Advanced EDM Technology
Microhole & Fasthole EDM Prototype Parts and High Precision, High Production Machines

AA EDM CORPORATION
ISO 9001 : 2001 CERTIFIED

Better Microholes Make Better Injectors

EDM MACHINES FOR:

- Microholes for Fuel Injectors
  Perfect Geometry Hole within 5 Microns
  Diesel and High-Pressure Gasoline
  Orifice, Lift and Damper Plates

- Aerospace EDM
  Blades and Vanes
  Nozzle Guide Segments
  Combustion Liners

- Medical and Textile

- Hydraulic & Pneumatic Valve Spools

Valve Spools
Medical Devices
Aerospace Components

www.aaedmcorp.com
AA EDM CORPORATION custom designs, builds and maintains EDM hole drilling machines for the special requirements of high volume production. Our staff of engineers and technicians have many years of combined experience in custom EDM design, applications, automation and manufacture. Chances are if you have a custom high production EDM machine it was built by one of our employees.

AA EDM generators are a sophisticated design featuring multiple processors, digital signal processing and a unique and highly intuitive operator interface. AA EDM machines feature modular construction with a distributed architecture and fiber optic networking for better reliability and ease of maintenance with minimal footprint. The result is the fast and accurate production of parts on a versatile, reliable, easy to operate and long-lived machine. Our machines drill holes in a range of materials, including aluminum, carbides, inconel, steel and stainless steel using oil and water dielectrics. Holes can be produced with circular or non-circular shapes, K Factor (reverse taper) holes, deep or shallow entry angles, and small or large depth-to-diameter ratios—without burrs, surface distortion, minimal micro cracks and residual stress. The machines can have automatic flow test, adaptive control, laser markers, and vision systems designed in. We supply to a wide range of industries, from aerospace and automotive to power generation, medical and materials.
PATENTED REVERSE TAPER EDM HOLE ATTACHMENT

IMPROVED INJECTOR PERFORMANCE, INCREASED FUEL ECONOMY,
REDUCED EMISSIONS, INCREASED INJECTOR LIFE.

AAEDM’s patented reverse taper machines features our advanced microhole EDM generator with taper-specific software. It’s reverse tapered head is small, lightweight, durable, easy-to-install, and easy-to-use. It offers a superior way to increase versatility and productivity. You will be making better parts, more efficiently, overnight.

FEATURES:
- K-Factors up to 5 can be programmed!
- K-Factor can change with depth—to get a uniform taper
- Speed of orbit can change with depth
- Dual-axis capability for hole shaping—not just round tapered holes!
- Multiple patterns from conical to semi conical to irregular
- Holes can be straight on one edge and reverse tapered on the other
- Parts can have a combination of straight and K-Factor holes!

CHARACTERISTICS OF TYPICAL INJECTOR MICROHOLE:
- Size from 0.004” to 0.012” (100µm to 400µm) diameter
- Hole tolerance + or − 0.00005” (1.3µm)
- Hole depth : 0.40” to 0.80” (1mm to 2mm)

Patents: 7,019,247; 6,734,384; 5,951,883; 5,908,563

THE SYNERGY OF FOUR ELEMENTS:

1. Advanced Generator Technology
2. Bottom Dielectric Flushing
3. Electrode Guide Design And Material
4. Unsurpassed Applications Expertise
AA EDM Provides three styles of Microhole EDM Heads—the standard straight hole version, a triple wire guide version and a K-Factor head for making reverse taper holes. Depending upon your requirements we can supply the proper EDM Head.

**K-FACTOR (REVERSE TAPER) MICROHOLE EDM HEAD**

The K-Factor EDM head is our latest innovation. It allows you to make K-Factor or reverse taper holes. Unlike some on the market it is programmable – you can program the desired K-Factor and orbit speed to produce the taper you need. To change the taper just change the part program – no mechanical adjustments or alignment needed!

The heads all have automatic re-feed and can use stick or spool electrodes. They share the same mounting footprint but vary in depth. The Standard and Triple EDM Heads use our standard wire guides and the K-Factor head requires our new mini-style.

