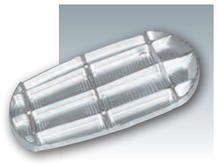
5-Axis Control Machining Center/
5 Surface Machining Double Column Machining Center

Multi-sided, angled, curved surfaces— universal heads capable of handling large complex shapes

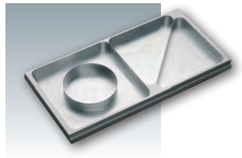
Improved machining accuracy through one-chucking

Improved cutting conditions through use of optimal, non-interfering tools

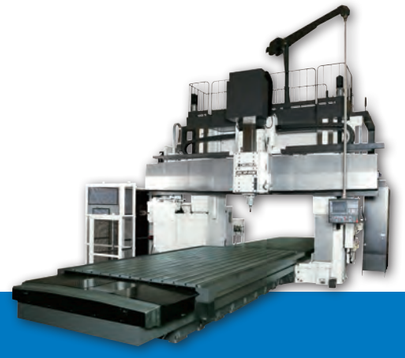
Reduced setup change time and costs



Machining shapes (examples)



5-Axis Machining Center
MILLAC 853PF

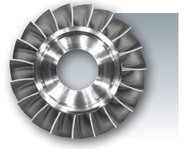


Double Column Machining Center
MCR-BIII
FOR 5-SIDED APPLICATIONS

Innovating aircraft part machining Okuma's latest technologies

5-axis multitasking machine lineup providing solutions perfectly suited to the workpiece

ENGINE PARTS Engine Case PG. 7

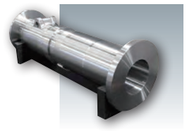


Highly accurate 5-axis machining

ENGINE PARTS Blisk PG. 9

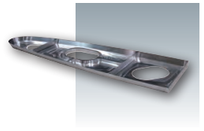
5-axis high speed blade machining

ENGINE PARTS Blade PG. 11



Total machining of large, long parts through integrated operations

SUSPENSION PARTS Landing Gear PG. 13



Highly efficient machining with simultaneous 5-axis control + high speed, high torque spindle

FUSELAGE/WING PARTS Plate PG. 15

Multi-sided, angled, curved surfaces—universal heads capable of handling large complex shapes

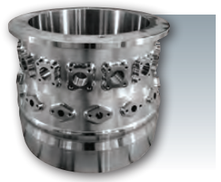
FUSELAGE/WING PARTS Frame PG. 17

5-axis multitasking machine lineup providing solutions perfectly suited to the workpiece

Process-intensive machining from OD turning to side milling

No-interference turning with spindle set on angle

Slide profile and fillet machining with 5-axis control



Machine: 5-Axis Vertical Machining Center VTM-1200YB
Workpiece: Engine case
Dimensions: ø800 x L650mm

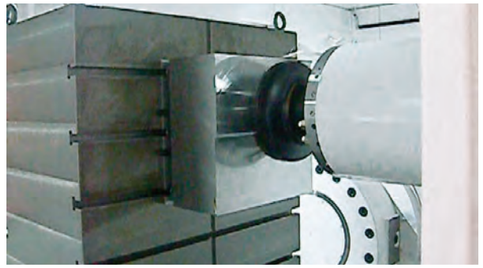
5-Axis Vertical Multitasking Machine
VTM-1200YB

5-Axis Vertical Multitasking Machine
VTM-2000YB

Double Column Multitasking Machine
VTR-160A/350A

Highly efficient machining with outstanding machining capacity

Beefy torque makes easy work even of difficult-to-machine material
Two types of spindle, integral motor/spindle and gear head, are ready for use depending on the purpose, to achieve easy cutting from high-speed machining of non-ferrous material to high-speed machining of difficult-to-machine material.



