

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

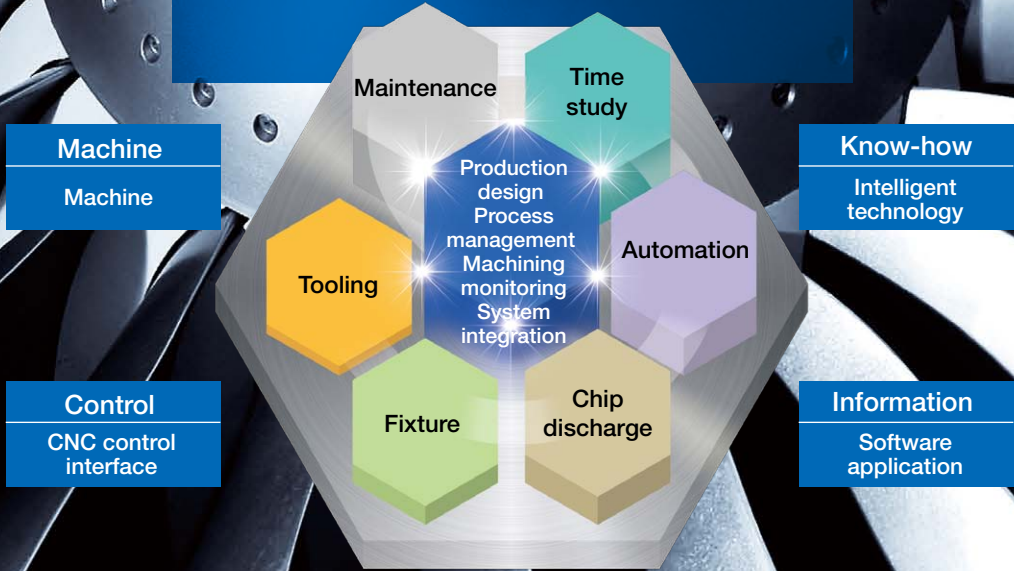
Aircraft part manufacturing often involves complex shapes, large part sizes and the use of exotic metals – all features that complicate the production process. The use of 5-axis and multitasking machines can help address these issues while raising productivity levels. And today's highly intelligent machine 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.



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, multitasking machines 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 areas, 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

Okuma's Intelligent Technology fully supports real shop floor environments



5-Axis Auto Tuning System

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

Geometric error compensation
High accuracy tuning



Collision Avoidance system

Allowing 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

Maximizing machine tool performance

Changes automatically to optimum spindle speed
Change cutting conditions while watching analysis results



SERVO NAVI

Optimization of servo control

Improved machining accuracy and machined surface quality
Highly precise, stable movements maintained for long periods

Innovating aircraft part machining Okuma's latest technologies

Okuma's superior machines are perfect for machining of high accuracy parts and parts with special shapes

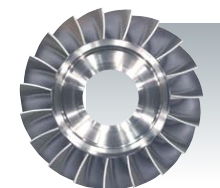


High efficiency machining with large multitasking machines

Engine parts

Engine case

[▶ P.7](#)

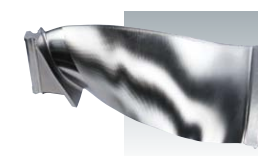


High surface quality machining

Engine parts

Blisk

[▶ P.9](#)



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

Engine parts

Fan blade

[▶ P.11](#)

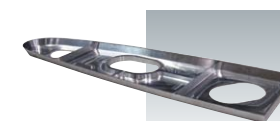


Total machining of large, long parts through integrated operations

Suspension parts

Landing gear

[▶ P.13](#)

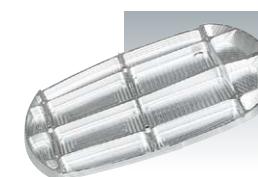


Highly efficient machining with simultaneous 5-axis control + high speed, high torque spindle

Fuselage and wing parts

Plate

[▶ P.15](#)



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

Fuselage and wing parts

Frame

[▶ P.17](#)

5-Axis Vertical Multi-tasking Machines

Double-Column Multi-tasking Machines

High efficiency machining with vertical multitasking machines

- Process-intensive machining from OD turning to side milling
- No-interference turning with spindle set on angle
- Side profile and fillet machining with 5-axis control

Machine: 5-Axis Vertical Machining Center
VTM-1200YB

Workpiece: Engine case

Dimensions: ø800 × L650 mm



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])

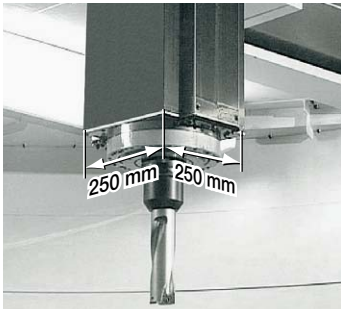


Ram multitasking machine
VTR-160A / VTR-350A

Ram head (Milling tool spindle)

High turning capacity delivered over full range of travel

Ram travel
900 mm
(VTR-160A) [Opt: 1,250 mm]
1,250 mm
(VTR-350A) [Opt: 1,500 mm]



Machining performance

VTM-1200YB / VTM-2000YB

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

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

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

VTR-160A / VTR-350A

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

- Turning**
(VTR-160A)
Output: VAC 45/37 kW (30 minutes/continuous)
Spindle torque: 17,100/14,000 N-m (30 minutes/continuous)
(VTR-350A)
External diameter heavy-duty cutting: **10 mm²** (S45C)
Ram ejection **600 mm**
Output: VAC 55/45 kW (30 minutes/continuous)
Spindle torque: 42,500/34,800 N-m (30 minutes/continuous)

Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

Machine specifications

Type	5-Axis Vertical Multitasking Machine		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 (high)	mm 1,080	1,400	1,250	1,600
Spindle speed	min ⁻¹ 500	300	400	160
Spindle (30 min/cont)	kW VAC 30/22	VAC 30/22	VAC 45/37	VAC 55/45



5-Axis Vertical Multitasking Machine
VTM-1200YB



5-Axis Vertical Multitasking Machine
VTM-2000YB



Double-Column Multitasking Machine
VTR-160A
VTR-350A

5-Axis Vertical
Machining Centers



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
MU-400V II
Super-NURBS (5-axis specs)
Workpiece: Blisk
Dimensions: ø400 × L75 mm



5-Axis Vertical Machining Center
**UNIVERSAL CENTER
MU-4000V**



5-Axis Vertical Machining Center
**UNIVERSAL CENTER
MU-5000V/MU-6300V
MU-8000V**

Highly rigid and accurate trunnion table with excellent follow-up control during process-intensive machining of difficult-to-cut materials—from roughing to finishing