**FEATURES:**

- Programmable K Factors & Orbit RPM
- Change K with hole depth
- Change RPM with hole depth
- K Factor 0.1 to 5.5 in 0.1 steps
- Future capability – not limited to round holes!

\[ \Delta = \frac{K \text{Factor} \times \text{Hole Depth}}{100} \]

Typical 1mm deep hole produces the following:

<table>
<thead>
<tr>
<th>Inside Diameter</th>
<th>K Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10um</td>
<td>1.0</td>
</tr>
<tr>
<td>20um</td>
<td>2.0</td>
</tr>
<tr>
<td>30um</td>
<td>3.0</td>
</tr>
<tr>
<td>40um</td>
<td>4.0</td>
</tr>
<tr>
<td>50um</td>
<td>5.0</td>
</tr>
<tr>
<td>55um</td>
<td>5.5</td>
</tr>
</tbody>
</table>
DOUBLE & TRIPLE WIRE GUIDE MICROHOLE EDM HEADS

We developed the Double and Triple Wire Guide EDM Heads so manufacturers can make parts with multiple holes sizes or leave the machine setup for up to three different parts. Program the Y servo axis to position the proper guide on the nozzle and the machine automatically knows which guide to use. It takes care of re-feeding the proper electrode and maintains the EDM Gap automatically for each guide. The Triple wire guide EDM Head shown in production of a part with 6 holes – 2 of each size.

STANDARD MICROHOLE EDM HEAD

The Standard EDM Head is our workhorse EDM Head. It has a long history of rugged use in nozzle manufacturing. Combined with our innovative software and generator electronics and long lasting wire guides it has proven itself a winner.

Our standard Microhole EDM Head features a single wire guide and either stick or spool electrodes. The picture shows the spool attachment. Typically it is used with stick electrode as the electrodes available in stick form are made to a tighter tolerance.
**EDM Generator Architecture**

- Open system running Windows XP or Embedded XP
- Connects to plant networks
- Can run multiple EDM heads
- Real Time Gap Condition Indicators
- Connects to microhole or fasthole power boards to monitor and control EDM Pulse and control machine I/O
- Accurately controls servos for EDM Heads and up to 6 other axes

**Why Fiber Optic LAN?**

- Superior Noise Immunity in Hostile Environment
- Versatile Configuration Capability
- Freedom in Component Placement

**Operator Console**

- Touch Screen
- USB Flash Drives
- Controls Multiple Generators

**Microhole EDM Generator**

- Controls the pulse energy for accurate hole size and flow
- Senses shorts and arcs to eliminate microcracks and other defects
- Interfaces to machine automation
- Accurate control of open circuit gap voltage
- Microhole & Fasthole output boards give excellent surface finish and quality
Recipe for EDM Sparks

Simple menu format for EDM parameters and hole positions

Precise control plus monitoring of electrode wear

Simple adjustment of flow rates

Saving the hole thing - Sensing to the Rescue

Excessive or untreated Shorts and Arcs will diminish EDM quality significantly and effect wear.

To prevent these problems, Sensing Parameters are set to watch for and to avoid sustaining these unwanted degrading conditions.

Precise Movement by DSP Servo Control

- High-speed gap control of electrode position
- Electrode wear compensation
- Hole diameter control

High Volume Microholes > Need for Speed

- Part Throughput > 25 Per Hour
- EDM Cycles Faster than 25 Seconds
- Fast Servo Part Positioning
- Custom Robotic Part Handling
- We customized the automation and part handling to your needs
- The generator can interface to flow stands, laser markers, cameras, etc.
Designed for volume production of diesel fuel injectors, fuel metering components and other parts requiring precisely placed small holes with repeatable flow characteristics, the AA EDM MH5 microhole machine features intuitive operation, easy setup and maintenance and solid construction for long life. It can be configured either for single part load or for up to eight hours of continuous unattended operation. Multiple hole sizes can be accommodated in a single pass without the need to change the machine setup. The EDM performance is monitored on every hole so that defective parts can be unloaded to a reject bin and do not enter the normal production flow. Options include a flow stand to monitor resulting flow rates and an integrated laser marking and data logging system. Water dielectric systems are also available. If you need precision holes in a reliable, simple to use machine with a small footprint look no further than the AA EDM MH5 series of production EDM Machines.
## MH-5 TECHNICAL DATA

