Double Column Machining Centers

The Spirit of Okuma
In 1964 Okuma introduced the first double-column machining center. In the almost 50 years since then, we have shipped over 8,000 units into a wide range of industrial markets. We have earned the trust of manufacturers and built a solid reputation of quality, reliability and service.

Okuma’s “total responsibility approach” combines electrical, mechanical and control technology, high product quality, machining know-how and ease-of-use. This provides high-rigidity, high accuracy and a product line that our customers can count on.

Okuma stays ahead of other machine tool manufacturers with a consistent approach to the art of manufacturing, employing “Only One” technologies to produce a full line of double-column machining centers for nearly any large part application.

Testament to trust

Expand your expectations
Okuma double column machining. A really big idea whose time has come.
Okuma double column machining centers provide the stability and power required to deliver supersized precision. That's why detail-oriented industries such as aerospace, electronics, and automotive rely on Okuma to generate accurately machined parts, time and again.

Big Time Production

High-rigidity, high-output

High-performance, high-accuracy

Superior cost performance, multifunctional

Space-saving, superior-cost performance

Linear motor drive, high-speed

Space-saving, high-speed vertical

Quill-type vertical

Photos in this brochure may include optional equipment.
Our history of technology development and delivery performance tell the story of quality and reliability.

Since first introducing Okuma double column machining centers in 1964, we have shipped more than 8,000 units. Today, Okuma boasts a 50%* share of the double-column machining center market.

In the die/mold machining market, our share exceeds 60%*. We will continue to respond to the confidence shown by customers with double-column machining centers that help them achieve their ideal form of machining.

* Orders received by Japan Machine Tool Builders’ Association members.

Four keys to the art of manufacturing

Okuma’s approach to the art of manufacturing is to provide customers with high quality, high accuracy products that cannot be matched by others. This is where we earn customers’ trust, and it is the reason we have the support of so many.

1. Total responsibility
   Okuma builds the complete package—from machines to controls, motors, and encoders.

2. Designed for optimum rigidity and higher machining accuracy

3. Quality engineered production processes

4. Okuma’s “Only One” technology
   Providing the highest machining accuracy and productivity to customers.
Solid performance achieved by advanced structural designs

Square column double-column construction

Double-column construction with square columns maintains good rigidity with respect to vertical loads, horizontal loads, and torsion for heavy-duty cutting with high accuracy.

Elevating crossrail guideway

The elevating crossrail has sufficient length and a structure for accuracy and long life with no “snaking” movement.

Crossrail clamp

Powerful clamping device in which the lever principle is applied to the crossrail clamp.

Spindlehead (ram saddle) guideway

The spindlehead guide has a wide, highly rigid rectangular cross section, and is supported by a deadweight balancer via rollers on the crossrail. This gives high speed, high accuracy movements and high quality machined surfaces.

Roller guide system for table guide

The weight of the table and workpiece is supported with roller bearings on hardened and ground surfaces. Movement is not affected by weight changes from heavy workpiece loads, enabling light, smooth movements and accurate positioning. Layout includes the drive system (ball screw) in the table center with a narrow width between the center guides, to achieve outstanding linear motion straightness and long-term stability.
Automation for highly productive and flexible performance

**Full array of heads**

All types of cutting in all types of shapes can be machined by changing the wide array of heads.

Many different processes can be performed in auto operation with the auto tool changer (ATC) and auto head changer (AAC).

**Smaller and faster AAC**

Completely automate machining of multiple sides with a variety of heads that mount automatically and accept ATC.

**Fast NC-ATC**

One arm performs the changes for both the horizontal and vertical spindles. The next tool to be used, regardless of the spindle location, is brought to the standby position during cutting. This simultaneous operation greatly reduces tool-to-tool time.

Various applications for higher productivity and comfortable operation

**These and other options available**

- Collection conveyor
- Side-shuttle 2-pallet APC
- Table-side conveyor
- 100-tool ATC magazine

**Examples of chip conveyor placement**

- Full-length gutter system + chip pan
- Hinged full-length chip conveyors + collection conveyor
- Hinged half-length chip conveyors + chip bucket

**Common collection conveyors**

<table>
<thead>
<tr>
<th>Type</th>
<th>Hinge</th>
<th>Scraper</th>
<th>Magnet scraper</th>
<th>Hinge + scraper (with drum filter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td></td>
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</tr>
</tbody>
</table>

* Conveyor flow direction (rear), off-machine conveyor flow direction (operator or magazine side), chip coolant tank position, and other factors can be considered to meet space requirements.