High speed trunnion table

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



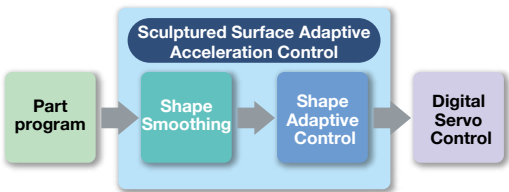
Type		UNIVERSAL CENTER MU-4000V	UNIVERSAL CENTER MU-5000V	UNIVERSAL CENTER MU-6300V	UNIVERSAL CENTER MU-8000V	UNIVERSAL CENTER MU-400V II
Table size	mm	ø400	ø500	ø630	ø800 × 630 width*	ø400
Table loading mass	kg	300	500	600	700	300
Trunnion swing (A axis)		+90 to -120° (210°)	+90 to -120° (210°)	+90 to -120° (210°)	+90 to -120° (210°)	+20 to -110° (130°)
Swing speed	min ⁻¹	50	50	30	30	40

Turning		UNIVERSAL CENTER MU-4000V-L	UNIVERSAL CENTER MU-5000V-L	UNIVERSAL CENTER MU-6300V-L	UNIVERSAL CENTER MU-8000V-L
Table rotation speed	min ⁻¹	1,200	1,000	800	800
Output (15 min/cont)	kW	15/10	17/13	16/12	16/12

*With turning specs ø800 mm

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, revolutionary control technologies that apply CAD/CAM system high speed mathematical analysis to speed and acceleration control, real time processes in CNCs.



Machine specifications

Type		5-Axis Vertical Machining Center		
Model		UNIVERSAL CENTER MU-4000V	UNIVERSAL CENTER MU-5000V	UNIVERSAL CENTER MU-6300V
Travels (X × Y × Z)	mm	740 × 460 × 460	800 × 1,050 × 600	925 × 1,050 × 600
Spindle speed	min ⁻¹	15,000	10,000	10,000
Spindle (10 min/cont)	kW	VAC 22/18.5	VAC 11/7.5	VAC 11/7.5

Type		5-Axis Vertical Machining Center	
Model		UNIVERSAL CENTER MU-8000V	UNIVERSAL CENTER MU-400V II
Travels (X × Y × Z)	mm	925 × 1,050 × 600	762 × 460 × 460
Spindle speed	min ⁻¹	10,000	8,000
Spindle (10 min/cont)	kW	VAC 11/7.5	VAC 11/7.5



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

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

High speed, high quality machining, from roughing to finishing

Machine: Special purpose machine for 5-axis control,
high speed machining of blades
BLADE T400

Workpiece: Jet engine
Fan blade

Material: Titanium alloy

Dimensions: 550 × 200 mm



Special purpose machine for 5-axis control,
high speed machining of blades
BLADE T400

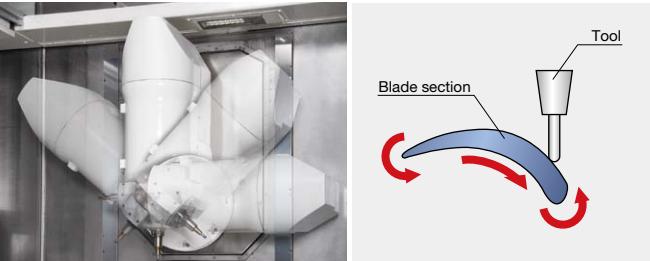


Intelligent Multitasking Machines
MULTUS U3000
MULTUS U4000

5-axis High Speed Blade Machine **BLADE T400**

Improved productivity in blade machining

High speed, high quality machining from roughing to finishing



Reduced roughing time

- High machining performance
- Cutting performance **667cm³/min** (Results: SUS material)

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/sec²
 - B axis 25 min⁻¹, 2,000 deg/sec²

Machine specifications

Type	5-axis High Speed 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 (30 min/cont)	kW	VAC38/28
Required floor space	mm	6,750 × 3,236*

*Does not include coolant tank

Intelligent Multitasking Machines **MULTUS U3000 / MULTUS U4000**

The ultimate multitasking machine that combines functions to meet all demands—High accuracy, high rigidity, high functionality, integrated operations

Outstanding machining performance enables highly efficient machining even of difficult-to-machine materials



Example of end milling

604 cm³/min (S45C)

Tool ø20 end mill 7 blade

Cutting Speed 192 m/min

Cutting depth 6.5 × 20 mm

Feed 1.52 mm/rev



Example of OD (MULTUS U4000)

5.0 mm² (S45C)

