Reaching for the leading edge of Monozukuri (Excellent-product development/manufacturing) together with you

There are things which only Mitsubishi Electric, the leader in electrical-discharge machines, can do.
Introducing the wire-cut EDM, which combines the innovative technology style from drive systems to control systems and power systems.
The NA Series, surpassing common knowledge to open up the next era.

Three advantages for the next era

- **High quality**
  A refined design makes impossible accuracies possible

- **Usability**
  An ultimate operability, is extremely operator-friendly

- **Economy & Ecology**
  Enhanced efficiency reduces operating costs from energy used to consumables
High-grade model combines high accuracy and ease of use

NA1200

High-grade model combines high accuracy and ease of use with larger capacity.

NA2400
Revolutionizing monozukuri (product creation) with high-accuracy machining which focuses on quality required for the next generation.

**Round machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Function used</th>
<th>Electrode material</th>
<th>Workpiece thickness</th>
<th>Surface roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA1200</td>
<td>Digital-V power supply</td>
<td>Steel (SKD11)</td>
<td>200mm (8&quot;)</td>
<td>Ra0.25µm (10µ&quot;&quot;)</td>
</tr>
</tbody>
</table>

- High-accuracy fit machining is possible using the OPT-drive system and X/Y independent construction.

**High-accuracy fit machining of thick workpiece**

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<tr>
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<th>Electrode material</th>
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<tbody>
<tr>
<td>NA2400</td>
<td>Digital-V power supply</td>
<td>Steel (SKD11)</td>
<td>300mm (11.8&quot;)</td>
<td>Ra0.63µm (25µ&quot;&quot;)</td>
</tr>
</tbody>
</table>

- Thick workpieces can be machined with a high straightness accuracy using the Digital-V power supply.

**High-accuracy punch machining**

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>NA1200</td>
<td>Digital-FS</td>
<td>Steel (SKD11)</td>
<td>50mm (2&quot;)</td>
<td>Ra0.1µm (4µ&quot;)</td>
</tr>
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- A shape accuracy of ±1µm (0004") or less is realized.

**High-accuracy fit machining**

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<tr>
<td>NA1200</td>
<td>Corner control</td>
<td>Steel (SKD11)</td>
<td>20mm (0.8&quot;) (punch)</td>
<td>Ra0.25µm (10µ&quot;&quot;)</td>
</tr>
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- Comers can be machined to a high accuracy of ±1µm (00008") using new corner machining control (CAM3).

**High-accuracy punch machining**

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<tr>
<td>NA2400</td>
<td>OPT-drive system</td>
<td>Tungsten carbide (G8)</td>
<td>150mm (5.9&quot;)</td>
<td>Ra0.63µm (25µ&quot;&quot;)</td>
</tr>
</tbody>
</table>

- Highly accurate machining with a straightness accuracy of ±1µm (0002") is possible even with 300mm (11.8") thick workpieces.

**Long stroke, high-accuracy pitch machining**

<table>
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<tr>
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<th>Function used</th>
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<th>Workpiece thickness</th>
<th>Surface roughness</th>
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</thead>
<tbody>
<tr>
<td>NA2400</td>
<td>OPT-drive system</td>
<td>Steel (SKD61)</td>
<td>70mm (2.8&quot;)</td>
<td>Ra0.1µm (4µ&quot;)</td>
</tr>
</tbody>
</table>

- Even when machining large plates with a stroke of 300mm (11.8") or more, the OPT-drive system enables highly accurate machining. ±1µm (00004") is possible.

**Tungsten carbide punch machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Function used</th>
<th>Electrode material</th>
<th>Workpiece thickness</th>
<th>Surface roughness</th>
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<tbody>
<tr>
<td>NA1200</td>
<td>Digital-FS</td>
<td>Tungsten carbide</td>
<td>20mm (0.8&quot;)</td>
<td>Ra0.25µm (10µ&quot;&quot;)</td>
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</table>

- A surface roughness of Ra0.1µm (0004") or less and a machining accuracy of ±1µm (00004") are possible using Digital-FS for tungsten carbide punch machining.

(Note) JIS B0601: ‘01 and ISO 4287: ‘97/ISO 1302: ‘02 compliant (Rz conventional notation Ry)

* The listed machining results are all based on in-house conditions and measurements.