*1. See separate product brochures for detailed descriptions and specifications.
From theory to effective machine applications
Okuma’s Intelligent Technology

Thermo-Friendly Concept

- Integrated machine design and control technology
  The Thermo-Friendly Concept plays a principal role in our machine design. With simple machine designs and construction that equalize ambient temperatures, deformation is predictable, and complex torsion or tilting is controlled.
  Moreover, highly accurate compensation technology (Okuma control [OSP] award winning innovation) effectively responds to deformation caused by changes in room temperature, frequent spindle speed changes, and non-coolant cutting.

Thermo-Friendly Concept

- Thermo Active Stabilizer—Spindle (TAS-S)
  Thermal deformation from spindle rotation controlled with high accuracy.
- Thermo Active Stabilizer—Table (TAS-T)
  Control of deformation from thermal expansion of table.

Thermo-Friendly Premium Specs

- Thermo Active Stabilizer—Spindle (TAS-S)
- Thermo Active Stabilizer—Construction for large machines (TAS-C)
  The machine is optimally controlled to maintain machining accuracies even when ambient temperatures change.

Thermo-Friendly Premium Specs

- "Manageable" thermal deformation construction (controlled vertical thermal growth without tilting)
- Thermo Active Stabilizer—Table (TAS-T)

Collision Avoidance System

- Allowing operators to focus on making parts NC controller (OSP) with 3D model data of machine components — workpiece, tool, fixture, head — 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.

Machining Navi M-g

- Maximizing machine tool performance
  Based on the chatter noise captured by the microphone, Machining Navi displays a number of optimal spindle speed possibilities on the screen. The operator can change to the indicated spindle speed with a single touch and immediately confirm the result.

Eco-Friendly Technology

- Energy-saving function
  Energy-saving technology
  Machines and technology to achieve eco-friendly "monozukuri"

environmental economic benefits of Okuma’s Thermo-Friendly Concept

In environments with normal temperature changes, machining accuracies equivalent to those in temperature-controlled rooms are achieved. As long as the operator is comfortable, there is no need for air conditioning to ensure accuracy.

- Amount of energy consumed for temperature-controlled room
  Savings of approximately 43,400 kWh (1)
  Prevents CO₂ emissions equivalent to about 24,300 beech trees per year

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Okuma’s CNC OSP-P300M

Satisfaction from complete control of a machine tool

As a “machine & control” builder, Okuma makes further strides in machine tool manufacturing with this superb, control featuring “Easy Operation”. Okuma took a close look at the way machinists actually operate machine tools, to help them create smoother and more effective ways of producing parts. Novice operators as well as professional machinists get complete control—and satisfaction. Moreover, what you want to see and do conveniently come together in a “single-mode operation”. First, select one of three operation screens. Then simply touch the screen or press a function key to see and do your job.

Easy tool registration

With spreadsheet simplicity—tool offsets, tilt, shape, life, etc.—all the tool data required to cut a part can be registered here. Since the registered tool data is also used by Okuma auto-programming (Advanced One-Touch IGF) and a collision check function (Collision Avoidance System), this screen will complete the entire registering process.

The touch sensor screen pops up from the tool registration screen. Tool compensation values are set while looking at a guidance message.

Technology that combines machine and control to give high-speed, high-accuracy machining

The Okuma OSP Control is essentially the “mechatronic” solution for tough machine shop requirements.

Fast contouring Super-NURBS

With the latest development (Sculptured Surface Adaptive Acceleration Control), a variety of free forms can be machined to high accuracy and quality by this fast CNC function.

Parameter F1 digit

When it is difficult to program feedrates for die-making and you need different feedrates for specific cutting patterns, you can simply program using feedrate numbers. Choose either the rotary switch or the keyboard type F1 parameters.

With PFC II

Lost motion and backlash from axis reverse movements occur at various speed levels. PCF II dynamically flattens out spikes when circular quadrants switch. Previously, bending was a problem in high-speed machining. Compensation for bending produced during acceleration and deceleration can make a big difference in high-speed machining.

Position

Feed axis bending compensation

Bending is caused by expansion/contraction and torsion of the drive system. Unevenness from reciprocating movement can be minimized by compensating for bending produced during acceleration and deceleration. This is particularly effective in die/mold machining.