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Axis Travel</td>
<td>6” / 150mm</td>
</tr>
<tr>
<td>Y Axis Travel</td>
<td>6” / 150mm</td>
</tr>
<tr>
<td>Z Axis Travel</td>
<td>6” / 150mm</td>
</tr>
<tr>
<td>W Axis Travel</td>
<td>1” / 25mm</td>
</tr>
<tr>
<td>B Axis Head Tilt</td>
<td>110°</td>
</tr>
<tr>
<td>C Axis Rotary Table</td>
<td>360°</td>
</tr>
<tr>
<td>Machine Height</td>
<td>73” / 1864mm</td>
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<tr>
<td>Machine Weight</td>
<td>800 lbs. / 363 Kg</td>
</tr>
<tr>
<td>Electro Diameter</td>
<td>0.003-0.014” / 100-400 µm</td>
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<tr>
<td>Electrode Material</td>
<td>Any</td>
</tr>
<tr>
<td>Dielectric Fluid</td>
<td>Water</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>3 KVA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AAEDM Microhole Generator</td>
</tr>
</tbody>
</table>

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**Diagram:**

- Machine dimensions:
  - Height: 73 [1864]
  - Width: 90 [2280]
  - Depth: 53 [1600]
MH5G Gasoline Injector Production Microhole EDM Machine

Designed for volume production of gasoline fuel injectors, fuel metering components and other parts requiring precisely placed small holes with repeatable flow characteristics, the AA EDM MH5G microhole machine features intuitive operation, easy setup and maintenance and solid construction for long life. It is configured to run gasoline injector plates fed from a small vibratory feeder bowl for up to eight hours of continuous unattended operation. Multiple hole sizes can be accommodated in a single pass without the need to change the machine setup. The EDM performance is monitored on every hole so that defective parts can be unloaded to a reject bin and do not enter the normal production flow. Options include a flow stand to monitor resulting flow rates and a data logging system to log each EDM cut. Optional water dielectric systems are available. If you need precision holes in a reliable, simple to use machine with a small footprint look no further then the AA EDM MH5G series of production EDM Machines.

FEATURES:
- Precision microholes down to 0.004”
- 5 axis positioning
  X,Y,Z axis with 75x75x100mm travel B axis tilt 110 degrees C axis rotate 360 degrees
- Fully automatic part handling Vibratory feeder bowl holds hundreds of parts Vacuum transfer between stations Load Station from feeder EDM Station for EDM process Flow Station for testing
- Unload Station into Accept or Reject bin Touch Screen operation
- Easy to use touch allows quick operation selection and simplifies data entry Small Footprint and easy installation
- Making parts within 4 hours of install! Plexiglass Enclosure
- Keeps you safe but informed Adjustable Tilt Screen
- Eliminate operator eye strain and fatigue Automatic Part Checking by Integrated Flow Test and EDM Part Profile evaluation sends parts to the accept or reject tray Standard Allen Bradley PLC
- User friendly, world wide support MS Windows Based PC Control
- Connect to plant floor networks, for program storage, printing or use USB thumb drives, CD drives Its simple to use and widely accepted
The MH5G is specifically designed for Gasoline Injector Plates. It can handle dual hole sizes and any hole geometry – including number of holes as well as hole position and angles. The Feeder Bowl, transfer system, part fixtures and flow volumes will be customized to your requirements.

### MH5G-5 TECHNICAL DATA

<table>
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<th>FEATURES</th>
<th>DIMENSIONS</th>
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<td>Y Axis Travel</td>
<td>3” / 75mm</td>
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<tr>
<td>Z Axis Travel</td>
<td>4” / 100mm</td>
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<tr>
<td>B Axis Head Tilt</td>
<td>110°</td>
</tr>
<tr>
<td>C Axis Rotary Table</td>
<td>360°</td>
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<tr>
<td>Machine Height</td>
<td>90° / 2200mm</td>
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<td>Machine Weight</td>
<td>1000 lbs. / 400 Kg</td>
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<td>Electro Diameter</td>
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<td>Electrode Material</td>
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<td>Dielectric Fluid</td>
<td>Oil or Water</td>
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<td>PC Controls</td>
<td>Microsoft Windows™</td>
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<tr>
<td>Power Requirement</td>
<td>3 KVA</td>
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</tbody>
</table>
MH5P Lift/Orifice Plate EDM Machine

