ROKU-ROKU
SINCE 1903
HISTORY OF ROKU-ROKU: A CENTURY OF PRECISION

Roku-Roku is one of the oldest manufacturer of machine tools in Japan. Starting in 1903, Roku-Roku has been designing, building and researching new machining fields for more than 100 years. This extensive experience has taught them that the most important factor in achieving superior results is the construction of the machine.

MC MACHINERY SYSTEMS: THE MITSUBISHI EXPERIENCE

As the importer and support network for the Roku-Roku line of high-speed vertical machining centers in North America, we know that providing the best solutions means much more than just providing the right equipment. We call it The Mitsubishi Experience. We have built a reputation as a world-class manufacturer and solution provider to the metalworking industry. We help our customers succeed by leveraging decades of know-how to keep them one step ahead of their competition.

Roku-Roku VMCs from MC Machinery are a perfect match for high-precision EDM shops looking for innovative ways to enhance efficiency, or as stand-alone centers when you need the ultimate in precision. We have extensive experience incorporating Roku-Roku VMCs into automated manufacturing cells to reduce labor costs and boost productivity to unprecedented levels.
CONTROL / SPINDLE

HIGH-SPEED FANUC CONTROL

- 20% faster processing speeds, 9.1 nanosecond/block
- 1,000-block look ahead for optimized performance
- NANO Smoothing and Interpolation for unmatched precision
- Nanometer Drive Resolution with 16-million count encoders
- Accuracy Compensation Suite includes: backlash, pitch error, inclination and straightness, thermal growth and 3D volumetric
- AI Contour Control II uses bell-shaped acc/dec and servo delays effectively eliminating trajectory errors in corners and small radii

Coupled with the Fanuc 31i-B5 controller, the Roku-Roku Super PC X optimizes velocity, acceleration and deceleration with a super high-speed processor and AI Contour Control II. High-speed processing, Nano Smoothing and 1,000-block look ahead minimize geometric errors during high-speed processing, providing a finish other machines simply can’t match. The Super PC X can be set to one of ten different modes from High-Precision to High-Speed – to meet any shop’s machining needs. The Roku-Roku line of equipment also features Fanuc’s Digital Intelligent Servo with five-place decimal input and high-resolution glass scale feedback. This combination results in unsurpassed speed and accuracy – even in complex, three-dimensional contours comprising short, consecutive line segments or arcs.

ROKU-ROKU DESIGNED INTEGRAL SPINDLES

Roku-Roku has become synonymous with success. Using the latest technology available, we give our machines a competitive edge few others can boast.

Roku-Roku does not use off-the-shelf spindles. Our proprietary designs offer ultra high-speed performance and incorporate the latest angular-contact bearing technology. These special long-life spindle designs use two large bearings at the top and two at the bottom of the integral motor. In “dry” models, these ceramic grease-packed bearings completely eliminate contamination of graphite work pieces and the machining area from dripping spindle oil. Our “wet” flood coolant models use an oil-mist lubricated system. Dynamic, real-time Z-axis thermal compensation on all our spindles eliminates thermal growth and ensures Z-depth accuracy.

Roku-Roku’s vertical machining centers are hand crafted and built solidly to jig-borer standards. The company still hand scrapes mating surfaces to eliminate vibration and by using computer Fine Element Design (FEA), creates its machine bases with a three point leveling system for maximum rigidity. Roku-Roku VMCs combine state-of-the-art spindle technology, smooth-action roller-pack type linear guides and the latest in high speed Fanuc control with linear glass scales. The result? A smoother finish and higher accuracy parts than other VMCs can produce.

The oil mist cooled spindle machines use a dual-layer jacketed and oil cooled using an ultra-precision chiller system that holds 0.2 deg F operating range.

The grease packed spindle machines use a single jacket oil cooling systems with a ±1.0 deg F operating range.
Roku-Roku is a leader in developing technology that meets the needs of the marketplace. Several years ago, it became apparent that many shops did not want, or could not afford, to buy two high-end VMCs - one for graphite and another for hard milling. Roku-Roku created a new category of high-end VMCs by combining technology from their industry-leading graphite and steel-cutting VMCs. The result was the HC-Series - still the industry’s leading hybrid machines. These hybrid machining centers combine the ability to machine graphite, using grease packed high-speed spindles and cutting edge dust collection, with the ability to hard mill mold steels using a mist lubrication system, allowing highly versatile, high-precision machining.

EXPANDING APPLICATIONS
Just when you thought it was impossible to machine sharp, square, inside corners on a milling machine, Roku-Roku develops the Super J-Cut Broaching System. The system provides a square broaching tool keyed into the spindle nose and uses the movement of the Z-axis to broach square corners.

DUST PROTECTION AND COLLECTION
As a graphite machining center, great care was taken in consideration of providing the best in dust collection and prevention. The HC Series provides a full enclosure cover and dust preventive structure for ways, screws, and ATC as standard equipment. The high-performance Amano PIA-15M or PIA-30M Dust Collector is capable of changing the working area air six times per minute. The dust collection and protection during graphite machining both outside and inside of the machine, such as ball screw and LM guide rail for work table, are perfectly complete.

HIGHLY RIGID CAST STRUCTURES
Roku-Roku believes that a machine’s foundation is the key to high-accuracy fine-finish machining, so great effort is taken to design and build the one-piece column and cross beam which creates a bridge-style mono-block casting, providing extra-rigid support and a wide X-axis guide base. Horizontal placement of the saddle above the cross beam places the gravity point inside the cross beam, which minimizes any excess head movement.
**APPLICATION EXAMPLES**

**HC-658 II**

**Graphite Electrode Machining:**
- **Machine:** Roku-Roku HC-658 II
- **Material:** Carbon

<table>
<thead>
<tr>
<th>TOOL</th>
<th>DESCRIPTION</th>
<th>RPM</th>
<th>IPM</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (3/32” ball e.m.)</td>
<td>Roughs detail.</td>
<td>13,000</td>
<td>100</td>
<td>2 hr. 21 min.</td>
</tr>
<tr>
<td>T2 (1/16” ball e.m.)</td>
<td>Semi-finishes detail.</td>
<td>14,500</td>
<td>100</td>
<td>1 hr. 36 min.</td>
</tr>
<tr>
<td>T3 (3/64” ball e.m.)</td>
<td>Finishes detail.</td>
<td>14,500</td>
<td>100</td>
<td>1 hr. 02 min.</td>
</tr>
<tr>
<td>T4 (1/8” flat e.m.)</td>
<td>Profiles outside edge.</td>
<td>14,500</td>
<td>100</td>
<td>2 hr. 32 min.</td>
</tr>
</tbody>
</table>

Normal Mode: Original test / 100% feed rate over ride
High Speed Mode: Original feed rates / Part labeled as part 3 / 160% over ride
High Speed Mode: Feed rates @ 250PM / Part labeled as part 2 / 100% over ride