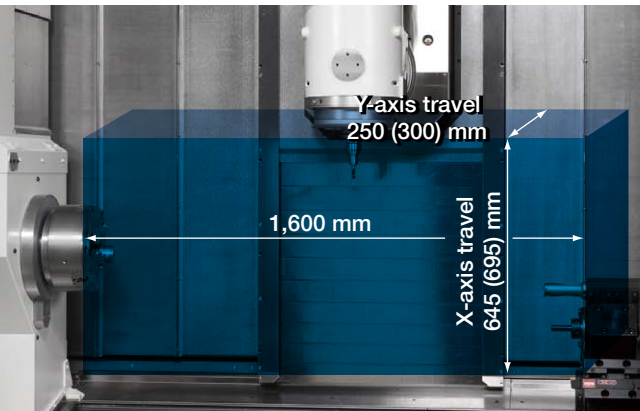
Cutting Speed 150 m/min

Cutting depth 8 mm

Feed 0.625 mm/rev

Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

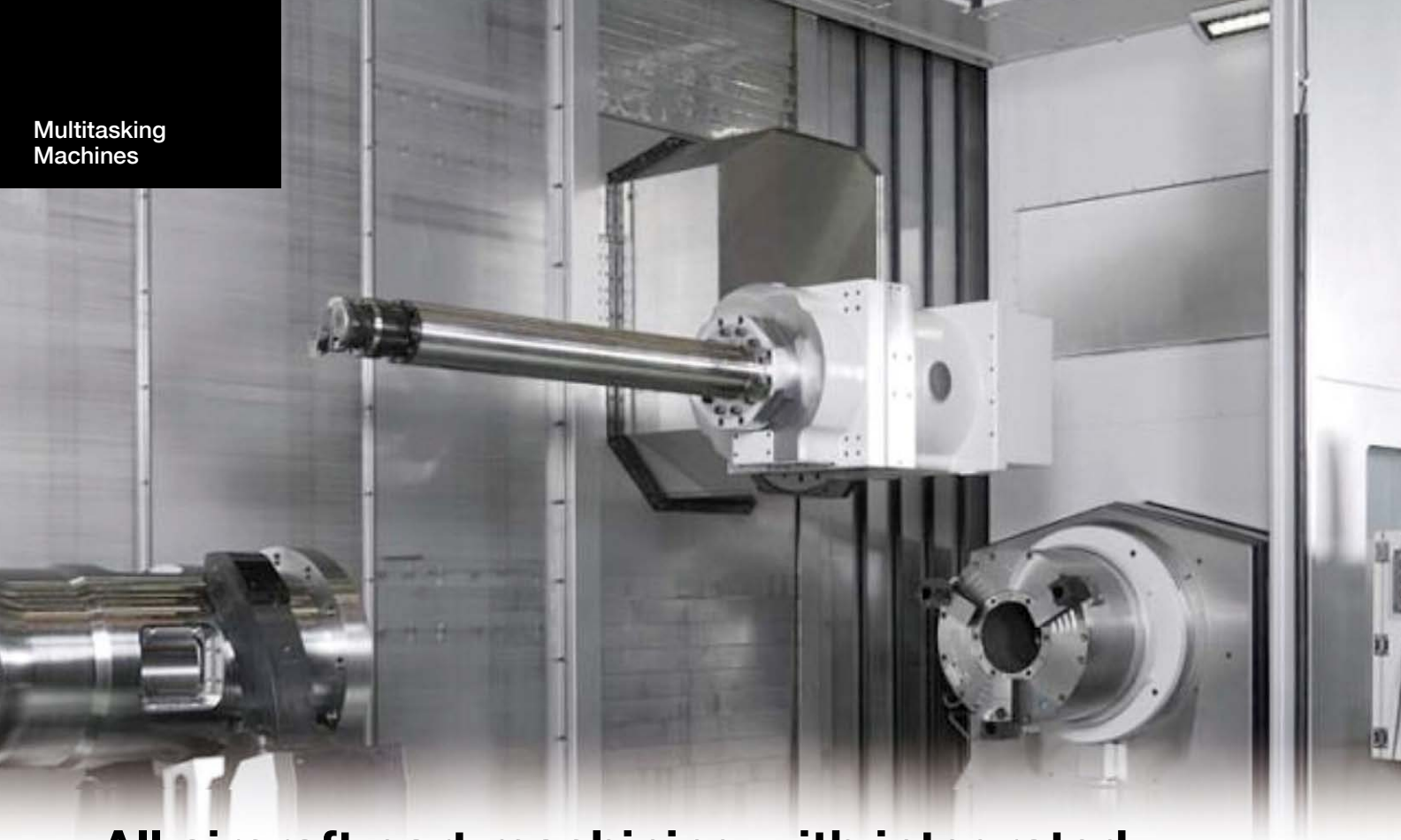
Wide working range



The figure shows distance between centers of 1,500
Parentheses are for MULTUS U4000

Machine specifications

Type		Intelligent Multitasking Machines	
Model		MULTUS U3000	MULTUS U4000
Max machining dia	mm	ø650	ø650
Max machining length	mm	1,000, 1,500	1,500, 2,000
Spindle speed	min ⁻¹	5,000	4,200
Spindle drive (30 min/cont)	kW	VAC 22/15	PREX 22/15



All aircraft part machining with 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 rotation and the C axis

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

* Users can select the MULTUS B750



Intelligent Multitasking Machine
MULTUS B550



Intelligent Multitasking Machine
MULTUS B750

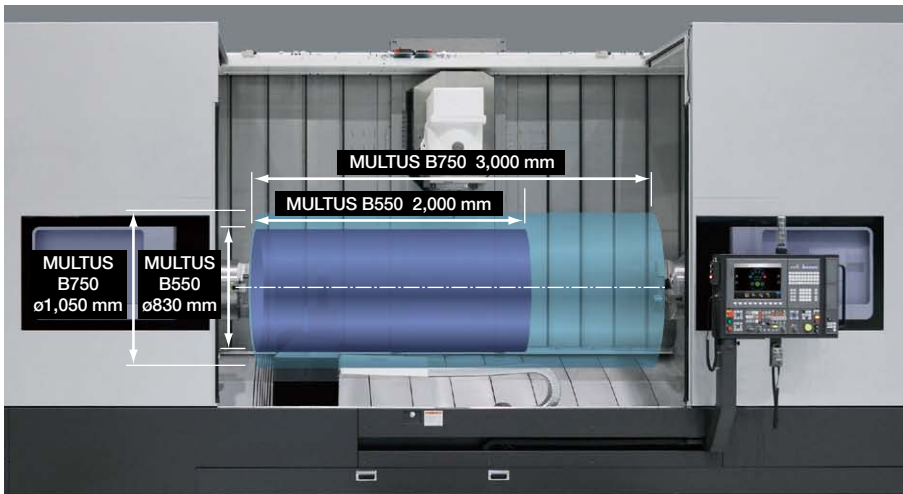
Shorter machining times with powerful cutting

MULTUS B200 II	MULTUS B300 II	MULTUS B400 II	MULTUS B550/MULTUS B750
Heavy-duty cutting OD	Heavy-duty cutting OD	Heavy-duty cutting OD	Heavy-duty cutting OD
2.5 mm ²	3.0 mm ²	4.8 mm ²	6.5 mm ²
Milling	Milling	Milling	Milling
224 cm ³ /min	360 cm ³ /min	450 cm ³ /min	1,000 cm ³ /min

*Material is S45C. Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

Large parts machining with ease *MULTUS B550 / MULTUS B750*

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



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.

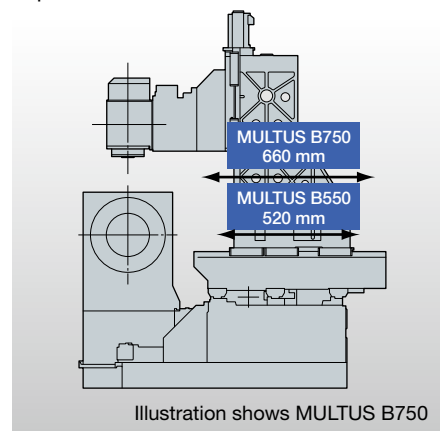


Illustration shows MULTUS B750

Machine specifications			
Type	Intelligent Multitasking Machines		
Model	MULTUS B550	MULTUS B750	
Max turning dia	mm	ø830	ø1,050
Max turning length	mm	2,000, 3,000	3,000, 4,000, 6,000
Tailstock support *	kg	1,500	6,000
Both chucks *	kg	1,600	7,000
Spindle speed	min ⁻¹	3,000	2,000
Spindle drive (30 min/cont)	kW	PREX 37/30	VAC 37/30

* Max loads may vary with other specifications not shown above.