Designed for volume production of diesel fuel injector lift and orifice plates and other parts requiring precisely placed small holes with repeatable flow characteristics, the AA EDM MH5P Lift & Orifice plate microhole machine features intuitive operation, easy setup and maintenance and solid construction for long life. The parts are loaded and unloaded into tubes or cassettes for unattended operation. A vision system is used to insure proper plate orientation – it will flip and rotate the part so that is loaded properly into the EDM nest. The EDM head can be either a single guide or multiple wire guide head so that multiple hole sizes can be programmed. The B tilt axis or C index axis are optional. After EDM the water is removed from the part in the blow off station and the parts are oiled and placed into the completed parts tube (or cassette). The EDM performance is monitored on every hole so that defective parts can be unloaded to a reject bin and do not enter the normal production flow. Options include a flow stand to monitor resulting flow rates and an integrated laser marking and data logging system. Water dielectric systems are also available.
MH-5P TECHNICAL DATA

<table>
<thead>
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<th>FEATURES</th>
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<tbody>
<tr>
<td>X Axis Travel</td>
<td>6&quot; / 150mm</td>
</tr>
<tr>
<td>Y Axis Travel</td>
<td>6&quot; / 150mm</td>
</tr>
<tr>
<td>Z Axis Travel</td>
<td>6&quot; / 150mm</td>
</tr>
<tr>
<td>W Axis Travel</td>
<td>1&quot; / 25mm</td>
</tr>
<tr>
<td>B Axis Head Tilt</td>
<td>110°</td>
</tr>
<tr>
<td>C Axis Rotary Table</td>
<td>360°</td>
</tr>
<tr>
<td>Machine Height</td>
<td>73&quot; / 1864mm</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>800 lbs. / 363 Kg</td>
</tr>
<tr>
<td>Electro Diameter</td>
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<tr>
<td>Electrode Material</td>
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<tr>
<td>Dielectric Fluid</td>
<td>Water</td>
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<tr>
<td>Power Requirement</td>
<td>3 KVA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AAEDM Microhole Generator</td>
</tr>
</tbody>
</table>
**MF5 Micro-Flex Manual Load 5 Axis CNC Microhole EDM Machine**

Designed for production (Manual load) of diesel fuel injectors, fuel metering components and other parts requiring precisely placed small holes with repeatable flow characteristics, the AA EDM MF5 microhole machine features intuitive operation, easy setup and maintenance and solid construction for long life. Multiple hole sizes can be accommodated in a single pass without the need to change the machine setup with optional multi guide head. The EDM performance is monitored on every hole so that any part not meeting quality standards can be rejected. These statistics can be charted to an Excel program for downloading and printing. Options include special fixture designs around your part(s) which can be easily interchanged. Water dielectric systems are also available. If you need precision holes in a reliable, simple to use machine with a small footprint look no further than the AA EDM MF5 series of Manual EDM Machines.
### MF-5 TECHNICAL DATA

<table>
<thead>
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<th>FEATURES</th>
<th>DIMENSIONS</th>
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<tr>
<td>Y Axis Travel</td>
<td>4&quot; / 100mm</td>
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<tr>
<td>Z Axis Travel</td>
<td>4&quot; / 100mm</td>
</tr>
<tr>
<td>W Axis Travel</td>
<td>1&quot; / 25mm</td>
</tr>
<tr>
<td>B Axis Head Tilt</td>
<td>110°</td>
</tr>
<tr>
<td>C Axis Rotary Table</td>
<td>360°</td>
</tr>
<tr>
<td>Machine Height</td>
<td>85&quot; / 2156mm</td>
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<tr>
<td>Machine Weight</td>
<td>800 lbs. / 363 Kg</td>
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<tr>
<td>Electro Diameter</td>
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<tr>
<td>Electrode Material</td>
<td>Any</td>
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<tr>
<td>Dielectric Fluid</td>
<td>Water</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>1.5 KVA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AAEDM Microhole Generator</td>
</tr>
</tbody>
</table>
Designed for production (Manual load) of diesel fuel injectors, fuel metering components and other parts requiring precisely placed small holes with repeatable flow characteristics, the AA EDM MF1 microhole machine features intuitive operation, easy setup and maintenance and solid construction for long life. Multiple hole sizes can be accommodated in a single pass without the need to change the machine setup with optional multi guide head. The EDM performance is monitored on every hole so that any part not meeting quality standards can be rejected. These statistics can be charted to an Excel program for downloading and printing. Options include special fixture designs around your part(s) which can be easily interchanged. Water dielectric systems are also available. If you need precision holes in a reliable, simple to use machine with a small footprint look no further than the AA EDM MF1 series of Manual EDM Machines.
MF-1 TECHNICAL DATA