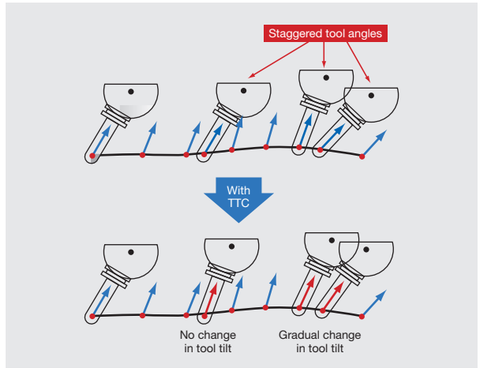
MU-10000H Integral motor/spindle	
Spindle speed	6,000 min^{-1}
Output	VAC 45/37 kW
Torque	1,071/637 N-m

MU-10000H Gear spindle	
Spindle speed	4,500 min^{-1}
Output	VAC 40/30 kW
Torque	1,920/1,440 N-m

MILLAC 1000VH Gear spindle	
Spindle speed	6,000 min^{-1}
Output	VAC 22/18.5 kW
Torque	525/441 N-m

MILLAC 800VH Integral motor/spindle	
Spindle speed	10,000 min^{-1}
Output	VAC 22/18.5 kW
Torque	165/117/95 N-m

Simultaneous 5-Axis Tool Tilt Compensation
The tool angle on a workpiece (tool tilt) in 5-axis machining will change on a waving surface. CAM processing errors will cause the tool to stagger with unnecessary accel/decel and reverse angles during axis feed. Simul 5-Axis TTC will keep feedrates steady with a smooth sequence of commands to automatically correct tool tilt angles–resulting in shorter cycle times and smoother surface finishes

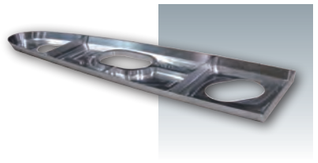


Machine Specifications

Type	5-Axis Horizontal Machining Center	5-Axis Large Machining Center	
Model	UNIVERSAL CENTER MU-10000H	MILLAC 1000VH	MILLAC 800VH
Table size mm	1,000 x 1,000	1,000 x 1,000	800 x 800
Travels (X x Y x Z) mm	1,550 x 1,600 x 1,650	1,650 x 1,300 x 1,000	1,020 x 1,020 x 1,020
Spindle speed min^{-1}	6,000	6,000	10,000
Spindle kW	VAC 45/37	VAC 22/18.5	VAC 22/18.5

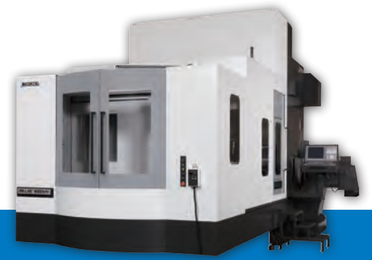
Highly efficient machining with simultaneous 5-axis control + high-speed spindle

From roughing to finishing, machining from plate blanks



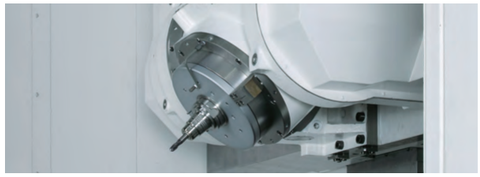
Machine: 5-Axis Large Machining Center MILLAC 1000VH Spindle 10,000 min^{-1} specifications Simultaneous 5-axis control
Workpiece: Plate
Material: Aluminum
Dimensions: 840 x 370 x 30 mm
Blank shape dimensions: 870 x 370 x 30 mm

5-Axis Horizontal Machining Center
MU-10000H UNIVERSAL CENTER



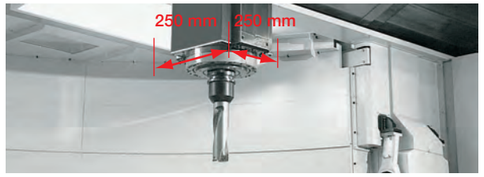
5-Axis Large Machining Center
MILLAC 1000VH

5-Axis Double Column Machining Center
MILLAC 800VH



Highly Accurate 5-axis Multitasking
VTM-1200YB/VTM-2000YB

B-axis control turret (Milling tool spindle)
B-axis control: 0.001 orientation
{Optional: NC-B axis [simultaneous 5-axis control]}