Parameter F1 digit

3-D tool compensation

Set 3-dimensional tool offsets by commanding the I, J, and K offset directions with the coordinates.

Mid-block restart

Resume cutting either from the beginning or midway into a desired block.
Okuma’s lineup of double-column machining centers

**Double-column machining center [5-sided applications]**

A high power machine for 5-sided applications for machining of large parts that demand high accuracies.

High output, powerful double-column machining center that increases productivity in high accuracy machining of 5-sided, large parts for heavy industry.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max axis travels (X-Y-Z)</th>
<th>Spindle motor output</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCR-C</td>
<td>12,200 x 4,200 x 1,050</td>
<td>45 kW</td>
</tr>
<tr>
<td>MCR-BIII</td>
<td>12,000 x 4,200 x 800</td>
<td>30 kW</td>
</tr>
<tr>
<td>MCR-A</td>
<td>8,000 x 3,500 x 650</td>
<td>26 kW</td>
</tr>
<tr>
<td>MCR-ASCII</td>
<td>12,200 x 4,100 x 800</td>
<td>26 kW</td>
</tr>
<tr>
<td>MCR-H</td>
<td>5,000 x 3,700 x 800</td>
<td>26 kW</td>
</tr>
<tr>
<td>MCR-AF</td>
<td>2,600 x 2,000 x 800</td>
<td>26 kW</td>
</tr>
<tr>
<td>MCU-AIII</td>
<td>5,000 x 2,000 x 450</td>
<td>22 kW</td>
</tr>
</tbody>
</table>

With head changers (5-sided applications)

High function, high accuracy

High rigidity, high output

Cost performance, multifunction

Space-saving, cost performance

Linear motor drive, high speed

Space-saving, high speed

Quill type
Double-column machining center [5-sided applications]  

**MCR-BIII**

This large high-tech machine features a powerful square-ram spindle with a wide selection of heads available for fully automatic 5-sided applications.

Offering top-class operations in heavy-duty cutting of large components as well as state-of-the-art quality for die/mold applications.

Table:
- Table length: 2,800 to 11,800
- Table width: 1,500 to 3,000
- Ram vertical: 800
- Elevating crossrail: 700 to 1,300
- Distance from table to spindle nose: 1,350 to 1,850

Double-column machining center [5-sided applications]  

**MCR-A**

Machine for 5-sided applications with true multi-functionality and cost performance that combines high functionality and economy.

High value-added production of general machine parts in many different kinds of machining with a wide array of heads.

Table:
- Table length: 3,000 to 7,800
- Table width: 1,500 to 2,500
- Ram vertical: 650
- Elevating crossrail: 700 to 1,300
- Distance from table to spindle nose: 1,350 to 1,950
Double-column machining center [5-sided applications]

**MCR-A5CII**

Agile and highly efficient with 2-station AAC
A compact machine for cost-effective 5-sided applications

Can also be extended to a 4-station AAC model, still compact, with quicker load/unload times for more productive machining of general machine components.

Double-column machining center [5-sided applications]

**MCR-H**

High speed, high accuracy 5-sided machining applications with linear motor take performance to the next dimension

Breaking through to a new machining dimension with high speed cutting feed using Okuma-developed linear motors on the X and Y axes, and outstanding thermal stability.
Double-column machining center

**MCR-AF**

**Fixed crossrail and 800 mm Z axis travel**

Space-saving, high speed double-column machining center

High-speed, high-accuracy machining of medium-sized and large dies/molds and parts

High-speed spindle and long Z-axis travel also handles shapes with large height changes

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**MCV-AII**

**Quill-type double-column machining center with light, comfortable operability**

The best machine for highly efficient machining of medium size general machine parts

Streamlines production from powerful heavy-duty cutting to high speed finishing

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**Table lengths**

- 1,800 to 5,000

**Table width**

- 1,200, 1,500

**Ram vertical**

- 450

**Elevating crossrail**

- 1,000, 1,150

**Distance from table to spindle nose**

- 1,360 to 1,510

**Table lengths**

- 1,500, 2,000

**Table width**

- 2,000

**Ram vertical**

- 800

**Distance from table to spindle nose**

- 300 to 1,100
### MACHINE SPECIFICATIONS

#### Tool selection
- Max tool weight
- Max tool diameter
- Tool magazine capacity
- Max tool diameter
- Max tool length
- Max tool weight
- Tool selection