<table>
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<th>FEATURES</th>
<th>DIMENSIONS</th>
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<tr>
<td>W Axis Travel</td>
<td>1” / 25mm</td>
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<tr>
<td>Micro Head Head Tilt</td>
<td>0° - 70°</td>
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<tr>
<td>C Axis Rotary Table</td>
<td>360°</td>
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<tr>
<td>Machine Height</td>
<td>85” / 2162mm</td>
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<tr>
<td>Machine Weight</td>
<td>650 lbs. / 295 Kg</td>
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<tr>
<td>Electro Diameter</td>
<td>0.003-0.014” / 100-400 µm</td>
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<td>Electrode Material</td>
<td>Any</td>
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<tr>
<td>Dielectric Fluid</td>
<td>Water</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>1.5 KVA</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AAEDM Microhole Generator</td>
</tr>
</tbody>
</table>
The quality of the deionized water is essential to produce consistently high quality Microholes for injectors. High quality Microholes for injectors, with exact tolerances, surface finish, geometry, no burrs and fast cycle times can be attained only with excellent flushing with perfect dielectric water. Especially critical at the hole “breakthrough” inside of the injector is the quality of the dielectric water. Our EDM Dielectric System has been developed to produce highest quality Deionized Water for our Microhole EDM machines. Maintaining the critical parameters of the fluid is critical in the EDM process.

The performance of our Dielectric Water System is accomplished with our high quality components and system design. The system constantly monitors and adjusts the critical parameters. We offer 2 standard EDM Water Dielectric Systems, but we can design and build any size Water Dielectric System:

**WD-1** Designed for 2 x MF-5 EDM Machines
**WD-2** Designed for 8 x MF-5 EDM Machines

**CRITICAL PARAMETERS:**
- Distilled water, as pure as possible
- Resin of high purity
- Conductivity; final resistivity must be maintained to 1.5 ~ 3 MegOhm
- Filter 5 microns
- Filter pressure 70psi
- Flushing pressure 10psi
- Temperature 65 F
Our Advanced EDM Technology helps our customers manufacture many Injection System components that use EDM Microholes. Here are some examples of parts we have built using our Microhole EDM machines.

### Applications

**High Pressure Gasoline Direct Fuel Injector:**
- **Hole Diameter:** 0.145 mm
- **C-Bore Diameter:** 0.250 mm
- **Different Angles:** 24°, 18°, 12°, 0°

**Dual & Triple Head Wire Guide Microhole EDM Heads**

**Seal Plunger**

**Lift Plates**

**Diesel Injector**
This is a high volume production Diesel Injector with 7 holes, equally spaced. The injector is made of heat treated alloy steel at 62Rc. The improved design with multiple smaller holes leads to better fuel dispersions in the cylinder, higher rate burning, increased power, reduced pollution. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our MH5 Production Microhole EDM Machine, specially designed for high volume production of diesel fuel injectors. The EDM head has X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with carousel feeder, part orientation, part transfer. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and integrated laser marking with data logging system. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**
- Hole diameter 0.142mm [0.0056"] ± 3 µm
- Wall thickness 1.00mm [0.040”]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 7 Holes, one angle, equally spaced
- Cycle time = 18 sec/hole, 2.7 minutes per injector
- Flow Tolerance ± 2%
- Tungsten Electrode 0.13mm Diameter x 304mm Long. Cost $1.80/ea
- EDM 2,250 holes per electrode at a cost of $0.0008/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
This is a Diesel Injector with 8 holes, equally spaced, low profile. The injector is made of heat treated alloy steel at 62Rc. The improved design with multiple smaller holes leads to better fuel dispersions in the cylinder, higher rate burning, increased power, reduced pollution. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our MH5 Production Microhole EDM Machine, specially designed for high volume production of diesel fuel injectors. The EDM head has X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with carousel feeder, part orientation, part transfer. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and integrated laser marking with data logging system. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**