**Total Machine Time:** 10 hr. 11 min.

**Hard Milling 420 Stainless with Oil Mist Lubrication:**
- **Machine:** Roku-Roku HC-658 II
- **Material:** 420SS (52Rc)

<table>
<thead>
<tr>
<th>TOOL</th>
<th>DESCRIPTION</th>
<th>RPM</th>
<th>IPM</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (10mm bull nose e.m.)</td>
<td>2D roughs top and cavity Leaves .012 stock / .075 Z level</td>
<td>6,500</td>
<td>50</td>
<td>2 hr. 21 min.</td>
</tr>
<tr>
<td>T2 (8 mm ball e.m.)</td>
<td>3D roughs cavity leaves .008 stock / .008 step over</td>
<td>9,000</td>
<td>50</td>
<td>1 hr. 36 min.</td>
</tr>
<tr>
<td>T3 (5mm ball e.m.)</td>
<td>Semi-finishes cavity Leaves .015 stock / .005 step over</td>
<td>12,000</td>
<td>70</td>
<td>1 hr. 02 min.</td>
</tr>
<tr>
<td>T4 (3mm ball e.m.)</td>
<td>Semi-finishes cavity Leaves .015 stock / .005 step over</td>
<td>20,000</td>
<td>70</td>
<td>1 hr. 13 min.</td>
</tr>
<tr>
<td>T5 (5mm ball e.m.)</td>
<td>Finishes cavity .005 step over</td>
<td>24,000</td>
<td>70</td>
<td>2 hr. 32 min.</td>
</tr>
<tr>
<td>T6 (3mm ball e.m.)</td>
<td>Picks out stock remaining from 5mm ball / .0025 step over</td>
<td>30,000</td>
<td>60</td>
<td>0 hr. 46 min.</td>
</tr>
<tr>
<td>T7 (2mm ball e.m.)</td>
<td>Picks out stock remaining from 3mm ball / .0015 step over</td>
<td>32,000</td>
<td>50</td>
<td>0 hr. 41 min.</td>
</tr>
</tbody>
</table>

**Total Machine Time:** 10 hr. 11 min.

**Graphite Electrode Machining with Sharp Inside Corners:**
- **Machine:** HC-658 II
- **Material:** Graphite Hardness N/A

<table>
<thead>
<tr>
<th>Cutter Type</th>
<th>Description</th>
<th>RPM</th>
<th>IPM</th>
<th>Rad/step</th>
<th>Axial/Step</th>
<th>Stock/Left</th>
<th>Prog/Tol</th>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>6mm Bull/1mmR</td>
<td>Diamond Rough</td>
<td>12000</td>
<td>125</td>
<td>0.0250</td>
<td>0.0030</td>
<td>0.0010</td>
<td>Std</td>
<td>4m</td>
<td>43s</td>
</tr>
<tr>
<td>6mm Bull/1mmR</td>
<td>Diamond Finish walls</td>
<td>12000</td>
<td>125</td>
<td>0.0030</td>
<td>0.0030</td>
<td>0.0010</td>
<td>Std</td>
<td>7m</td>
<td></td>
</tr>
<tr>
<td>Broaching Tool</td>
<td>carbide</td>
<td>80</td>
<td>0.0200</td>
<td>x</td>
<td>0.0000</td>
<td>0.0002</td>
<td>Std</td>
<td>2m</td>
<td>8s</td>
</tr>
</tbody>
</table>

**Total Machine Time:** 13m 56s

**HC-548EX**

**Hard Milling 420 Stainless with Oil Mist Lubrication:**
- **Machine:** HC-548EX
- **Material:** 420SS Hardness 52Hrc

<table>
<thead>
<tr>
<th>Cutter Type</th>
<th>Description</th>
<th>RPM</th>
<th>IPM</th>
<th>Rad/step</th>
<th>Axial/Step</th>
<th>Stock/Left</th>
<th>Prog/Tol</th>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>6mm Ball TAN</td>
<td>Rough</td>
<td>6420</td>
<td>45</td>
<td>0.012</td>
<td>0.001</td>
<td>0.001</td>
<td>Std</td>
<td>22m</td>
<td></td>
</tr>
<tr>
<td>3mm Ball TAN</td>
<td>Rest Rough</td>
<td>12800</td>
<td>90</td>
<td>0.015</td>
<td>0.003</td>
<td>0.002</td>
<td>Std</td>
<td>4m</td>
<td></td>
</tr>
<tr>
<td>3mm Ball TAN</td>
<td>Finish</td>
<td>18000</td>
<td>51</td>
<td>0.002</td>
<td>0.002</td>
<td>0.0002</td>
<td>Std</td>
<td>53m</td>
<td></td>
</tr>
<tr>
<td>2 mm ball TAN</td>
<td>Fin Channel</td>
<td>27200</td>
<td>51</td>
<td>0.002</td>
<td>0.002</td>
<td>0.0001</td>
<td>Prec</td>
<td>10m</td>
<td></td>
</tr>
<tr>
<td>1mm Ball TAN</td>
<td>Fin Top</td>
<td>30000</td>
<td>67</td>
<td>0.002</td>
<td>0.002</td>
<td>0.0001</td>
<td>Prec</td>
<td>8m</td>
<td></td>
</tr>
</tbody>
</table>

**Total Machine Time:** 1 hr 37 m
## MODELS AND SPECIFICATIONS

### HC-435 II
**Machine Options**
- Upgrade to 40 Position Tool Changer
- Semi-Dry Cutting System (Oil Mist)
- Automatic Centering (Blum Infrared Probe)
- Automatic Centering (Renishaw Infrared Probe)
- Full 20mm (7.874") Column Riser (Max Spindle Height 17.7")
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- 4th and 5th Axis Unit Including Interface Transformer: Sized to your application

### HC-548EX
**Machine Options**
- Upgrade to 30 Position Tool Changer
- Semi-Dry Cutting System (Oil Mist)
- Automatic Centering (Blum Infrared Probe)
- Automatic Centering (Renishaw Infrared Probe)
- Rigid Tapping
- Super-J-Cut (Corner Broaching System)
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- 4th and 5th Axis Unit Including Interface Transformer: Sized to your application

### HC-658 II & HC-878 II
**Machine Options**
- Upgrade to 40,000 RPM 7.4HP Spindle
- Upgrade to 30,000 RPM 20HP Spindle
- Upgrade to 60 Position Tool Changer
- Flood Coolant System Package (Tank, Nozzle and Coolant Device, Removes Dust Collection System)
- Mist Collection for Flood Coolant System
- Left Hand CNC Control Version
- Semi-Dry Cutting System (Oil Mist)
- Super MAC II Part Probing w/ Renishaw OMP400
- Automatic Centering (Blum Infrared Probe)
- Automatic Centering (Renishaw Infrared Probe)
- Rigid Tapping
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- 4th and 5th Axis Unit Including Interface Transformer: Sized to your application
- HC-878 II Only:
  - Chip Conveyor
  - Bed Gutter Coolant Rinse