Ram Multitasking Machine
VTR-160A/350A

Ram Head (Milling tool spindle)
Large section ram of 250x250mm displays high turning capacity over the entire travel.
Ram Travel: **900mm** (VTR-160A) [Opt: 1,250mm]
1,250mm (VTR-350A) [Opt: 1,500mm]

Machining Performance

VTM-1200YB / VTM-2000YB

Milling
Output: VAC 37/30/22 kW (3 minutes/30 minutes/continuous)
Spindle torque: 505/300/205 N-m (3 minutes/30 minutes/continuous)
Milling cutting amount: 1,000 cm³/min (S45C)
End milling cutting amount: 645 cm³/min (S45C)
Drill machining cutting amount: 707 cm³/min (S45C)

Turning
VTM-1200YB
Output: VAC 30/22 kW (30 minutes/continuous)
Spindle torque: 6,093/4,062 N-m (20 minutes/continuous)
External diameter heavy-duty cutting: 6.5 mm² (S45C)

VTM-2000YB
Output: VAC 30/22 kW (30 minutes/continuous)
Spindle torque: 8,415/5,610 N-m (20 minutes/continuous)
External diameter heavy-duty cutting: 6.5 mm² (S45C)

VTR-160A / VTR-350A

Milling
Output: VAC 18.5/15 kW (30 minutes/continuous)
Spindle torque: 230/190 N-m (30 minutes/continuous)
Milling cutting amount: 317 cm³/min (S45C)
Ram ejection 550 mm

Turning
VTR-160A
Output: VAC 45/37 kW (30 minutes/continuous)
Spindle torque: 17,100/14,000 N-m (30 minutes/continuous)

VTR-350A
Output: VAC 55/45 kW (30 minutes/continuous)
Spindle torque: 42,500/34,800 N-m (30 minutes/continuous)
External diameter heavy-duty cutting: 10 mm² (S45C)
Ram ejection 600 mm

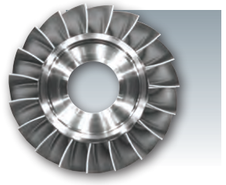
Machine Specifications

Type	5-Axis Vertical Multitasking Machines		Double-Column Multitasking Machines	
Model	VTM-1200YB	VTM-2000YB	VTR-160A	VTR-350A
Max machining dia mm	ø1,200	ø2,000	ø1,600	ø3,500
Max turning length mm	1,550	1,400	1,250	1,600
Spindle speed min^{-1}	500	300	400	160
Spindle kW	VAC 30/22	VAC 30/22	VAC 45/37	VAC 55/45

Highly accurate 5-axis machining

High speed contouring

High surface quality machining with Super-NURBS (5-axis specs)



Machine: 5-Axis Vertical Machining Center
UNIVERSAL CENTER
Super-NURBS (5-axis specs)
Workpiece: Blisk
Dimensions: ø400 x L75mm

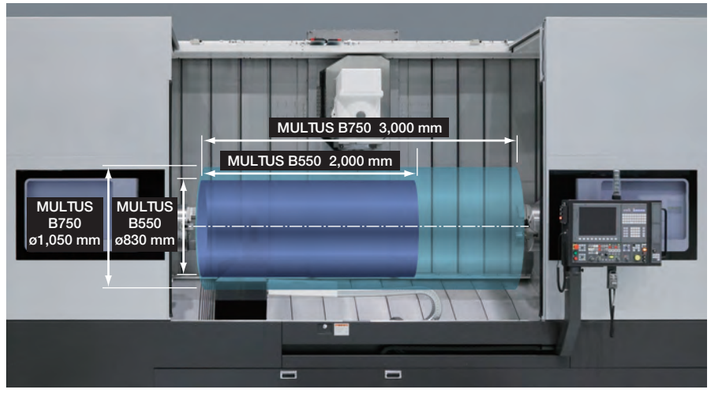
5-Axis Vertical Machining Center
MU-5000V
UNIVERSAL CENTER

5-Axis Vertical Machining Center
MU-6300V/8000V
UNIVERSAL CENTER

5-Axis Vertical Machining Center
MU-400V II/500V II
UNIVERSAL CENTER

Large parts machining with ease

Modular production line with an orthogonal Y axis wide working range integrated on a single machine



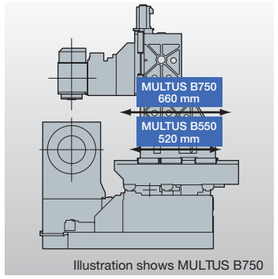


Illustration shows MULTUS B750

Y axis travel

Y axis travel comparable to that of a large machining center gives a large working range and powerful support capacity to easily handle even large parts.