Type		Intelligent Multitasking Machines		
Model		MULTUS B200II	MULTUS B300 II	MULTUS B400II
Max turning dia	mm	ø600	ø630	ø710
Max turning length	mm	550, 750	900	1,500, 2,000
Spindle speed	min ⁻¹	6,000	5,000	3,800
Spindle drive	kW	PREX 11/7.5 (20 min/cont)	VAC 15/11 (20 min/cont)	VAC 22/15 (50% ED/cont)



Intelligent Multitasking Machine
MULTUS B200 II
MULTUS B300 II
MULTUS B400 II

5-Axis Horizontal
Machining Centers

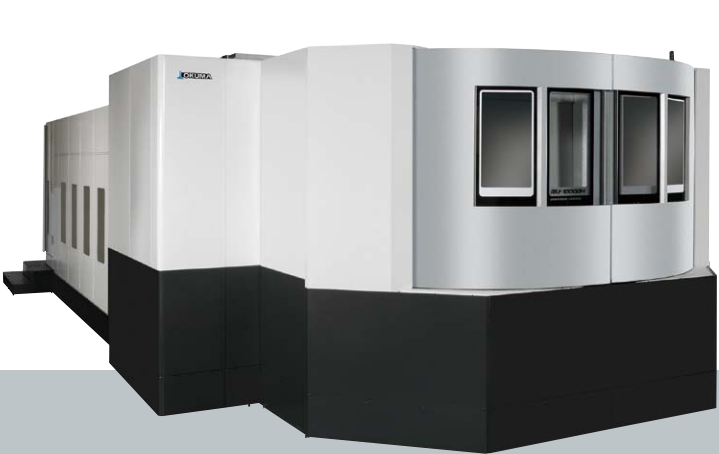
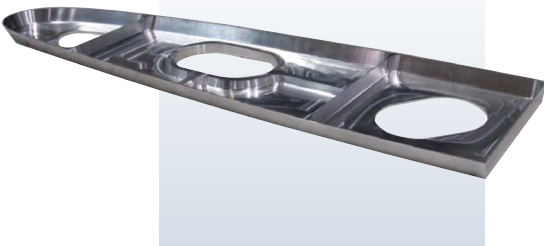
5-Axis Large
Machining Centers

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
Dimensions: 840 × 370 × 30 mm
Material: Aluminum
Blank shape: 870 × 370 × 30 mm



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



5-Axis Large Machining Center
**MILLAC 1000VH
MILLAC 800VH**

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.



Photo shows a MU-10000H

MU-10000H Integral motor/spindle

Spindle speed 6,000 min⁻¹
Output VAC45/37 kW (20 min/cont)
Torque 1,071/637 N-m (3 min/cont)

MU-10000H Gear spindle

Spindle speed 4,500 min⁻¹
Output VAC40/30 kW (15 min/cont)
Torque 1,920/1,440 N-m (15 min/cont)

MILLAC 1000VH Gear spindle

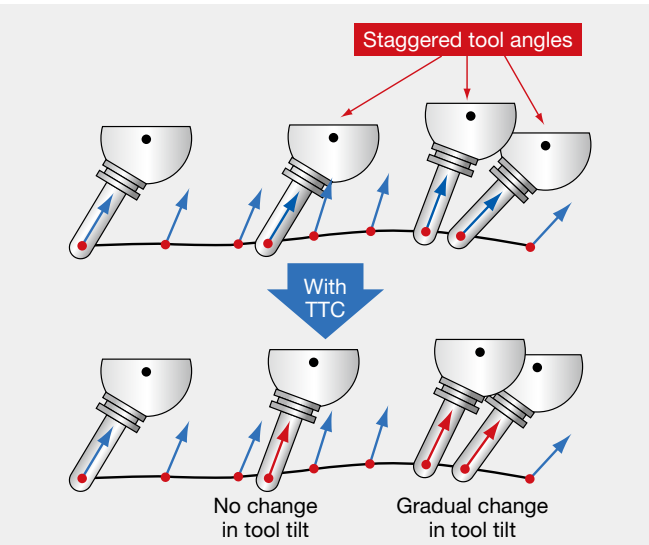
Spindle speed 6,000 min⁻¹
Output VAC22/18.5 kW (30 min/cont)
Torque 525/441 N-m (30 min/cont)

MILLAC 800VH Integral motor/spindle

Spindle speed 10,000 min⁻¹
Output VAC22/18.5 kW (15 min/cont)
Torque 165/117/95 N-m (25%ED/15 min/cont)

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



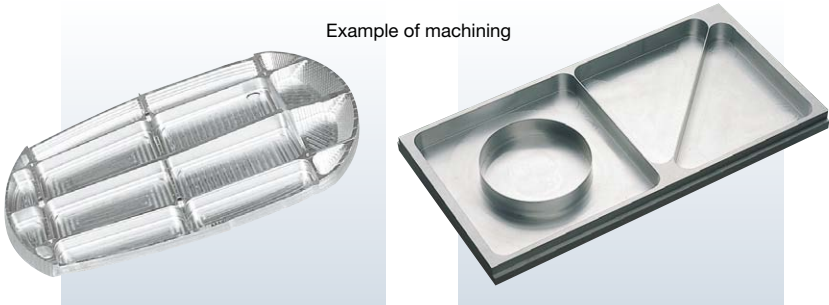
Machine specifications

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 × 1,000	1,000 × 1,000	800 × 800
Travels (X × Y × Z)	mm 1,550 × 1,600 × 1,650	1,850 × 1,300 × 1,000	1,020 × 1,020 × 1,020
Spindle speed	min ⁻¹ 6,000	6,000	10,000
Spindle	kW VAC45/37 (20 min/cont)	VAC22/18.5 (30 min/cont)	VAC22/18.5 (15 min/cont)

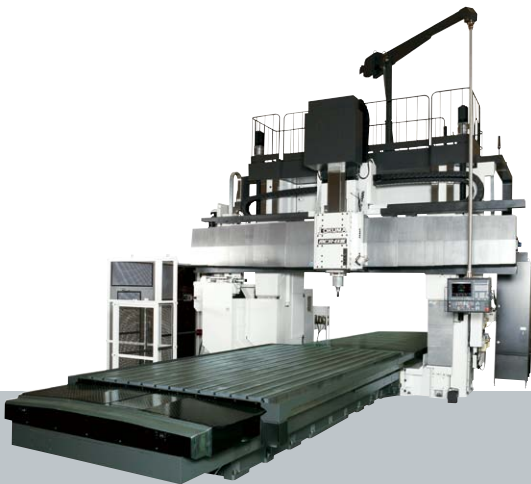


Complete machining with universal heads capable of handling large, complex shapes— multi-sided, angled, and curved surfaces

- Improved machining accuracy through one-chucking
- Improved cutting conditions through use of optimal, non-interfering tools
- Reduced setup change time and costs