### Specification Table

<table>
<thead>
<tr>
<th>Model</th>
<th>HC-435 II</th>
<th>HC-548EX</th>
<th>HC-658 II</th>
<th>HC-878 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle Power</td>
<td>5HP</td>
<td>8.4HP</td>
<td>8.4HP</td>
<td>8.4HP</td>
</tr>
<tr>
<td>Spindle RPM Range</td>
<td>3,000-36,000</td>
<td>200-32,000</td>
<td>200-32,000</td>
<td>200-32,000</td>
</tr>
<tr>
<td>Spindle Tool Holder</td>
<td>HSK E25</td>
<td>HSK E40</td>
<td>HSK E40</td>
<td>HSK E40</td>
</tr>
<tr>
<td>Spindle Lubrication Type</td>
<td>Grease Packed</td>
<td>Grease Packed</td>
<td>Grease Packed</td>
<td>Grease Packed</td>
</tr>
<tr>
<td>Spindle Cooling</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
</tr>
<tr>
<td>Z-Axis Thermal Compensation</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
</tr>
<tr>
<td>Linear/Rotary Scales</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
</tr>
<tr>
<td>Table Size</td>
<td>23.6&quot; x 13.0&quot;</td>
<td>23.6&quot; x 14.1&quot;</td>
<td>29.5&quot; x 19.7&quot;</td>
<td>37.4&quot; x 29.5&quot;</td>
</tr>
<tr>
<td>Table Height From Floor</td>
<td>29.5&quot;</td>
<td>31.5&quot;</td>
<td>31.5&quot;</td>
<td>33.5&quot;</td>
</tr>
<tr>
<td>Max Workpiece Weight</td>
<td>220 lbs.</td>
<td>440 lbs.</td>
<td>440 lbs.</td>
<td>440 lbs.</td>
</tr>
<tr>
<td>X,Y-Axis Travel</td>
<td>16.1&quot; x 13.0&quot;</td>
<td>18.1&quot; x 14.1&quot;</td>
<td>23.6&quot; x 19.7&quot;</td>
<td>33.5&quot; x 29.5&quot;</td>
</tr>
<tr>
<td>Z-Axis Travel</td>
<td>7.8&quot;</td>
<td>10.2&quot;</td>
<td>15.7&quot;</td>
<td>16.0&quot;</td>
</tr>
<tr>
<td>Table to Spindle Nose Distance</td>
<td>7.0&quot; - 14.9&quot;</td>
<td>5.9&quot; - 16.1&quot;</td>
<td>7.8&quot; - 23.6&quot;</td>
<td>8.8&quot; - 24.6&quot;</td>
</tr>
<tr>
<td>Max Cutting Feed Rate</td>
<td>394&quot;/min</td>
<td>1,181&quot;/min HS mode</td>
<td>787&quot;/min HS mode</td>
<td>394&quot;/min HS mode</td>
</tr>
<tr>
<td>Rapid Feed Rate</td>
<td>560&quot;/min</td>
<td>1,181&quot;/min HS mode</td>
<td>787&quot;/min HS mode</td>
<td>787&quot;/min</td>
</tr>
<tr>
<td>Positioning Accuracy</td>
<td>+/- 0.000039&quot;</td>
<td>+/- 0.000098&quot;</td>
<td>+/- 0.000060&quot;</td>
<td>+/- 0.000120&quot;</td>
</tr>
<tr>
<td>Repeatability</td>
<td>+/- 0.000012&quot;</td>
<td>+/- 0.000039&quot;</td>
<td>+/- 0.000020&quot;</td>
<td>+/- 0.000039&quot;</td>
</tr>
<tr>
<td>ATC Tool Number</td>
<td>20</td>
<td>12</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Max Tool Diameter</td>
<td>0.25&quot;</td>
<td>2.36&quot; (3&quot;) non-adjacent</td>
<td>2.36&quot; (3&quot;) non-adjacent</td>
<td>2.36&quot; (3&quot;) non-adjacent</td>
</tr>
<tr>
<td>Max Tool Length</td>
<td>3.1&quot;</td>
<td>9.8&quot;</td>
<td>9.8&quot;</td>
<td>9.8&quot;</td>
</tr>
<tr>
<td>Max Tool Weight</td>
<td>6.6 lbs.</td>
<td>6.6 lbs.</td>
<td>6.6 lbs.</td>
<td>6.6 lbs.</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>5,500 lbs.</td>
<td>8,830 lbs.</td>
<td>12,100 lbs.</td>
<td>15,500 lbs.</td>
</tr>
<tr>
<td>Corner Broaching</td>
<td>NA</td>
<td>Optional</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Dust Collector</td>
<td>Amano PIE-15</td>
<td>Amano PIE-30</td>
<td>Amano PIE-30</td>
<td>Amano PIE-30</td>
</tr>
</tbody>
</table>
HC-435II
Unit: mm (inch)

Machine Height: 87.4”  Installation Footprint: 71.8” x 78.7” (Machine Unit Only)  Machine Weight: 5,500lb.
Power Requirement: 208V ±5%, 60Hz, 12.5kVA (depends on options)  Compressed Air Supply: 14.1CFM @ 72psi.

HC-548EX
Unit: mm (inch)

Machine Height: 98.4”  Installation Footprint: 106.3” x 116.5”  Machine Weight: 8,830lb.
Power Requirement: 208V ±5%, 60 Hz, 22kVA (depends on options)  Compressed Air Supply: 21.2CFM @ 72psi.

HC-658II
Unit: mm (inch)

Machine Height: 112.6”  Installation Footprint: 116.1” x 129.9”  Machine Weight: 12,100lb.
Power Requirement: 208V ±5%, 60 Hz, 22kVA (depends on options)  Compressed Air Supply: 21.2CFM @ 72psi.
**MEGA / CEGA**

**MICRO FINE MACHINING CENTERS**

Back in 1996, Roku-Roku was faced with a market challenge: design a machine to meet micro fine machining detail at very high speed. The development concept went to extremes in reaching its specified targets for machining with high precision, high speed, and small cutter diameters. It was in every way an intrepid challenge. After a great deal of market research and examination of current construction methods, Roku-Roku came up with a completely different strategy which resulted in the release of the MEGA prototype. Initially ridiculed as reckless at the time, the MEGA won praise from the market which started its evolutionary process of improving the machine’s dynamic balance, axis response and thermal stability bringing us to the 6th generation MEGA SSS design (now available in a 400 and 600 version with spindle speeds of 40,000 and 60,000 RPM respectively.)