- Hole diameter 0.13mm [0.005”] ± 3 µm
- Wall thickness 0.81mm [0.032”]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 8 Holes one angles, equally spaced
- Cycle time = 18 sec/hole, 2.7 minutes per injector
- Flow Tolerance ± 2%
- Tungsten Electrode 0.1mm Diameter x 304mm Long. Cost $1.70/ea
- EDM 3,000 holes per electrode at a cost of $0.0006/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
This is a Diesel Injector with 9 holes at multiple spray angle, hole height and spacing. The injector is made of heat treated alloy steel at 62Rc. The improved design with multiple smaller holes leads to better fuel dispersions in the cylinder, higher rate burning, increased power, reduced pollution. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our MH5 Production Microhole EDM Machine, specially designed for high volume production of diesel fuel injectors. The EDM head has X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with carousel feeder, part orientation, part transfer. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and integrated laser marking with data logging system. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**

- Hole diameter 0.178mm [ .007” ] ± 3 µm
- Wall thickness 1.12mm [ .044” ]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 9 Holes multiple angles, locations
- Cycle time = 32 sec/hole, 5.2 minutes per injector
- Flow Tolerance ± 2%
- Tungsten Electrode 0.152mm Diameter x 304mm Long. Cost $2.05/ea
- EDM 2,250 holes per electrode at a cost of $0.0011/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
This is a Diesel Injector with 12 holes at multiple spray angle, hole height and spacing. The injector is made of heat treated alloy steel at 62Rc. The improved design with multiple smaller holes leads to better fuel dispersions in the cylinder, higher rate burning, increased power, reduced pollution. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our MH5 Production Microhole EDM Machine, specially designed for high volume production of diesel fuel injectors. The EDM head has X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with carousel feeder, part orientation, part transfer. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and integrated laser marking with data logging system. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**

- Hole diameter 0.33mm [0.0132”] ± 3 µm
- Wall thickness 1.5mm [0.060”]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 12 Holes multiple angles, locations
- Cycle time = 48 sec/hole, 6 minutes per injector
- Flow Tolerance ± 2%
- Tungsten Electrode 0.3mm Diameter x 304mm Long. Cost $2.50/ea
- EDM 2,250 holes per electrode at a cost of $0.0016/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
This is a Diesel Injector Needle Seal with 2 holes, different diameters at 90 degrees, low profile. The Needle Seal is made of heat treated alloy steel at 62Rc. The new EPA emission regulation for 2010 as well as Euro 5 emission standards prompted the development of this new common rail 40,000psi injection system. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our MH5 Production Microhole EDM Machine with one Generator and one Head with 2 different diameters electrodes, specially designed for high volume production of the Needle Seal with 2 Holes different diameters. The EDM head has 2 electrodes and X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with magazine feeder, part orientation, part transfer. There are 2 different EDM programs. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and integrated laser marking with data logging system. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**

- Hole diameter 0.22mm [0.0086"] ± 3 µm
- Hole diameter 0.24mm [0.0095"] ± 3 µm
- Wall thickness 0.71mm [0.028”]
- Wall thickness 1mm [0.040”]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 2 Holes, 90° apart
- Cycle time = 32 sec/part to part
- Flow Tolerance ± 2%
- Tungsten Electrode 0.21mm Diameter x 304mm Long. Cost $1.70/ea.
- EDM 3,000 holes per electrode at a cost of $0.0006/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
Gasoline Injector with 8 holes, 4 holes at 14 degrees and 4 holes at 24 degrees. The injector is made of stainless steel. Used in low pressure with flow within 1% for all parts. This new Gasoline Injector design dramatically increases fuel atomization in the cylinder, increased burning rate, lower pollution, increased fuel economy. High quality hole no burrs, no taper, no micro cracking, excellent surface quality.