(Nov. 2004) 51 and ISO 4287: '97/ISO 1302: '02 compliant (Ry is conventional notation Ry)
Highly accurate drive systems

High quality

Integrated rectangular table

Highly rigid structure

• Newly designed with CAE analysis, the machine structure is highly rigid with a low center of gravity
• Ribs are optimally arranged to suppress the structure’s deformation during axis movement

Optimum structure matches machining applications

NA1200
• X/Y-axis independent construction method combines table movement and column movement
• This structural design eliminates axis overhang, enhancing machining accuracy

NA2400
• Drive method which combines table fixing and column movement incorporated
• Fixed table, and movable-column design eliminates the need to move large workpiece, enabling a higher degree of machining accuracy

UV-axis OPT-drive system*
• UV-axis can also be fitted with the OPT-drive system
• High-accuracy taper machining is possible

* Compatible models: NA1200/NA2400 (option).

Integrated rectangular table

• A highly rigid one-piece stainless steel table is used for easy workpiece setup
• Workpieces can be machined to a high accuracy at any position

Excellent frame design provides higher-dimensional performance

Highly rigid structure

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High quality
High-accuracy power systems

Merging high speed and high accuracy
Refined power supply control technology

High-speed anti-electrolysis power supply
(AE power supply)
- Electrolytic corrosion is suppressed to prevent the formation of softened layers
- Compatible with all power circuits from rough machining to finish machining
- High-speed, safe unmanned machining possible using water

Oxidation of workpiece surface

<table>
<thead>
<tr>
<th>Material</th>
<th>Conventional Machining</th>
<th>AE Machining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brass</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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</table>

Shape control power supply (Digital-AE II)
- Digitally control 3D shapes with the world’s only use of Digital-AE II electrical-discharge position control
- Reduce the total machining time by improving straightness accuracy during rough, intermediate and finishing processes

Comparison of straightness accuracy in finish machining

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<tr>
<td>No. of cuts</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Electrode material</td>
<td>ø0.25mm (.010&quot;)</td>
<td></td>
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</table>

Super-fine finishing power supply (Digital-FS)
- Optimum surface roughness of Rz0.4µm
- Machining with the workpiece set directly on the table (dedicated jig not required)
- Machining range not limited (entire XY stroke area)
- Achieves both surface roughness and straightness accuracy
- Extends die life and improves die releasing properties

Oxidization of workpiece surface

* The photo shows a comparison under adverse conditions where electrolysis occurs easily.

High-accuracy power systems

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**Corner machining control** (CM3 control: Corner Master3)
- Improve machining accuracy at extremely small in-corners and out-corners
- Realize highly accurate shape machining even in complicated geometry with several types and sizes of corners
- Corner accuracy can be easily controlled by the operator

**Wire tension control** (TS Master)
- Suppress tension fluctuation to realize stable machining
- Suppress lines on the machined surface after polishing

**Die-shaped machining** samples

**Comparison of corner accuracies**

<table>
<thead>
<tr>
<th>Corner Type</th>
<th>CM3</th>
<th>Traditional Corner Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-corner 60° (R0.2mm)</td>
<td>3µm</td>
<td>5µm</td>
</tr>
<tr>
<td>In-corner 90° (R0.2mm)</td>
<td>3µm</td>
<td>5µm</td>
</tr>
</tbody>
</table>

**Machined surface before polishing**

**Analysis of machined surface before polishing**

**Machine systems**

**Control Unit**

**Efficiency**

**Options**

**Power supply / Control specifications**

**Machine Installation**

**Die-shaped machining** examples

**Comparison of straightness**

**Examples of PM machining applications**

- Stepped shape machining
- Stepped shape machining
- Cross-cavity shape machining

**Under-cut (dimple) reduction control** (EM control: Entrance Master)
- Reduces dimples at the approach section
- Allows shape adjustment from convex to concave
- Greatly reduces polishing time

**Machining surface step/straightness control** (SL control: Stepless control)
- Greatly improves the step finish and wall straightness for workpieces with varying thickness
- Finish complicated parts to a high accuracy

**Dimensional error control** (OM control: Orbit Master)
- OM control is designed to attain a uniform electrical discharge gap regardless of the corner shape
- This improves the radial shape error and greatly improves the total part accuracy