Maximum workpiece size

	MULTUS B550	MULTUS B750
Max turning dia	ø830 mm	ø1,050 mm
Max turning length	2,000 mm	3,000 mm*

*4,000 mm, 6,000 mm specifications also available.

Maximum support weight

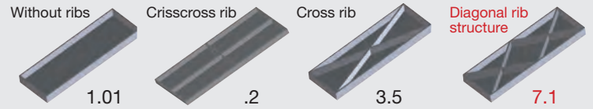
	MULTUS B550	MULTUS B750
Tailstock support	1,500 kg	6,000 kg
Both chucks	—	7,000 kg

Note: Max loads may vary with other specifications not shown above.

Highly rigid bed column

Diagonal rib structure used on bed and column. The rigidity is 7 times greater than without ribs. Withstands bending and torsion and readily handles large loads of heavy-duty cutting, maintaining high accuracy over long periods.

Rigidity comparison sample (rigidity per unit weight)



Machine Specifications

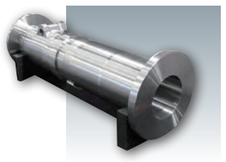
Type	Intelligent Multitasking Machines	
Model	MULTUS B750M	MULTUS B550
Max machining data mm	ø1,050	ø830
Max turning length mm	3,000	2,000
Spindle speed min^{-1}	2,000	3,000
Spindle drive kW	VAC 37/30	PREX 37/30

Total machining of large, long parts through integrated operations

Continuous machining of 1-2 processes with opposing spindles and steadyrest

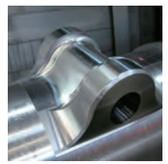
Internal diameter machining with long boring bar*

Gear cutting with synchronized control of tool turning and C axis



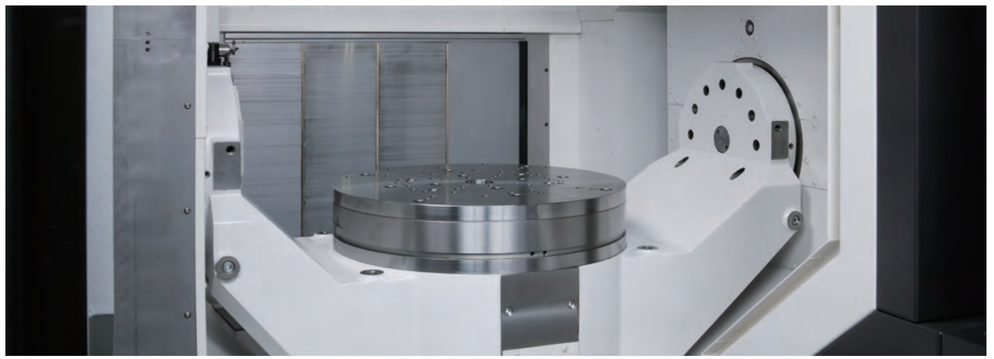
Machine: Intelligent Multitasking Machine
MULTUS B750
Opposing spindle
Long boring bar
Workpiece: Landing gear
Dimensions: ø330 × L1,000 mm