#### Cutting feedrate
- mm/min

#### Table
- Working surface
- Height from the floor
- Table travel (X-axis)
- Table travel (Y-axis)
- Table travel (Z-axis)

#### Feeds_trates
- Rapid traverse
- Cutting feedrate
- W-axis (crossrail vertical)

#### Tool Shank
- Tool shank (Fixed address)
- Tool magazine capacity (Fixed address)
- Tool selection

#### Optional:
- Nominal sizes:
  - Fixed crossrail
  - Elevating crossrail

#### Dimensions
<table>
<thead>
<tr>
<th>Machine</th>
<th>MCR-C</th>
<th>MCR-B</th>
<th>MCR-A</th>
<th>MCR-ASC</th>
<th>MCR-H</th>
<th>MCR-AF</th>
<th>MCR-A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel</td>
<td>4,200 to 12,200</td>
<td>3,200 to 12,200</td>
<td>3,200 to 8,000</td>
<td>3,200 to 12,200</td>
<td>4,000</td>
<td>5,000</td>
<td>2,600</td>
</tr>
<tr>
<td>X-axis travel (spindle horizontal)</td>
<td>3,200 to 4,200</td>
<td>2,700 to 4,200</td>
<td>2,500 to 3,500</td>
<td>2,600 to 4,100</td>
<td>3,000</td>
<td>3,700</td>
<td>1,500</td>
</tr>
<tr>
<td>Z-axis travel (front vertical)</td>
<td>1,050 [1,250]</td>
<td>800 [1,000]</td>
<td>850 to 950</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>450 (full vertical)</td>
</tr>
<tr>
<td>W-axis travel (crossrail vertical)</td>
<td>1,200 to 1,200</td>
<td>700 to 1,300</td>
<td>700 to 1,300</td>
<td>800 to 1,200</td>
<td>1,000</td>
<td>1,300</td>
<td>–</td>
</tr>
<tr>
<td>Effective width between columns</td>
<td>2,650 to 3,650</td>
<td>2,050 to 3,550</td>
<td>2,050 to 3,050</td>
<td>2,150 to 3,650</td>
<td>2,550</td>
<td>3,050</td>
<td>2,600</td>
</tr>
<tr>
<td>Table to spindle nose (max)</td>
<td>1,850 to 1,850</td>
<td>1,350 to 1,850</td>
<td>1,350 to 1,950</td>
<td>1,450 to 1,850</td>
<td>1,550</td>
<td>1,750</td>
<td>1,150</td>
</tr>
<tr>
<td>Height from the floor</td>
<td>850 to 950</td>
<td>850 to 950</td>
<td>850 to 950</td>
<td>850 to 950</td>
<td>1,020, 1,070</td>
<td>850</td>
<td>750 to 800</td>
</tr>
<tr>
<td>Table travel (X-axis)</td>
<td>120</td>
<td>100</td>
<td>80</td>
<td>65</td>
<td>50</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Table travel (Y-axis)</td>
<td>80</td>
<td>65</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Table travel (Z-axis)</td>
<td>60</td>
<td>50</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>15</td>
<td>–</td>
</tr>
</tbody>
</table>