When the need arose for a larger more powerful version of the MEGA, the CEGA was born and through the same process of evolution has now become the CEGA SSS-300 model using a higher horse power 30,000 RPM spindle, or the SSS-400 using a 40,000 RPM spindle depending on your application.

**COMMITMENT TO DYNAMIC BALANCE**

High accuracy and fine surface finish are products of a dynamically balanced spindle and Tool Holder System. Roku-Roku designs their integral motor spindles with the finest materials available, including special ceramic bearings, to achieve a dynamic run-out at the spindle taper of 0.5 µm. Combined with an ultra-fine ± 0.2° F precision double-layered oil circulation jacket and HSK-E25 / HSK-E40 tool holders, this allows continuous operation with maximum speed producing beautiful seamless surface finish with multiple tools.

**EXPANDING APPLICATIONS**

Both the MEGA and CEGA Series have the ability to add the “RG Machining” package which provides a precision grinding function with high-speed chopping function, dual dust preventative covers for the Y-axis screw and ways, and a 100 µm mesh sludge filter. Adding the 150,000 RPM Turbine Spindle device elevates RG Machining capability to true CNC jig grinder status providing optimum cutter surface speed for ultra-small diameter tools. The turbine spindle is attached and removed automatically by the ATC and provides a tool shank diameter of 4mm.

**SPECIAL OPTION PACKAGES**

Both the MEGA and CEGA Series have the ability to add the “M-Kit” Accuracy & Productivity Monitoring System which combines seven (7) thermal sensors that can be connected to a data logger to monitor and record the behavior of the machine in your environment. The kit includes temperature displays for the room, machining area, spindle, spindle oil cooling, machine casting, coolant, linear motors and linear scales. The goal of this system to achieve actual workpiece machining accuracy to within ±1.5µm.
# APPLICATIONS EXAMPLES

## MEGA SSS-400

Machining Alumina by Electro-Plated Diamond Grinding Wheel:

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed rate mm/min</th>
<th>Sp speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>φ3.0 Square diamond plated grinding stone</td>
<td>1,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Roughing 2</td>
<td>R1.0 Ball diamond plated grinding stone</td>
<td>1,500</td>
<td>35,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>R0.5 Ball diamond plated grinding stone</td>
<td>1,500</td>
<td>35,000</td>
</tr>
</tbody>
</table>

Cycle time: 7 hours 24 minutes

## Tungsten Carbide Flat Surface Machining:

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed rate mm/min</th>
<th>Sp speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>R2.0 Diamond coated end mill</td>
<td>24,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>R2.0 Diamond coated end mill</td>
<td>24,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>8.0 Diamond electric coat grinding stone</td>
<td>4,000</td>
<td>200</td>
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</table>

Cycle time: 7 hours 24 minutes

## MEGA SSS-600

Copper Mirror Finish Micro-Tool Machining:

<table>
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<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed rate mm/min</th>
<th>Sp speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>R1.0 Ball end mill</td>
<td>2,500</td>
<td>30,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>R0.3 Ball end mill</td>
<td>500</td>
<td>50,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>R0.3 Luminous DCL</td>
<td>200</td>
<td>50,000</td>
</tr>
</tbody>
</table>

Cycle time: 60 hours

## CEGA SSS-300

Top Surface Finishing with Drilling and Tapping in Carbide:

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed rate mm/min</th>
<th>Sp speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>φ1.0 Drill</td>
<td>Diamond coated drill</td>
<td>-8.0</td>
<td>7.5</td>
</tr>
<tr>
<td>φ0.4 Drill</td>
<td>Diamond coated drill</td>
<td>-3.2</td>
<td>5.0</td>
</tr>
<tr>
<td>M4 Tap</td>
<td>Diamond coated thread milling</td>
<td>-7.0</td>
<td>10</td>
</tr>
</tbody>
</table>

Cycle time: 1 minute 6 seconds / Hole 0.4 : 41 seconds / Hole M4 Tap : 3 minutes 20 seconds / Hole (Helical threading)

## Cold Forging Die Machining is Carbide:

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed Rate</th>
<th>Sp Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>φ4 Grinding stone</td>
<td>1,500</td>
<td>30,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>φ2 Grinding stone</td>
<td>337</td>
<td>30,000</td>
</tr>
<tr>
<td>Smt-finishing</td>
<td>φ2 Grinding stone</td>
<td>350</td>
<td>30,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>R1.0 Ball end mill</td>
<td>350</td>
<td>under 30,000</td>
</tr>
</tbody>
</table>

Diamond coated Ball end mill
Cycle time: 4 hours
### MODELS AND SPECIFICATIONS

#### MEGA SSS-400/600

**Available Options**
- Upgrade to 40 Position Tool Changer
- Upgrade to 60 Position Tool Changer
- Super MAC Il-Part Probe (OMP400)
- Super TMS (M&S ONE Touch Laser Tool Calibration)
- Forty (40) Position Automatic Pallet Changer (AHC)
- Semi-Dry Cutting System (Oil Mist + Collector)
- M-Kit (7-Sensor Thermal Data Logger)
- Sixty (60) Position Automatic Pallet Changer (AHC)
- Schedule Management B
- Chip Wash Cycle with Coolant Bed Flow
- Chip Bucket Sets for Chip Receiver
- Rigid Tapping
- RG Machining Function (Chopping/Jig Grinding)
- Three (3) Color Patent Light (Replaces std. 2 Color Light)
- Precision Filter Device for Graphite, Carbide & Ceramic Machining
- Spare Filter for Precision Filter Device
- Large Capacity Coolant Tank with Chiller (80 gal.)
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- X-Axis Guide Cover (Protection for Graphite, Carbide & Ceramic Machining)
- 4th and 5th Axis Unit Includes Interface Kit
- Transformer: Sized to your application

#### CEGA SSS-300/400

**Available Options**
- Upgrade to 40 Position Tool Changer
- Upgrade to 60 Position Tool Changer
- Super MAC Il-Part Probe (OMP400)
- M-Kit (7-Sensor Thermal Data Logger)
- Sixty (60) Position Automatic Pallet Changer (AHC)
- Schedule Management B
- Chip Wash Cycle with Coolant Bed Flow
- Chip Bucket Sets for Chip Receiver
- Rigid Tapping
- RG Machining Function (Chopping/Jig Grinding)
- Three (3) Color Patent Light (Replaces std. 2 Color Light)
- Precision Filter Device for Graphite, Carbide & Ceramic Machining
- Spare Filter for Precision Filter Device
- Large Capacity Coolant Tank with Chiller (100 gal.)
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- 4th and 5th Axis Unit Includes Interface Kit
- Transformer: Sized to your application