*A featured MULTUS B750 application



Intelligent Multitasking Machine
MULTUS B750

Intelligent Multitasking Machine
MULTUS B550



High speed and high accuracy
5-axis machining with trunnion table

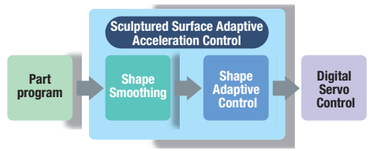
HIGH SPEED TRUNNION TABLE

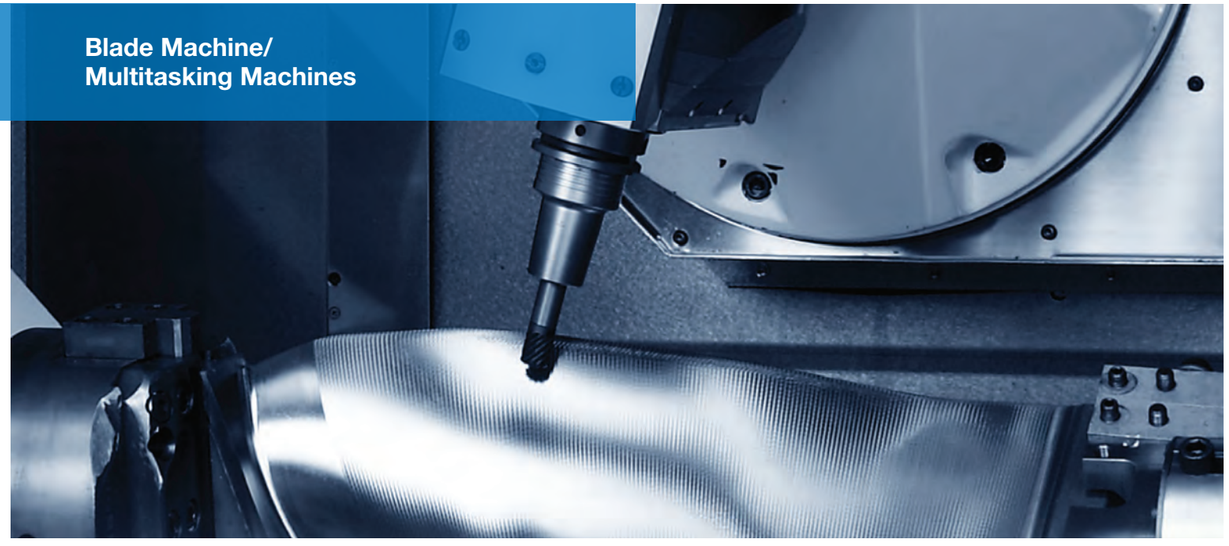
Achieves high quality machined surfaces in simultaneous 5-axis machining with high-speed, high-accuracy positioning and light, smooth movements.

Type	5-Axis Vertical Machining Center				
Model	MU-8000V	MU-6300V	MU-5000V	MU-500VII	MU-400VII
Table diameter mm	800	630	500	500	400
Table load max. kg	700	600	500	500	300
Trunnion swing (A axis)	+90 to -120° (210°)	+90 to -120° (210°)	+90 to -120° (210°)	+20 to -110° (130°)	+20 to -110° (130°)
Travels (X x Y x Z)	900 x 1,050 x 600	900 x 1,050 x 600	800 x 1,050 x 600	1,250 x 660 x 540	762 x 460 x 460
Spindle speed min^{-1}	10,000	10,000	10,000	8,000	8,000
Spindle kW	VAC 11/7.5	VAC 11/7.5	VAC 11/7.5	VAC 11/7.5	VAC 11/7.5

High-Speed Machining of Contoured Surfaces Super-NURBS

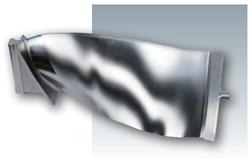
Super-NURBS—the world's first "Sculptured Surface-Adaptive Acceleration Control." From routine parts to complex free forms, this high-speed CNC function lets you machine fast—and get superb accuracies and quality. "Sculptured-surface adaptive acceleration control" consists of Shape Smoothing and Shape Adaptive Control, revoluntionary control technologies that apply CAD/CAM system high speed mathematical analysis to speed and acceleration control, real time processes in CNCs.