5-Axis Machining Center
MILLAC 853PF-5X



Double-Column Machining Center
MCR-BIII
[For 5-Sided Applications]

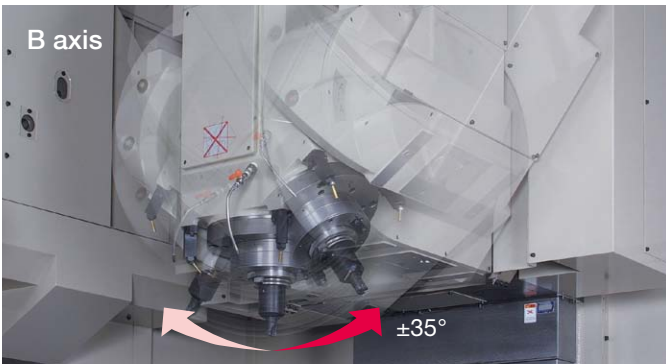
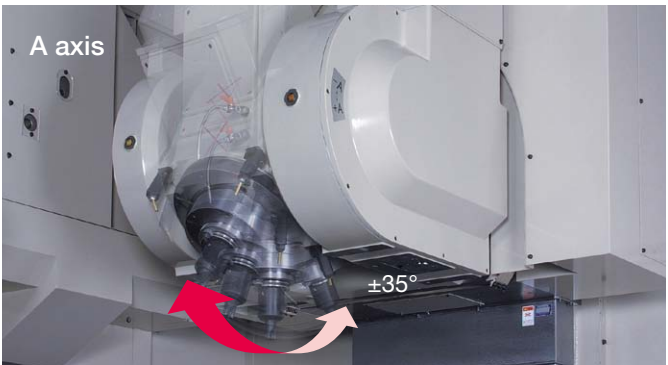
Combines high quality machining with shorter lead times
MILLAC 853PF-5X

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 (10 min/cont)
- Spindle tilt: A axis (spindle forward and back swing) ±35°
B axis (spindle left and right swing) ±35°
- Rapid feedrate: X-Y axis 30,000 mm/min
Z axis 24,000 mm/min

Machine specifications

Type	5-axis control machining center	
Model	MILLAC 853PF-5X	
Table dimensions	mm	3,200 × 850
Max load capacity	kg	3,000
Travel (X × Y × Z)	mm	3,050 × 850 × 700



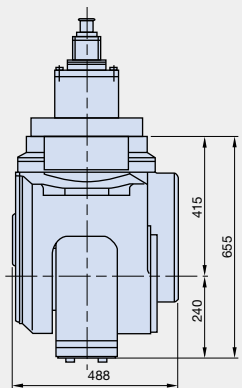
The best machine for powerful cutting of large parts with complex shapes

MCR-BIII

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

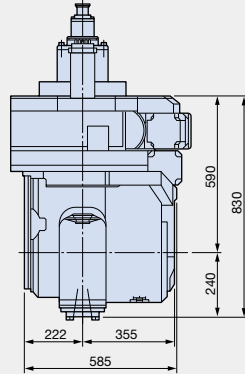
For high quality, high efficiency machining of multi-sided, angled, and curved surfaces

■ Universal index head (B-/C-axis)
2,000 min⁻¹, 10 kW
6,000 min⁻¹, 7.5 kW

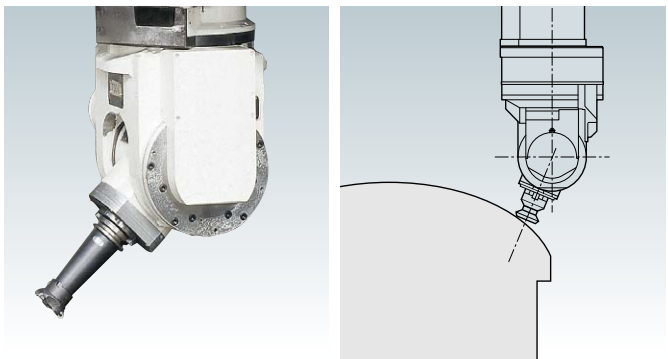


Note: With B-axis 1°, C-axis 1°, 2,000 min⁻¹ dimensions

■ NC-BC Universal head
10,000 min⁻¹, 15 kW
20,000 min⁻¹, 15 kW
6,000 min⁻¹, 26/22 kW



Note: Machine spindle 8,000 min⁻¹ specification required
With 6,000 min⁻¹ dimension



Machine specifications

Type	Double-Column Machining Center	
Model	MCR-BIII	
Table dimensions	mm	1,500 × 2,800 to 3,000 × 11,800
Travel (X × Y × Z)	mm	3,000 to 12,000 × 2,700 to 4,200 × 800
Spindle speed	min ⁻¹	4,000
Spindle motor	kW	VAC 30/22 (30 min/cont)

Innovation of 5-axis machining volumetric accuracy – Okuma original technologies



Geometric error gauging and compensation

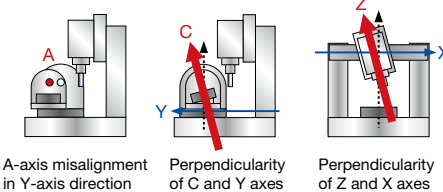
okuma.co.jp/english/onlyone/fivetuning/

5-Axis Auto Tuning System

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.”
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.

[Geometric errors]*



* Rotary axis misalignments and eight other errors, 11 types of geometric error all together can be automatically tuned.
The figure shows an example with a 5-axis vertical machining center.

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



* Measurement time when tuning for 11 types of geometric error in “Full” mode with MU-V series machines.
Measurement time changes depending on the machine type and measurement mode.
In “Simple” mode, tuning for 4 types of geometric error takes about 5 minutes.

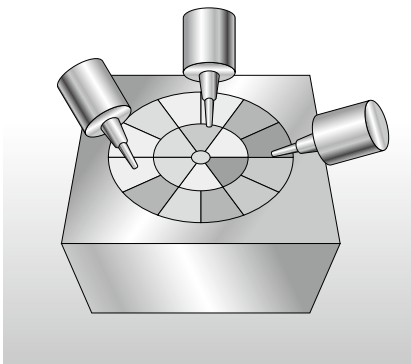
A higher level of 5-axis machining accuracy

Without 5-axis Auto Tuning
Adjustment carried out manually
(Actual values with MU-6300V)
Machining surface error **Maximum 12 μm**
(MULTUS U4000)
Machining surface error **Maximum 25 μm**



After 5-axis Auto Tuning
(Actual values with MU-6300V)
Maximum 3 μm
(Actual values with MULTUS U4000)
Maximum 10 μm

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 difference of 0 for most surfaces.