#### ZEUS (Z-86)

**Available Options**
- Upgrade to 60 Position Tool Changer
- Automatic Centering (Blum Infrared Probe)
- Super MAC Il-Part Probe (OMP400)
- Semi-Dry Cutting System (Oil Mist + Collector)
- Rigid Tapping
- Air Blow
- Automatic Greasing for Axis Guides and Ball Screws
- Large Capacity Coolant Tank with Chiller (100 gal.)
- Mist Collector
- RG Machining Function (Chopping/Jig Grinding)
- 3R / EROWA Robot Interface Kits
- Pneumatic Side Door for Automation
- 4th and 5th Axis Unit Includes Interface Kit
- Transformer: Sized to your application

<table>
<thead>
<tr>
<th>Model</th>
<th>MEGA SSS-400/600</th>
<th>CEGA SSS-300/400</th>
<th>ZEUS (Z-86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle Power</td>
<td>4.7HP</td>
<td>20HP/7.4HP</td>
<td>20HP</td>
</tr>
<tr>
<td>Spindle RPM Range</td>
<td>3,000–40,000/60,000</td>
<td>200–30,000/3,000–40,000</td>
<td>200–25,000</td>
</tr>
<tr>
<td>Spindle Tool Holder</td>
<td>HSK E25</td>
<td>HSK E40</td>
<td>HSK E40</td>
</tr>
<tr>
<td>Spindle Lubrication Type</td>
<td>Oil Mist</td>
<td>Oil Mist</td>
<td>Oil Mist</td>
</tr>
<tr>
<td>Spindle Cooling</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
</tr>
<tr>
<td>Z-Axis Thermal Compensation</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
</tr>
<tr>
<td>Linear/ Rotary Scales</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
</tr>
<tr>
<td>Table Size</td>
<td>23.6” x 13.0”</td>
<td>25.6” x 14.1”</td>
<td>37.4” x 23.6”</td>
</tr>
<tr>
<td>Table Height From Floor</td>
<td>29.5”</td>
<td>29.5”</td>
<td>37.4”</td>
</tr>
<tr>
<td>Max Workpiece Weight</td>
<td>220 lbs.</td>
<td>440 lbs.</td>
<td>1,763 lbs</td>
</tr>
<tr>
<td>X x Y-Axis Travel</td>
<td>16.1” x 13.0”</td>
<td>20.0” x 16.1”</td>
<td>31.5” x 23.8”</td>
</tr>
<tr>
<td>Z-Axis Travel</td>
<td>7.8”</td>
<td>12.2”</td>
<td>15.7”</td>
</tr>
<tr>
<td>Table to Spindle Nose Distance</td>
<td>1.9” – 9.8”</td>
<td>5.9” – 18.1”</td>
<td>7.8” – 23.6”</td>
</tr>
<tr>
<td>Max Cutting Feed Rate</td>
<td>393”/min</td>
<td>394”/min</td>
<td>315”/min 590 HS mode</td>
</tr>
<tr>
<td>Rapid Feed Rate</td>
<td>590”/min</td>
<td>590”/min</td>
<td>590”/min</td>
</tr>
<tr>
<td>Positioning Accuracy</td>
<td>+/- 0.00039”</td>
<td>+/- 0.000039”</td>
<td>+/- 0.000080”</td>
</tr>
<tr>
<td>Repeatability</td>
<td>+/- 0.000012”</td>
<td>+/- 0.000020”</td>
<td>+/- 0.0000030”</td>
</tr>
<tr>
<td>ATC Tool Number</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Max Tool Diameter</td>
<td>0.25” (3” non-adjacent)</td>
<td>2.36” (3” non-adjacent)</td>
<td>2.75” (3” non-adjacent)</td>
</tr>
<tr>
<td>Max Tool Length</td>
<td>3.1”</td>
<td>9.8”</td>
<td>7.8”</td>
</tr>
<tr>
<td>Max Tool Weight</td>
<td>6.6 lbs.</td>
<td>6.6 lbs.</td>
<td>8.8 lbs.</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>5,732 lbs.</td>
<td>11,000 lbs.</td>
<td>17,637 lbs</td>
</tr>
<tr>
<td>Blum Laser</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Flood Coolant</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Fluid Tank Capacity</td>
<td>37 gal.</td>
<td>53 gal.</td>
<td>62.5 gal.</td>
</tr>
</tbody>
</table>
LAYOUT DRAWINGS

MEGA SSS-400/600

Machine Height: 82.3"  Installation Footprint: 79.1" x 105.9"  Machine Weight: 5,732lb.
Power Requirement: 208V ±5%, 60Hz, 14.0kVA (depends on options)  Compressed Air Supply: 14.1CFM @ 72psi.

CEGA SSS-300/400

Machine Height: 100.0"  Installation Footprint: 95.1" x 114.2"  Machine Weight: 11,000lb.
Power Requirement: 208V ±5%, 60Hz, 32kVA (depends on options)  Compressed Air Supply: 14.1CFM @ 72psi.

ZEUS Z-86

Machine Height: 129.1"  Installation Footprint: 110.0" x 137.8"  Machine Weight: 17,640lb.
Power Requirement: 208V ±5%, 60Hz, 32.5kVA (depends on options)  Compressed Air Supply: 17.5CFM @ 72psi.
In order to answer escalating new demands in Ultra-High-Accuracy Micro-Machining, Roku-Roku has thrown off the expectations of the past to create the Android II and Vision 300/600 models, which places the machine and operator in an entirely new relationship. The machine is a pleasure to operate thanks to the elimination of all factors that degrade precision, pushing micromachining hardware as far as it can go while using an operator interface that visualizes data on the behavior of the machine. This allows the operator to perfectly grasp minute-by-minute positional changes in behavior during machining bringing his or her abilities to the maximum.

**HIGH-RIGIDITY BASIC STRUCTURE**
A heat symmetric basic frame structure, designed by Finite Element Analysis (FEA), uses a high-grade cast iron base with Roku-Roku’s traditional box-shaped 3-point support system and a 3-layer hollowed cross rail structure with rational rib placement to ensure twist rigidity against spindle head motion while lowering weight. A reduction in thermal displacement is effectively achieved with forced ventilation through the hollow ribbed structures. By creating an ideal rib distribution in the table and saddle, a balance of high-rigidity and reduced weight are obtained for high-motion response. An ideal axis configuration is one of no overhang throughout the machining range, both X and Y-axes. The drive axes are structured separately to thoroughly control mass eccentricity while eliminating factors that could alter orientation.

**HORIZONTALLY-OPPOSED LINEAR DRIVE**
A system of two horizontally opposed flat linear motors are used in each axis, X, Y, & Z, to cancel out all of the attraction forces completely, suppressing moving objects and eccentric loads on the slide-ways caused by the powerful magnets in the linear motors. To address the heat sources, a double cooling system is used between the heat generating coils and their mounting surfaces. Absolute movement accuracy is maintained with a fully closed loop linear glass scale system with an incredible 0.002 μm (2nm) resolution providing an actual machining precision of ±1 μm.