5-axis high speed blade machine

High speed, high quality machining roughing to finishing



Machine: Blade machine
BLADE T400
Work name: Jet engine
Fan blade
Material: Titanium alloy
Dimensions: 550 x 200

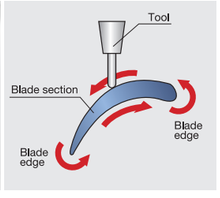
Blade Machine
BLADE T400

Intelligent Multitasking Machines
MULTUS U series

Steady and highly productive
BLADE T400

- Contributes greatly to increased productivity of blade machining
- 5-Axis high speed blade machine

High speed, high quality machining from roughing to finishing



Reduced roughing time

High machining performance
-Cutting performance 667cm^3/min
(Results: SUS material)

Reduced finishing time and high surface quality

Reduced finishing time and high surface quality
- Okuma mechatronics achieve higher speeds and quality finishes
- Machine design aimed at maintaining high rigidity while also providing high speeds
- The optimum following error control of the simultaneous 5-axes allows for high speed machining

Increased speed of blade edge reverse operation
- X, Y, Z axis 40 m/min, 0.7G
- A axis 200 min^{-1}, 28,800 deg/sec^2
- B axis 25 min^{-1}, 2,000 deg/sec^2

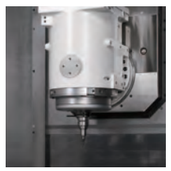
Machine Specifications

Type	Blade machine
Model	BLADE T400
Max swing diameter mm	ø400
Max machining length mm	1,500
Tool shank	HSK-A63
Spindle speed min^{-1}	18,000
Motor kW	VAC 38/28
Required floor space mm	6,750 × 3,252

High accuracy contouring of free-form surfaces with 5 axes simultaneously
MULTUS U series

- Highly accurate, rigid, hi-tech, and process-intensive
- All that's required and packed in the ultimate multitasking machine

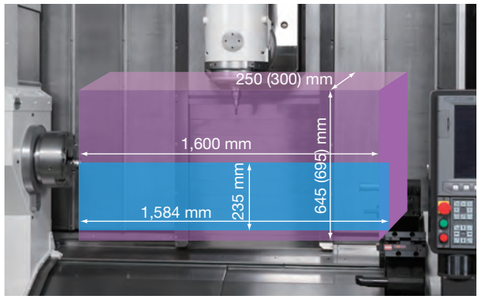
Max milling or turning performance



Face milling example
602 cm3/min (S45C)
ø50-mm face mill, 5 blades
Cutting speed: 300 m/min
Cutting depth: 6×35 mm
Feedrate: 2,865 mm/min

OD turning example
5.0 mm2 (S45C)
Cutting speed: 150 m/min
Cutting depth: 8 mm
Feedrate: 0.625 mm/rev

First priority: large work envelopes



Machine Specifications

Type	Intelligent Multitasking Machines	
Model	MULTUS U3000	MULTUS U4000
Max machining dia mm	ø650	ø650
Max machining length mm	1,500	1,500
Spindle speed min^{-1}	5,000	4,200
Spindle drive kW	VAC 22/15	PREX 22/15

Global Support

For over 115 years, Okuma has been investing in new technology, pioneering machine tool and control development, and has been helping manufacturers improve quality, enhance productivity and reduce costs. Our commitment to manufacturing extends around the world and our partnerships with industry suppliers and local distributors helps bring the best solutions to our customers.

Okuma provides global support and service for manufacturers around the world. With over 3300 employees worldwide, and over one hundred distributor locations, Okuma is the team to partner with when it comes to engineering support and information. Outfitted with the finest CNC machine tools, Okuma's technical centers (including the Aerospace Centers of Excellence in Paris, France and Charlotte, North Carolina) provide an opportunity for manufacturers to test and trial new equipment and processes, to improve productivity.

Aerospace Center of Excellence—Charlotte, USA

Aerospace Center of Excellence—Paris, France

Okuma America

11900 Westhall Drive
Charlotte NC 28278
USA

P: +1 (704)588-7000
F: +1 (704)588-6503

www.okuma.com/americas

Okuma Europe GmbH

Europark Fichtenhain A 20
47807 Krefeld
Germany

P: +49 (0)2151-374 0
F: +49 (0)2151-374 100

www.okuma.eu

Okuma Technical Centre Paris

Parc d'Activités des Chanteraines
7, rue du Commandant d'Estiennes d'Orves
92390 Villeneuve la Garenne
France

P: +33 1 55 84 21 40

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