Note: The data mentioned in this brochure are “actual data” and do not represent guaranteed accuracies.



Manageable Deformation—Accurately Controlled

okuma.co.jp/english/onlyone/thermo/

Thermo-Friendly Concept

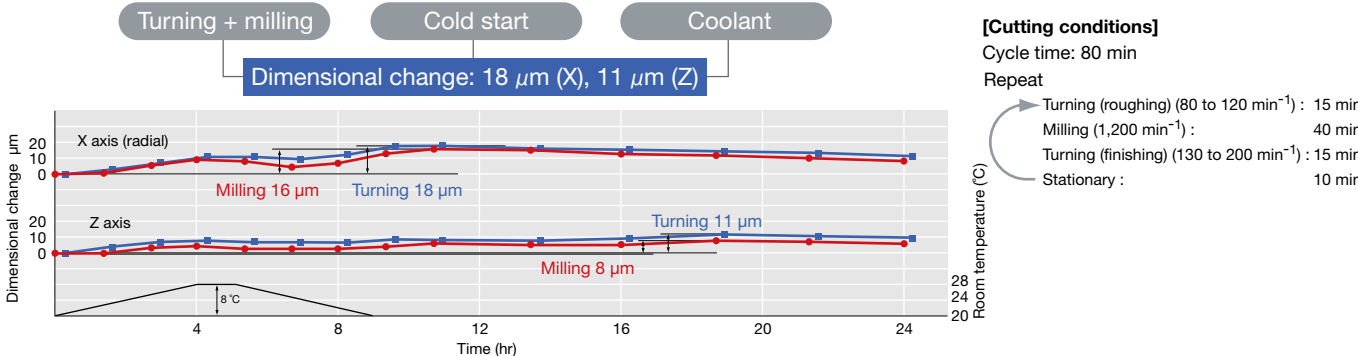
For superb accuracies in “normal” manufacturing environments The unique approach of “accepting temperature changes”

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 multitasking data for turning and milling with room temperature change of 8°C (Actual values withVTM-1200YB)



Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

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, temperature 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.

Next-generation energy-saving

ECO suite

okuma.co.jp/english/ecosuite/

A suite for energy savings that can be achieved on machine tools

Accuracy ensured, cooler off ECO Idling Stop

Intelligent energy-saving function with the Thermo-Friendly Concept.
The machine itself determines whether or not cooling is needed and cooler idling is stopped with no loss to accuracy.
(Standard application on machines with Thermo-Active Stabilizer—Spindle)

On-the-spot check of energy savings ECO Power Monitor

Power is shown individually for spindle, feed axes, and auxiliaries on the OSP operation screen. The energy-saving benefits from auxiliary equipment stopped with ECO Idling Stop can be confirmed on the spot.

Wasteful holding pressure pump rotation cut to the minimum ECO Hydraulics

Precise control achieved with super-slow rotation by combining the servo control technology used on machine tools and highly efficient hydraulic pumps.
Pump rotation is optimized to match operation status.

Peripheral equipment operates only at the necessary time and in the necessary amount

ECO Operation

Chip conveyors, mist collectors, and other devices automatically stop when machining is done.

Navigate easily to the best cutting conditions



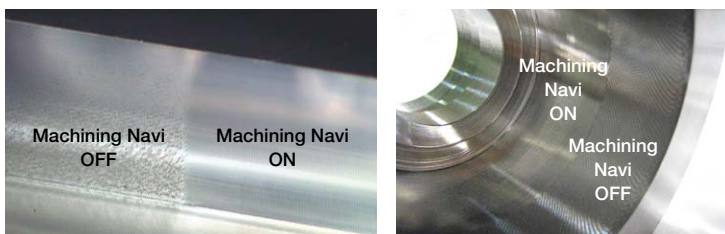
Cutting conditions search

okuma.co.jp/english/onlyone/proless/

Machining Navi

Maximizing machine tool performance

Machining Navi searches instantly for the best cutting conditions to achieve high efficiency machining. This revolutionary tool makes it easy for anyone to draw out the maximum performance of machine and tools by “visualization” of the machining status.



Four Machining Navis for easy navigation by the customer

For milling

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

Machining Navi M-i (Spindle speed optimization)
(Harmonic control)

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

For turning

Chatter-free applications for lathes

Machining Navi L-g (Harmonic control of spindle speed)

Turning chatter is suppressed by changing spindle speeds to the ideal amplitude and wave cycle.

For milling

Adjust cutting conditions while monitoring the data

Machining Navi M-gII (Spindle speed optimization)
Machining Navi M-gII+ (Spindle speed optimization)
(Harmonic control)

Machining Navi M-gII displays suggestions for the best spindle speed from chatter noise picked up by the microphone. The effect can be quickly checked by selecting one of the suggested spindle speeds with a single touch. M-gII+, which is available for machines with integral motor/spindles, controls chatter by changing the spindle speed during machining at low speeds.

Cutting condition

Threading chatter can be easily controlled by anyone

Machining Navi T-g threading

In the threading cycle, chatter during threading is controlled through appropriate change of the spindle speed in each path.

Preventing machine stoppages from machine collisions



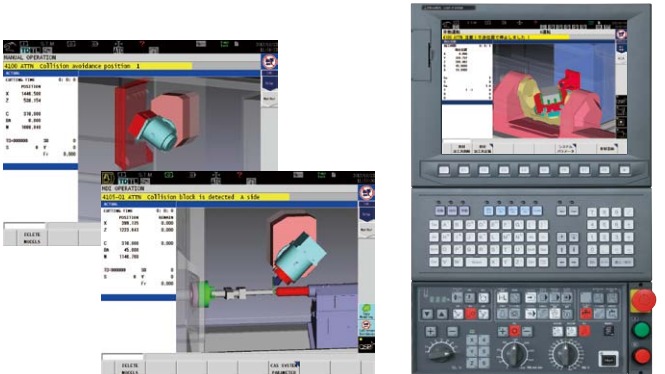
Collision prevention

okuma.co.jp/english/onlyone/anti/

Collision Avoidance System

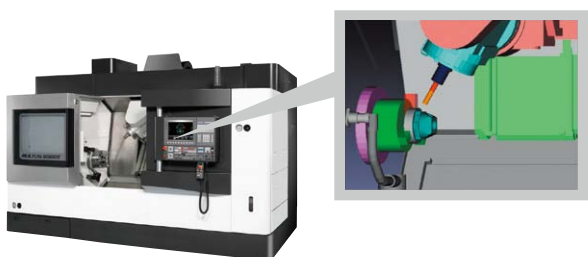
Allowing operators to focus on making parts

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 making 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.