**Fully-automatic rough machining control** (PM control: Power Master)
- No need to set machining conditions or have EDM machining know-how
- Automatically recognizes machining conditions
- Makes adjustments for the optimum machining condition

**<3D-PM>**
- Analyzes 3D data and recognizes shape characteristics
- Eliminates transition lines which appear easily in stepped machining areas
- Improves machining speed with nozzle close conditions
Creating a comfortable, reassuring operating environment

3-sided elevating work-tank (NA2400)
- 3-sided elevating work-tank allows easy loading of large workpieces
- The machine table can be reached from three sides making workpiece setups quick and easy
- Multiple workpiece setups are made easy by the open access to the machine table

Hand lift mode (NA2400)
- Top surface of the working tank can be lowered approx. 60mm (2.4") from the top of the table
- Table access is improved when loading/unloading using a hand lift

Increased machining stroke
- Ample stroke for large workpieces
  X600 (23.6") x Y400mm (15.7") (NA2400)
  X400 (15.7") x Y300mm (11.8") (NA1200)

High-accuracy taper machining (Angle Master)
- Angle Master function realizes high-grade machining of large tapers
- Optimum taper specifications are automatically set to match the wire electrode angle

All stainless-steel structure
- Workpiece mounting table
- Lower machine arm
- Seal plate
- Work-tank and dielectric fluid reservoir

Seal plate self-cleaning mechanism
- Forced flush self-cleaning mechanism prevents sludge from sticking to the stainless-steel seal plate
- A simple jet wash nozzle provides the operator with the ability to quickly rinse down the work area after each job is completed
High-speed auto-threader: AT2

- High-speed, highly reliable 10-second automatic threading

Compact head design

- The new compact head design greatly improves how close the nozzle can get to stepped workpieces or clamping fixtures such as vises and ruler systems.

One-touch lever clamp mechanism

- New one-touch lever clamping system provides quick, easy, and accurate power feed indexing.
- The clamp lever accurately locates the power feeder with repeatable torque, unlike systems that use a set-screw method.

Diamond guide

- A round diamond guide is used to provide the best accuracy for both straight and taper cutting applications.
- Both upper and lower guides can be replaced by simply unscrewing the flush cups (no tools required).

Jet off wire insertion (AT Master)

- The automatic wire threading range has been increased to provide capability for wire breakage point insertion, top/bottom countersunk hole insertion, slit insertion, small diameter initial hole and submerged threading.
- By using the AT Master guide kit and AT Enhance Mode setting, the auto-threading performance can be improved where using jet stream on, causes enough turbulence to prohibit threading.

- Applicable models: All models (option).
- Applicable wire diameter: ø0.2, 0.25BS (.008, .010" BS)

Innovative design for improving productivity
Ultimate Control

ADVANCE control intelligence and ease of use

Taking the interface to new heights with three advanced levels

Easy-ADVANCE — New advanced ergonomic design

Easy-to-read screen and outstanding operability
- 15-inch LCD and touch panel
- Simple menu configuration eliminates deep nesting

Ergonomic design
- Smooth operations with mouse
- Easy-to-use screen, keyboard and mouse position

Quick simple workpiece Setup
(Work alignment function)
- By measuring the workpiece flatness with a dial indicator, the wire tilt can be automatically compensated to match the angle of the part rather than taking time to indicate it in perfectly flat.
- Even when using multiple workpieces, the flatness can be automatically compensated in each workpiece coordinate system without editing the program.

Easy repeat (technology information package)
- Process information and technology is saved in a batch file for each job
- Process information can be recalled to repeat a previously cut job

3D-ADVANCE — Advanced 3D data for machine control
- Reads 3D CAD data (Parasolid format *)
- Extracts 3D model contours
- Creates NC data with a built-in 2D CAM
- Analyzes shape features for improved machining performance (refer to following page for details)

*1: Parasolid is a registered trademark of UGS PLM Solutions Co., Ltd.