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**Optional:**
### MACHINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Spindle</th>
<th>MCR-C</th>
<th>MCR-B`</th>
<th>MCR-A</th>
<th>MCR-ASC</th>
<th>MCR-H</th>
<th>MCR-AF</th>
<th>MCR-ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle speed</td>
<td>min⁻¹</td>
<td>4,000 [6,000]</td>
<td>4,000 [3,600, 6,000, 8,000, 10,000]</td>
<td>4,000 [6,000, 8,000, 10,000]</td>
<td>4,000 [6,000, 10,000]</td>
<td>8,000</td>
<td>8,000 [12,000, 15,000, 20,000, 25,000]</td>
</tr>
<tr>
<td>Taper bore</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
<td>7/24 Taper No. 50</td>
</tr>
<tr>
<td>Bearing diameter</td>
<td>mm</td>
<td>90 (ø85, ø130, ø160)</td>
<td>ø100 (ø85)</td>
<td>ø100 (ø85)</td>
<td>ø100 (ø85)</td>
<td>ø85</td>
<td>ø85 (ø100, ø120, ø160)</td>
</tr>
<tr>
<td>Motors</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spindle drive</td>
<td>kW</td>
<td>VAC 45/37 (30 min/cont)</td>
<td>[45/37 (30 min/cont)]</td>
<td>VAC 30/22 (30 min/cont)</td>
<td>VAC 30/22 (30 min/cont)</td>
<td>VAC 60/22 (30 min/cont)</td>
<td>VAC 60/22 (30 min/cont)</td>
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<tr>
<td></td>
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<td>50</td>
<td>100</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>60</td>
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<tr>
<td></td>
<td></td>
<td>22 kW (cont)</td>
<td>22 kW (cont)</td>
<td>22 kW (cont)</td>
<td>22 kW (cont)</td>
<td>22 kW (cont)</td>
<td>22 kW (cont)</td>
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<tr>
<td></td>
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<td>26 kW (30 min)</td>
<td>26 kW (30 min)</td>
<td>26 kW (30 min)</td>
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<td>26 kW (30 min)</td>
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<tr>
<td>Crossrail traverse</td>
<td>W: 4.6 x 2</td>
<td>W: 4.6 (5.2) x 2</td>
<td>W: 4.2</td>
<td>W: 4.6 x 2</td>
<td>W: 5.1 x 2</td>
<td>--</td>
<td>3.7 (AC)</td>
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<td></td>
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<tr>
<td>Power Requirements</td>
<td></td>
<td>KVA</td>
<td>60/50</td>
<td>60/50</td>
<td>60/50</td>
<td>55/50</td>
<td>55/50</td>
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<tr>
<td>Electrical power supply</td>
<td>kW</td>
<td>30/22 (10 min/cont)</td>
<td>30/22 (10 min/cont)</td>
<td>30/22 (10 min/cont)</td>
<td>30/22 (10 min/cont)</td>
<td>30/22 (10 min/cont)</td>
<td>30/22 (10 min/cont)</td>
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<tr>
<td>Spindle speed: 4,000 min⁻¹</td>
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<tr>
<td>Spindle torque/output diagrams</td>
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</tr>
</tbody>
</table>

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1. Asterisk (*) marked square brackets indicate with 250-mm extension head. 2. Deceleration near both ends of Y-axis travel *3. 30 x 50, 30 x 65, 35 x 50, 35 x 65 machine nominal sizes *4. 6, 6000 min⁻¹ specs *6. 4, 000 min⁻¹, high output specs *7. 6, 000 min⁻¹, high output specs *8. Standard specs *9. Elevating crossrail *10. Deceleration near both ends of Y-axis travel with 30 and 35 size machines *11. With 32-tool ATC there are limitations to ATC range with 25 and larger size machines *12. 6, 000, 8, 000, 10,000 min⁻¹ specs *13. 3, 6000 min⁻¹ specs *14. 8, 000, 10,000 min⁻¹ specs *15. 30 x 120 size machine *16. 35 x 120 size machine *17. 35 size machine *18. 35 size machine *19. 30 size machine *20. 30 x 50, 30 x 65 size machines

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**MACHINE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Spindle torque/output diagrams</th>
<th>MCR-C</th>
<th>MCR-B`</th>
<th>MCR-A</th>
<th>MCR-ASC</th>
<th>MCR-H</th>
<th>MCR-AF</th>
<th>MCR-ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle speed: 4,000 min⁻¹</td>
<td>Max output</td>
<td>VAC 45/37 kW (30 min/cont)</td>
<td>Max torque: 2,025/1,665 N-m (30 min/cont)</td>
<td>Max output: VAC 26/22 kW (30 min/cont)</td>
<td>Max torque: 735/622 N-m (30 min/cont)</td>
<td>Max output: VAC 26/22 kW (30 min/cont)</td>
<td>Max torque: 735/622 N-m (30 min/cont)</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Spindle torque/output diagrams</th>
<th>MCR-A</th>
<th>MCR-H</th>
<th>MCR-AF</th>
<th>MCR-ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle speed: 4,000 min⁻¹</td>
<td>Max output: VAC 26/22 kW (30 min/cont)</td>
<td>Max torque: 735/622 N-m (30 min/cont)</td>
<td>Max output: VAC 26/22 kW (30 min/cont)</td>
<td>Max torque: 735/622 N-m (30 min/cont)</td>
</tr>
</tbody>
</table>
When using Okuma products, always read the safety precautions mentioned in the instruction manual and attached to the product.

This product is subject to the Japanese government Foreign Exchange and Foreign Trade Control Act with regard to security controlled items; whereby Okuma Corporation should be notified prior to its shipment to another country.

Engine block photo at 1/32 scale.

Double Columns

The Framework of Superb Reliability