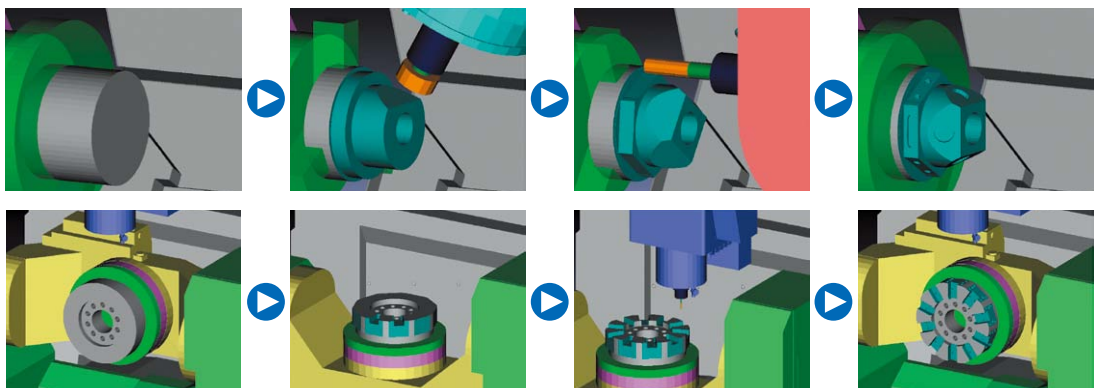
Interference check precedes actual movement



Stop before collision

Realistic simulation of workpiece cutting

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



High accuracy, stable machining maintained for long periods



Optimized Servo Control

okuma.co.jp/english/onlyone/servo-navi/

SERVONAVI

Achieves long term accuracy and surface quality

The best setting can be found automatically

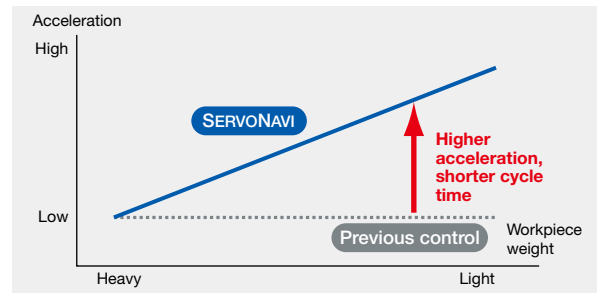
SERVONAVI AI (Automatic Identification)

Exclusive feature for machining centers

Cycle time shortened with faster acceleration

Work Weight Auto Setting

On table travel type machining centers, the table feed acceleration with the previous system was the same regardless of weight, such as workpieces and fixtures loaded on the table. Work Weight Auto Setting estimates the weight of the workpiece and fixture on the table and automatically sets servo parameters, including acceleration, to the optimum values. Cycle times are shortened with no changes to machining accuracy.



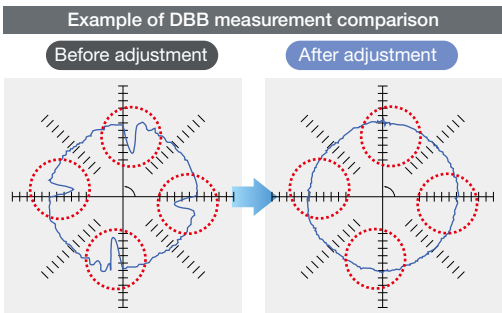
Function for longer use of the machine

SERVONAVI SF (Surface Fine-tuning)

Maintains machining accuracy and surface quality

Reversal Spike Auto Adjustment

Slide resistance changes with length of time machine tools are utilized, and discrepancies occur with the servo parameters that were the best when the machine was first installed. This may produce crease marks at motion reversals and affect machining accuracy (part surface quality). SERVONAVI's Reversal Spike Auto Adjustment maintains machining accuracy by switching servo parameters to the optimum values matched to changes in slide resistance.

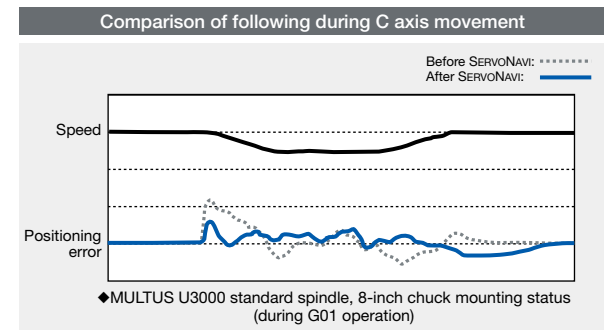


Exclusive feature for turning centers

For higher accuracies and more stable movements

Automatic inertia setting

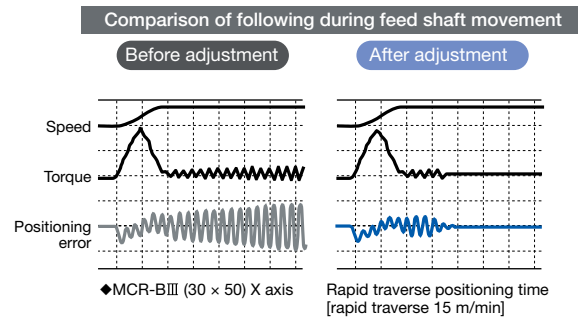
Inertia changes when the chuck and workpiece are changed, which previously led to large accompanying positioning error on the C axis. With the SERVONAVI automatic setting, chuck and workpiece inertia are estimated from acceleration torque and the best Servo parameters are automatically set so that high accuracy and stable movement can be maintained.



Contributes to longer machine life

Vibration Auto Adjustment

When aging changes machine performance, noise, vibration, crease marks, or fish scales may appear. Vibration Auto Adjustment can quickly eliminate noise and vibration even from machines with years of operation. The ball screw replacement cycle can also be made longer, contributing to extended machine life.



Dramatic tool cost reductions in machining of difficult-to-cut material

New machining solutions for titanium alloys and difficult-to-cut materials

okuma.co.jp/english/synchro/

Dynamic Tool Load Control

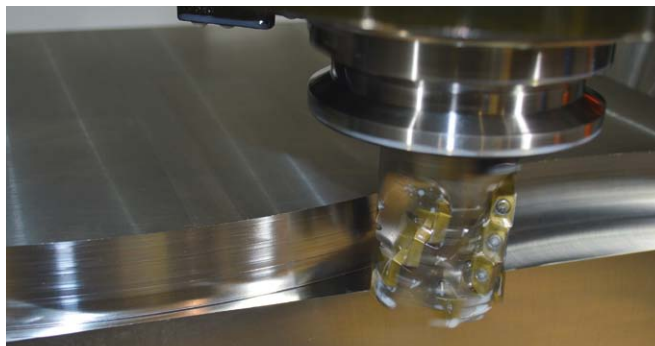
Inhibits chipping of insert tipped tools and gives stable machining and longer tool life with difficult-to-cut materials.