Net-ADVANCE — Advanced support service using Internet technology

Providing the newest systems, manuals and machining conditions
- The latest system software, manuals and machining conditions, etc., are provided through the Internet
- Users can download the latest version and upgrade their system

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Providing the newest systems, manuals and machining conditions
- The latest system software, manuals and machining conditions, etc., are provided through the Internet
- Users can download the latest version and upgrade their system
Extensive utilization of 3D CAD data for machine control

Read 3D data
- 3D CAD data (Parasolid format) can be read and displayed in original format and design information can be taken directly to the site

Built-in 3D CAM
- Extract contour lines with the height designated in 3D data
- Transmit the contour lines to the built-in 2D CAM

Built-in 2D CAM
- Create NC data from contour lines
- Simple CamMagic operations
- Revise drawings and define additional machining on the EDM

High compatibility with CamMagic
- Common operability
- Mutual use of Machining-defined data

Program check/monitor
- Overlay and display 3D data during the NC data path check
- Overlay and display 3D data on the monitor screen even while machining
- Check the status at a glance

3D Viewer
- Reference the 3D image display at any time, even during setup

1 This is not a function to create or edit the 3D model.
2 The 2D CAM is based on CamMagicW, but is limited to basic 2D CAM functions.
3 Parasolid is a registered trademark of UGS PLM Solutions Co., Ltd.
The above data is a comparison with designated machining conducted by Mitsubishi Electric using the conventional Mitsubishi FA Series.

Machining time reduced by up to **30%**

Digital V power supply improves machining performance in all ranges.

Wire consumption rate reduced by up to **44%**

The new control system (Intelligent Master) optimally controls the wire speed during machining.

Machining power consumption reduced by up to **58%**

Major power-usage reductions during continuous operation are achieved through the use of multifaceted cost reductions and the union of new technology.

* The left graph gives the values when the same machining amounts are compared.

Total power consumption reduced by up to **69%**

The combination of the above technology and the new “Sleep Mode” function greatly reduces the total energy used, including during idling.

* The right graph gives the values when the idle time is contained and the same machining amounts are compared. And NA used Sleep mode at the idle time.

The new energy-saving mode can be scheduled according to the current job ending time and your next day start time.

Once the scheduled start time is reached, the system restarts the fluid system thermally, stabilizing the machine for the next days work.

**Flat power feed terminal**

The flat shape makes it easy to index to the next location.

A total of 48 index locations can be used (24 on each side).

**Main tension roller**

Multiple indexing locations greatly reduces running costs.

**Large-diameter collection roller**

Large collection roller, now with multiple index locations, greatly reduces running costs.
Options

- UV-axis OPT-drive system
  - The OPT-drive system has been adopted for the UV-axis
- Wire processing unit
  - Spent wire is cut at discharge section
- Angle Master guide kit
  - Max. 45˚ taper machining possible using dedicated diamond guide
- 4-piece filter kit
  - 4-piece filter specifications reduce filter replacement frequency
- Lightings
- Advanced manual control box/standard manual control box
  - The advanced manual control box is provided with an LCD display, and can be used for positioning, zero set and AT operations
- High-accuracy wire-alignment device / Wire-alignment device
  - Use this device to align the wire to the table
- AT Master guide kit
  - Broken wire threading performance is improved when using the AT Enhanced mode and the Type Z guide kit. ø0.2, ø0.25 (.008, .010") sizes available.
- Tools
  - Tools (tool box)
  - Workpiece clamp set
- LAN/W
- FTP (S/W)
- DNC (DNC64W - S/W)

Wire-cut EDM automation system
- Accumulates workpiece measurement data
- Compatible for external set-up using a coordinate measuring machine
- Enables automatic measurement when measuring on an EDM
- Creates processes offline
- Automatically exchanges workpieces using a robot

Network connection specifications (DNC, FTP Options)

- Operator on the EDM side: and receives data from the personal computer
- Operator on the personal computer: to send data to the EDM
- Operator on the personal computer: to send data to the EDM
- Data communication: FTP
- Data communication: Standard

Data transmission

Required Specifications

- Standard data communication
- Data communication
- Standard

Required Data

- Standard data communication
- Data communication
- Standard

Data transmission

- FTP
- Standard

Network connection

- Operator on the personal computer: to send data to the EDM

Data communication

- Standard
- FTP
- UNIX

Commercially available DNC software must be installed on the personal computer. Refer to DNC Specifications for details on operation.
1. **Machining ControlMachine systems**