**A-H.I.S. CONTROL HIGH-PERFORMANCE SPINDLE**
A dual layer cooling system is the heart of the Advanced Heat Isolation System on these machines. The high RPM integral motor spindle uses a direct forced oil cooling system combined with a wide-range jacket separating the spindle head from the casting. Complete heat isolation can be achieved. Perfect control of the coolant temperature is provided by an in-line type oil chiller unit. A system involving centralized exhaust and outside air flow prevents hot air from collecting at the spindle.

An innovative approach to the spindle head design brings the spindle centerline extremely close to the Z-axis guide-ways providing ultimate stability for high-speed Z-axis movement used in micro drilling and chop grinding. This Location combined with the casting cooling jacket, also suppresses displacement in the Y-axis.

**SPECIAL OPTION PACKAGES**
Both the Android II and Vision Series have the ability to add the “Advanced M-Kit” Ultra-High Accuracy & Productivity Monitoring System which works the same as the MEGA/CEGA version, but combines sixteen (16) thermal sensors that can be connected to a data logger to monitor and record the behavior of the machine in your environment. The goal of this system to achieve actual workpiece machining accuracy to within ±1.0μm.
**APPLICATIONS EXAMPLES**

---

**Single NANO** Finish on Tungsten Carbide Mold Machining: Android II

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool Used</th>
<th>Feed Rate in/min</th>
<th>Spindle Speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>Diamond coated R2.0 Ball end mill</td>
<td>7.9</td>
<td>24,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>PCD R0.02&quot; Ball end mill</td>
<td>11.8</td>
<td>40,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>PCD R0.02&quot; Ball end mill</td>
<td>7.9</td>
<td>40,000</td>
</tr>
</tbody>
</table>

Cycle time: 7 hours 10 minutes

Finishing Cutter: 50Nm particle size single-phase polycrystalline diamond binder-less ball end mill.
Surface Finish: 0.0057/µm Ra
Measured by: ZYGO New View 7100

---

Mirror Finishing on a 3D Mold Surface: Vision 300/600 or Android II

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool Used</th>
<th>Feed Rate in/min</th>
<th>Spindle Speed RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>R0.08&quot; Ball end mill</td>
<td>78.7</td>
<td>16,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>R0.08&quot; Ball end mill</td>
<td>39.4</td>
<td>16,000</td>
</tr>
<tr>
<td>Finishing</td>
<td>R0.08&quot; Ball end mill</td>
<td>15.7</td>
<td>20,000</td>
</tr>
</tbody>
</table>

Cycle time: 3 hours

Surface Finish: 0.018µm Ra
Measured by: ZYGO New View 7100

---

Micro Drilling Example: Vision 300/600 or Android II

<table>
<thead>
<tr>
<th>Machining Conditions</th>
<th>Tool Used</th>
<th>Spindle Speed in/min</th>
<th>Feed Rate in/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centering</td>
<td>Φ0.02 x 0.06 Centering drill</td>
<td>12,000</td>
<td>3</td>
</tr>
<tr>
<td>Drilling</td>
<td>Φ0.023 x 0.25 Micro drill</td>
<td>12,000</td>
<td>3</td>
</tr>
</tbody>
</table>

Cycle time: 40 seconds / Hole (8 hr 16 min 40 sec for 745 holes)

This Micro Drilling Sample shows off the ability of the Vision 300/600 or Android II to maintain thermal stability over long time periods.

---

Circle Test: Vision 300/600 or Android II

<table>
<thead>
<tr>
<th>Machining Conditions</th>
<th>Tool Used</th>
<th>Material</th>
<th>Size</th>
<th>Feedrate</th>
<th>Cutting Depth</th>
<th>Cutting Direction</th>
<th>Room Temp</th>
<th>Measured by</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Mill</td>
<td>Brass</td>
<td>ø6.0mm t=3mm Outer Circle</td>
<td>200mm/min.</td>
<td>0.02mm</td>
<td>CW</td>
<td>73.5°F</td>
<td>Talyrond 365 (Taylor Hobson)</td>
<td></td>
</tr>
</tbody>
</table>

**Measured Circularity: 0.62µm**

**745 Hole Position Accuracy:** ±0.00006" (±1.5 µm)

Measured by Mitutoyo (SQ606-PR05G)
ANDROID II

Unit: mm (inch)

Spindle Power: 5 HP
Spindle RPM Range: 3,000~60,000
Spindle Tool Holder: HSK-E25
Spindle Lubrication Type: Oil Mist
Spindle Cooling: Chilled Oil Jacket
Z-Axis Thermal Compensation: Direct Sensor Type
Linear/ Rotary Scales: 3-Axis Standard
Table Size: 21.6" x 13.8"
Table Height From Floor: 29.5"
Max Workpiece Weight: 220 lbs.
X x Y-Axis Travel: 17.7" x 13.8"
Z-Axis Travel: 7.8"
Table to Spindle Nose Distance: 3.1" ~ 11.0"
Max Cutting Feed Rate: 590"/min
Positioning Accuracy: +/- 0.000039"
Repeatability: +/- 0.0000079"
ATC Tool Number: 20
Max Tool Diameter: 0.236"
Max Tool Length: 3.1"
Max Tool Weight: 3.3 lbs.
Machine Height: 89.8"
Installation Footprint: 94.7" x 108.3"
Power Requirement: 208V ±5%, 60Hz, 19.0kVA (depends on options)
Compressed Air Supply: 14.1CFM @ 72psi.

VISION

Unit: mm (inch)

Spindle Power: 20 HP
Spindle RPM Range: 200~30,000/3,000~60,000
Spindle Tool Holder: HSK-E40/HSK-E25
Spindle Lubrication Type: Oil Mist
Spindle Cooling: Chilled Oil Jacket
Z-Axis Thermal Compensation: Direct Sensor Type
Linear/ Rotary Scales: 3-Axis Standard
Table Size: 29.5" x 21.6"
Table Height From Floor: 33.5"
Max Workpiece Weight: 660 lbs.
X x Y-Axis Travel: 25.6" x 21.6"
Z-Axis Travel: 11.8"
Table to Spindle Nose Distance: 5.9" ~ 17.7"
Max Cutting Feed Rate: 390"/min
Positioning Accuracy: +/- 0.000039"
Repeatability: +/- 0.0000079"
ATC Tool Number: 20
Max Tool Diameter: 1.77"
Max Tool Length: 7.87"
Max Tool Weight: 7.87 lbs.
Machine Height: 115.0"
Installation Footprint: 127.2" x 107.7"
Power Requirement: 208V ±5%, 60Hz, 36kVA (depends on options)
Compressed Air Supply: 14.1CFM @ 72psi.