When machining difficult-to-cut material, chipping from blade runout often occurs with insert-tipped end mills. Because of this, solid end mills with high tool costs are sometimes used to stabilize acceleration. To stabilize such machining, solid end mills with high tool costs have generally been used.

Dynamic Tool Load Control gives uniform cutting force with advanced synchronization of spindle phase and feed rate to control end mill chipping. This improves tool life and stabilizes machining. Switching from expensive solid tools also leads to reduced tool costs.



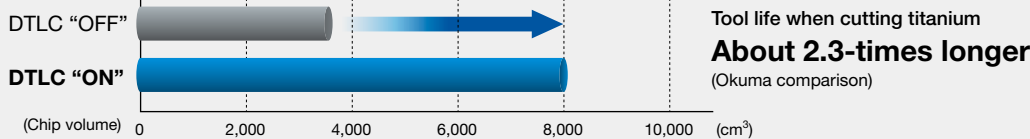
Onboard auto tool runout gauge



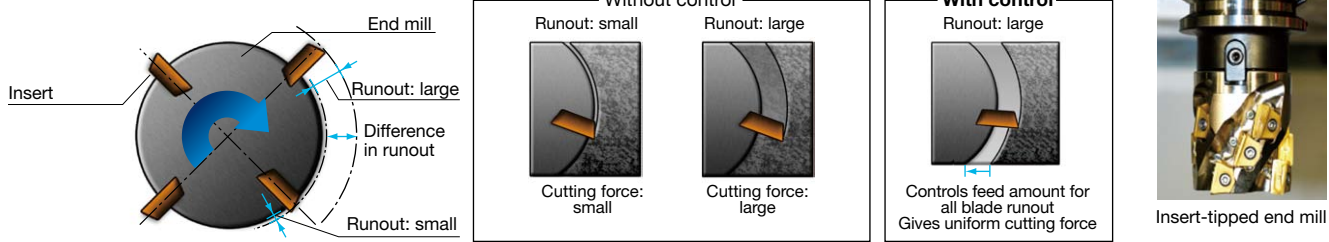
Machining of difficult-to-cut material with insert-tipped tools

Photographed tool made by SECO

[Actual data] Chip volume per tool under the same cutting conditions (tool life)



(Runout of insert-tipped end mill)



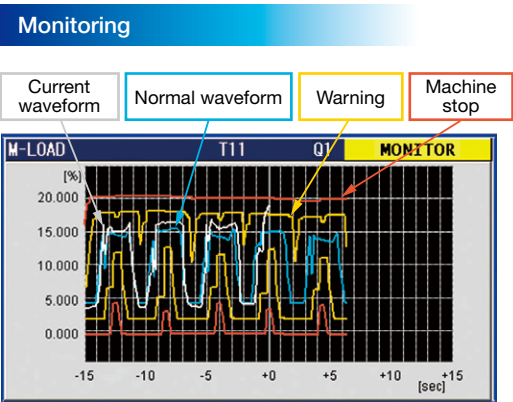
Note: The above are actual examples. Your results may vary due to differences in specifications, tooling and cutting conditions.

Power demonstrated with digitization of know-how

Monitoring of machining and assurance of traceability

Cutting Status Monitor and Machine Status Logger

Further enhancing quality and reliability through monitoring, recording, and analysis of machining

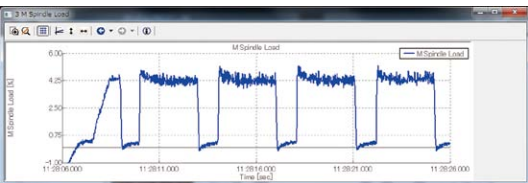


Cutting Status Monitor

- This detects abnormalities in machining and executes an automatic stop, reducing loss and also protecting the machinery and tools.

With data during normal machining used as a reference, deviation from the reference due to a tool abnormality or the like results in a machine stop (alarm stop, slide hold, and retraction are possible). This prevents occurrence of defective pieces as well as preventing damage to the machine or tool.

Recording

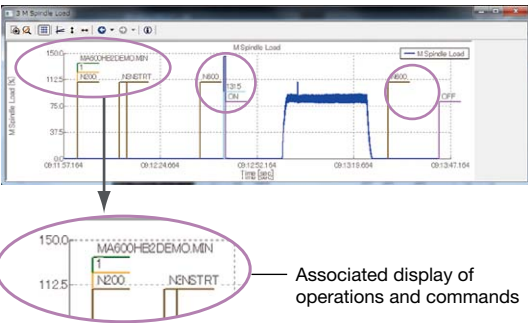


Machine Status Logger

- Recording machine data such as spindle load and override operation for use in traceability and investigation of causes when an abnormality occurs.

MSL records the correlation between **trace data** (spindle and feed load, external sensors) and **event data** (part programs, machine operation information, etc). This makes it easy to use track CNC data with better traceability and analysis.

Analysis



Log Data Viewer

- Used to visualize recorded data for comparison and analysis, cause investigation, process improvement, and digitization of expertise.

Recorded data is displayed on a computer screen. Analysis involving list creation, visualization, and the like is supported. Spindle and feed-axis load data as well as their operation and commands and the timing of program selection and tool changes is displayed in an associated fashion. (This function is a program for Windows®-based computers. The computer is to be supplied by the customer.)

Windows is a registered trademark of Microsoft Corporation of the U.S.A.

Solutions for aircraft parts machining provided globally

Aerospace Center of Excellence



Okuma Global CS Center (Japan)

ASIA



Okuma America (North Carolina, USA)

USA



Okuma Technical Centre Paris (France)

EUROPE

***Monozukuri* support for the aerospace and other industries extending across three key regions—Asia, America, and Europe.**

The Aerospace Center of Excellence has the best machines, the best applications, and the best staff to respond to customer needs for the machining of complex-shaped parts and difficult-to-cut materials. We provide aircraft solutions globally in the three key regions of Asia, America, and Europe.

From test cuts to a wide range of provided information, experience advanced applications with the best machines

At the Aerospace Center of Excellence in Asia (Japan), see the latest solutions born of Okuma's M-E-I-K (Mechanics - Electronics - IT - Knowledge) technology together with test cuts for all kinds of machining problems. Centers of Excellence are places and organizations for advanced research and development, creating novel innovations in the three key world regions of Asia, America, and Europe.



When using Okuma products, always read the safety precautions mentioned in the instruction manual and attached to the product.

● The specifications, illustrations, and descriptions in this brochure vary in different markets and are subject to change without notice.
Pub No. Aerospace Solutions-E-(4a)-500 (Nov 2016)



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