   **Power supply**

   **Control unit specifications**

<table>
<thead>
<tr>
<th>Compatible model</th>
<th>NA1200</th>
<th>NA4240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor</td>
<td>25 26</td>
<td>57</td>
</tr>
<tr>
<td>Power supply circuit</td>
<td>Regenerative transistor pulse type</td>
<td>Regenerative transistor pulse type</td>
</tr>
<tr>
<td>Cooling method</td>
<td>Current cooled/Thermal cooling</td>
<td>Current cooled/Thermal cooling</td>
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<tr>
<td>Anti-electrolytic power supply</td>
<td>Anti-electrolytic power supply in all modes</td>
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<tr>
<td>Maximum output current</td>
<td>500A</td>
<td>500A</td>
</tr>
<tr>
<td>Machine vibration selection</td>
<td>17 types</td>
<td>17 types</td>
</tr>
<tr>
<td>Setting weight</td>
<td>32 types</td>
<td>32 types</td>
</tr>
<tr>
<td>OFF timer</td>
<td>10 types</td>
<td>10 types</td>
</tr>
<tr>
<td>Stall detection circuit A</td>
<td>20 types</td>
<td>20 types</td>
</tr>
<tr>
<td>Stall detection circuit B</td>
<td>3 types</td>
<td>3 types</td>
</tr>
<tr>
<td>Stall detection circuit C</td>
<td>3 types</td>
<td>3 types</td>
</tr>
<tr>
<td>FM circuit (LA, LC, LD)</td>
<td>3 types</td>
<td>3 types</td>
</tr>
<tr>
<td>PM control</td>
<td>3 slots (changeable with kit code or screen)</td>
<td></td>
</tr>
</tbody>
</table>

   - Workpiece material: Steel, tungsten, copper, aluminum
   - Applicable only for rough-out conditions
   - Fast usable with CS mode

   **Power supply unit**

<table>
<thead>
<tr>
<th>Unit weight (kg)</th>
<th>660</th>
<th>660</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit weight (lb)</td>
<td>145</td>
<td>145</td>
</tr>
</tbody>
</table>

2. **Workpiece inclination compensation**

   - Floating decimal point function
   - Year, month, date display
   - 30-sec. short-circuit stop
   - Overlap window function

3. **Control specifications**

   - Control unit specifications

   | - Geometric function
   | - Stabilization circuit A
   | - Machining setting
   | - Maximum output current
   | - Power supply circuit
   | - PM control
   | - Sliding window function
   | - Unit weight (kg) (lb)
   | - Adaptive control
   | - Manual input positioning
   | - Sub-program
   | - Program number command
   | - Wire offset
   | - Optimum feed control
   | - Position command format
   | - Max. command value
   | - Setting unit
   | - Number of control axes
   | - Pointing device
   | - Model

4. **Machining Control**

   - Adaptive control
   - Manual input positioning
   - Sub-program
   - Program number command
   - Wire offset
   - Optimum feed control
   - Position command format
   - Maximum command value
   - Minimum driving unit (mm) (in)
   - Setting unit
   - Number of control axes
   - Pointing device
   - Model

5. **Machine Installation**

   - Preparation for machine installation

   | Machine installation preparation
   | - Checklist for Installing Machine
   | - Determining the machining details

6. **Precautions for Selecting Earth Leakage Breaker**

   - To prevent malfunctions caused by the external noise, connect earth leak breaker, etc. to the machine power supply input. By grounding one end of this link, an earth leakage current of approx. 30mA to 40mA passes through the filter. A highly sensitive earth leakage breaker can cause electric equipment failures.

   **Disposal**

   - The electric field, electric field lines, etc. are industrial waste. They must be disposed of following national and local laws and ordinances.

   **Harmonic Distortion**

   - If there is a harmonic distortion in this power supply, the machine operation could be affected because the filter could not function as designed.

   **Recommended Wire Electrode**

   - Always use the following applicable wire electrodes:

   **Recommended Sliding Surface Lubricant**

   - Use the following lubricants on the sliding surface.
Wire-cut EDM SYSTEMS

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI, 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

* Not all models are supported for all countries and regions.
* Machine specifications differ according to the country and region, so please check with your dealer.
* Processing data provided in this brochure is for reference only.