Available Machine Options: Android II & Vision 300/600
Upgrade to 40 Position Tool Changer
Upgrade to 60 Position Tool Changer
Super MAC II Part Probe w/2mm Stylus & Auto Centering Function (OMP400)
Coolant Nozzle (2-Pieces)
150mm Column Riser Package (Max Spindle Height 23.8")
RG Machining Function (Chopping/Jig Grinding)
CCD Camera w/ 15" Monitor (60-120X Variable Zoom)
Advanced M-Kit (Special Software with Operator Information and 16 Thermal Readouts)
150,000 RPM Air Turbine Spindle Kit (ATC Changeable)
One (1) 150,000 RPM Air Turbine Spindle Replacement
Additional M&H Double TMS Device (Used with Air Turbine Spindle)
Three (3) Color Patrol Light (Replaces std. 2 Color Light)
Precision Filter Device for Graphite, Carbide & Ceramic Machining
Spare Filter for Precision Filter Device
X-Axis Guide Cover (Protection During Wet Graphite, Carbide & Ceramic Machining)
Handy- Type Data Logger for the Advanced M-Kit
Transformer: Sized to your application
Vision 300/600 Only:
Air Blow
Vision Type Non-Contact Tool Measure (DYNALINE)

Vision 300/600 Only:
Air Blow
Vision Type Non-Contact Tool Measure (DYNALINE)

Vision Type Non-Contact Tool Measure (DYNALINE)

Machine Height: 115.0"  Installation Footprint: 127.2" x 107.7"  Machine Weight: 19,180lb.
Power Requirement: 208V ±5%, 60Hz, 36kVA (depends on options)
Compressed Air Supply: 14.1CFM @ 72psi.

Machine Specifications:

<table>
<thead>
<tr>
<th>Model</th>
<th>Android II</th>
<th>VISION 300/600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle Power</td>
<td>5 HP</td>
<td>20 HP</td>
</tr>
<tr>
<td>Spindle RPM Range</td>
<td>3,000~60,000</td>
<td>200<del>30,000/3,000</del>60,000</td>
</tr>
<tr>
<td>Spindle Tool Holder</td>
<td>HSK-E25</td>
<td>HSK-E40/HSK-E25</td>
</tr>
<tr>
<td>Spindle Lubrication Type</td>
<td>Oil Mist</td>
<td>Oil Mist</td>
</tr>
<tr>
<td>Spindle Cooling</td>
<td>Chilled Oil Jacket</td>
<td>Chilled Oil Jacket</td>
</tr>
<tr>
<td>Z-Axis Thermal Compensation</td>
<td>Direct Sensor Type</td>
<td>Direct Sensor Type</td>
</tr>
<tr>
<td>Linear/ Rotary Scales</td>
<td>3-Axis Standard</td>
<td>3-Axis Standard</td>
</tr>
<tr>
<td>Table Size</td>
<td>21.6&quot; x 13.8&quot;</td>
<td>29.5&quot; x 21.6&quot;</td>
</tr>
<tr>
<td>Table Height From Floor</td>
<td>29.5&quot;</td>
<td>33.5&quot;</td>
</tr>
<tr>
<td>Max Workpiece Weight</td>
<td>220 lbs.</td>
<td>660 lbs.</td>
</tr>
<tr>
<td>X x Y-Axis Travel</td>
<td>17.7&quot; x 13.8&quot;</td>
<td>25.6&quot; x 21.6&quot;</td>
</tr>
<tr>
<td>Z-Axis Travel</td>
<td>7.8&quot;</td>
<td>11.8&quot;</td>
</tr>
<tr>
<td>Table to Spindle Nose Distance</td>
<td>3.1&quot; ~ 11.0&quot;</td>
<td>5.9&quot; ~ 17.7&quot;</td>
</tr>
<tr>
<td>Max Cutting Feed Rate</td>
<td>590&quot;/min.</td>
<td>390&quot;/min.</td>
</tr>
<tr>
<td>Rapid Feed Rate</td>
<td>590&quot;/min.</td>
<td>590&quot;/min.</td>
</tr>
<tr>
<td>Positioning Accuracy</td>
<td>+/- 0.000039&quot;</td>
<td>+/- 0.000039&quot;</td>
</tr>
<tr>
<td>Repeatability</td>
<td>+/- 0.0000079&quot;</td>
<td>+/- 0.0000079&quot;</td>
</tr>
<tr>
<td>ATC Tool Number</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Max Tool Diameter</td>
<td>0.236&quot;</td>
<td>1.77&quot;</td>
</tr>
<tr>
<td>Max Tool Length</td>
<td>3.1&quot;</td>
<td>7.87&quot;</td>
</tr>
<tr>
<td>Max Tool Weight</td>
<td>3.3 lbs.</td>
<td>7.87 lbs.</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>12,787 lbs.</td>
<td>19,180 lbs.</td>
</tr>
<tr>
<td>Blum Laser</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Flood Coolant</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Fluid Tank Capacity</td>
<td>53 gal.</td>
<td>69 gal.</td>
</tr>
</tbody>
</table>
MULTI-AXIS / AUTOMATION

Roku-Roku’s FANUC 31i-B5 control provides the ability to add a 4th or 5th axis unit to any of the machine models vastly expanding their capability to handle multi-axis machining type work. A variety of different unit sizes and manufactures are available to be interfaced to the machines to meet the exact specifications of your application’s size and accuracy requirements.

AUTOMATION CHANGES EVERYTHING

Mitsubishi EDM and Roku-Roku high-speed VMCs are in more automated installations than any other manufacturer. From modular cells to fully automated storage and inventory systems, our automation systems will allow you to run back-to-back jobs with virtually no supervision — helping you drive incredible profits and blow the competition away.

Roku-Roku offers their own single machine 24 to 45 position Pallet Handling Systems to support metal or graphite applications. MC Machinery and Roku-Roku have developed special automated solutions to increase EDM throughput as well, for example, an automated cell integrating a Roku-Roku HC-548EX can machine graphite electrodes to be stored and used on a Mitsubishi Sinker EDM — allowing many operations to take place unattended. A special capability Roku offers is the ability to invert the machine control/ATC unit over to the left side for convenient dual-machine automation serving both machines from a single centralized robot.

Several single machine configurations are also available.
**FULL 5-AXIS CONTROL**

**FANUC CONTROL UPGRADE**

Roku-Roku has been able to expand the machine controller to work in the world of Simultaneous 5-Axis Machining by adding the NC Package for 5-Axis Machining for the already powerful FANUC 31 i-B5 CNC Control.

This package includes:
- High-speed smooth TCP
- Tool center point control
- Smooth TCP
- Tool posture control
- Cutting point command
- Expansion of axis move command in tool center point control
- Three-dimensional cutter compensation
- Tilted working plane command
- Multiple command of tilted working plane indexing
- Tool axis direction control
- Expansion of the way to set 5-axis machining function parameters
- Tolerance control

**ROKU-ROKU & Tsudakoma**

Roku-Roku and Tsudakoma teamed up to design the best two-axis rotary tables to fit the exacting requirements set by the machines themselves. These Ultra-Precision tables are available in both a Direct Drive RTT-216 model specifically designed to complement the Linear Drive System of the Android II-5AXP for high-speed positioning, the RT-261 which is a Worm Drive table used on both the Android II-5AXP and the CEGA SSS-5AXP providing improved thermal stabilization, and the RT-110 also a Worm Drive table specifically designed a bit smaller to fit the MEGA SSS-5AXP platform.

High-Value Added Specifications:

- Special table design includes optical rotary scale feedback on both axes.
- A pneumatic clamping system ensures strong support rigidity for both the tilt and rotary axes.
- High efficiency, high precision and best surface finishes can be optimized by utilizing the tilt and rotary axes. Shorter length tools improves tool rigidity and reduces dynamic tool run-out while improving surface quality and extending tool life.
- Tables are designed to accept major manufactures tooling systems such as EROWA and System 3R.
**APPLICATIONS EXAMPLES**

**Roku-Roku 5-AXIS**  
*Powered Metal Mold Carbide Punch*

**Conventional Processing**  
1. Profile Grinding w Diamond Wheel  
2. CNC Sinker EDM (requires electrodes)  
*Cycle Time: 120 hrs.*

**ANDROID II-5-AXP Method**  
Machining by 5-Axis High Speed Mill  
*Cycle Time: 24 hrs.*

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**Blue Globe**  
*Machining Conditions*

<table>
<thead>
<tr>
<th>Process</th>
<th>Tool used</th>
<th>Feed rate (mm/min)</th>
<th>Sp speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>12mm Ball end mill</td>
<td>3,020</td>
<td>20,000</td>
</tr>
<tr>
<td>Semi-finishing</td>
<td>8mm Ball end mill</td>
<td>4,528</td>
<td>30,000</td>
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<tr>
<td>Finishing</td>
<td>6mm Ball end mill</td>
<td>3,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Engraving</td>
<td>1mm Ball end mill</td>
<td>740</td>
<td>50,000</td>
</tr>
</tbody>
</table>

*Cycle time: 1 hour*

**Material:** Nylon  
**Work Size:** Ø3.0” x 6.0

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**Cap**  
*Machining Conditions*

<table>
<thead>
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<th>Feed rate (mm/min)</th>
<th>Sp speed (min⁻¹)</th>
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</thead>
<tbody>
<tr>
<td>Roughing</td>
<td>6mm Ball end mill</td>
<td>1,990</td>
<td>13,260</td>
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<tr>
<td>Semi-finishing</td>
<td>5mm Ball end mill</td>
<td>2,055</td>
<td>10,820</td>
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<tr>
<td>Finishing</td>
<td>2mm Ball end mill</td>
<td>2,315</td>
<td>44,560</td>
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</tbody>
</table>

*Cycle time: 1.5 hours*

**Material:** H13 Hardened  
**Hardness:** Hrc 52  
**Work Size:** 50mm x 50mm x 50mm

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**Graphite Part**  
*Machining Conditions*

<table>
<thead>
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<th>Tool used</th>
<th>Feed rate (mm/min)</th>
<th>Sp speed (min⁻¹)</th>
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<tbody>
<tr>
<td>Roughing</td>
<td>6mm Ball end mill</td>
<td>1,900</td>
<td>16,000</td>
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<tr>
<td>Semi-finishing</td>
<td>3mm Ball end mill</td>
<td>3,000</td>
<td>28,000</td>
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<tr>
<td>Finishing</td>
<td>1mm Luminous DCL</td>
<td>2,500</td>
<td>40,000</td>
</tr>
</tbody>
</table>

*Cycle time: 30 minutes*

**Material:** POCO 3 Graphite  
**Work Size:** 25mm x 25mm x 100mm

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**Surface Finish:** 0.4µm Ra  
**Finishing Pass Depth:** 0.025mm

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**Surface Finish:** 0.5µm Ra  
**Finishing Pass Depth:** 0.05mm

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**Surface Finish:** 0.3µm Ra  
**Finishing Pass Depth:** 0.05mm
**5AXP LAYOUT DRAWINGS**

**ANDROID II**

- Machine Height: 95.1"  
- Installation Footprint: 94.7" x 108.3"  
- Machine Weight: 14,109lb.  
- Power Requirement: 208V ±5%, 60Hz, 27.5kVA (depends on options)  
- Compressed Air Supply: 14.1CFM @ 72psi.

**CEGA SSS**

- Machine Height: 105.9"  
- Installation Footprint: 94.7" x 114.2"  
- Machine Weight: 12,100lb.  
- Power Requirement: 208V ±5%, 60Hz, 32kVA (depends on options)  
- Compressed Air Supply: 14.1CFM @ 72psi.

**MEGA SSS**

- Machine Height: 90.1"  
- Installation Footprint: 79.1" x 105.9"  
- Machine Weight: 6,173lb.  
- Power Requirement: 208V ±5%, 60Hz, 14.1kVA (depends on options)  
- Compressed Air Supply: 14.1CFM @ 72psi.
remote360™ Machine Monitoring

remote360 is a robust production monitoring and support solution offering real-time data to help increase productivity, improve efficiency and reduce downtime. It provides:

- Email and mobile notifications of stoppages, completions and maintenance warnings
- Dashboard display of runtime performance by shift, day, week and month
- Proactive support with real-time monitoring and remotely connected service technicians

PREMIER TRAINING, SERVICE AND SUPPORT

Regionalized Service Network
With our industry-leading regionalized service network, we have the most experienced, knowledgeable and responsive employees in the industry. We’re here for you with phone support, operation training, on-site service, parts inventory and a robust, interactive website.

- With regionalized locations throughout North America, we can respond promptly to your service needs.
- We have the largest fleet of service vehicles in the field—three times more than any other company in the industry.
- From installation and on-site training to support and service throughout the life of your system, our national service network is just a phone call away.
- You’ll have access to 24/7 support, a detailed interactive parts catalog, printable machine manuals and software.

Application Support
The value of our support stretches well beyond service, parts and training. Our experienced and creative team members put their knowledge and problem-solving skills to work for you—offering application and engineering support that includes creating specialized shop-floor setups that work harder and get better results. Whether developing integrated manufacturing cells from the ground up or adding specific solutions to complement existing operations, our pre-sales, sales, installation and application support staff can help you eliminate bottlenecks, improve accuracy and drive throughput.