This installation is using our Gasoline Injector Microhole EDM Machine, specially designed for high volume production of Gasoline Fuel Injectors. The EDM head has X-Y-Z servo axis plus servo Rotary Table. The EDM fixture holding the injector has one servo rotary axis. Using water dielectric system with back flush. Automatic operation with 8 hours of unattended operation with bawl feeder, part orientation, part transfer. The EDM performance is monitored on every hole so that defective parts can be unloaded to reject bin and do not enter the normal production flow. Flow stand monitor and with adaptive controls and data logging system maintains flow within 1% variation. On board graph screen to monitor part flow. Fiber Optic LAN for superior noise immunity in hostile environment.

**TECHNICAL SPECIFICATIONS:**

- Hole diameter 0.127mm [0.005”] ± 3 µm
- Wall thickness 0.30mm [0.012”]
- Surface Roughness Ra 0.4 µm
- Recast Layer 1-3 µm
- 8 Holes multiple angles, locations
- Cycle time = 6 sec/hole, 1 minute per injector
- Flow Tolerance ± 2%
- Tungsten Electrode 0.1mm Diameter x 304mm Long. Cost $1.70/ea
- EDM 4.500 holes per electrode at a cost of $0.0004/hole
- Electrode Guide cost $525/ea
- EDM 500,000 holes per Guide at a cost of $0.001/hole
### Machine Type
- **Diesel Fuel Injector** Microhole Machines with Reverse Taper (K-Factor EDM Heads)
- **Piston Check Machines**
- 5 axes fasthole counter bore machines
- **DOC Valve** Fasthole Machines
- **Damper Plate Machine**
- **Orifice Plate Microhole EDM Machines**
- **Barrel EDM Machine**
- **Manual Diesel Injector EDM Machine** (no automation)
- 6 Axis Dual Head Plate Machine
- 5 Axes Diesel Fuel Injector Microhole EDM Machines fully automated

### Machine Type
- **5 Axis Diesel Injector Machine** with automation and adaptive flow test
- **Seal Plunger 5 axis** fully automated Microhole EDM Machines

### Machine Type
- **5 Axes Diesel Fuel Injector Microhole EDM Generators, EDM Head and Controls**

### Machine Type
- **Twin Head 5 Axis Plunge EDM Machine** for Jet Engine Rotor Components
- **5 Axis 120 Amp Fasthole EDM Machine** for Liners and rings

### Machine Type
- **Gasoline Fuel Injector** 5 axes Microhole EDM Machines with Adaptive Flow Test

### Machine Type
- **120 Amp Fasthole EDM Machine** for Jet Engine Blade Repair

### Machine Type
- **120 Amp 6 Axis Fasthole EDM Machines** for Jet Engine Components

### Machine Type
- **120 Amp 6 Axis Fasthole EDM Machines** for Jet Engine Components
- **60 Amp EDM Generators and Heads** for Jet Engine Components
- **120 Amp EDM Generators and Heads** for Jet Engine Components
- **60 Amp 3 axes Die Sinksers** for Jet Engine Components
- **60 Amp 6 Axis Fasthole EDM Machines** for Jet Engine Components

### Machine Type
- **Dual Part Load 60 Amp 6 Axis Fasthole EDM Machine** with Linear Motor EDM Head for valve components

### Machine Type
- **Microhole EDM Generator** for Research Projects

### Machine Type
- **Diesel Injector 2 axis retrofit EDM Microhole Machines**
AA EDM history and advantages:

Our AA EDM patented and proprietary technology is the outgrowth of supplying over one thousand micro hole EDM machines since 1970. Our technology is constantly updated because we work closely with our customers and see what their needs are. Being a small company we maintain a focus on our area of expertise.

The core group of people in our company goes back to Raycon Corporation in the 1970’s where we developed the machines that they sold around the world. At Raycon we made the world’s first computer controlled EDM generator – the CP60. We developed and patented the use of flow testing to control EDM hole size in injectors. We started the EDM division of Ann Arbor Machine Company in 1992 and continued our innovation by improving cycle times and hole quality, a patent pending reverse taper (K-Factor) EDM head and adding ease of use features, vision systems and laser markers to our machines. Ann Arbor Machine Company was purchased in a leveraged buyout in 2005 and as a result had too much debt to withstand the auto industry meltdown and went into receivership. The losses incurred by the automotive related machine tool division of AAM were too high even though the EDM division had a very profitable year. So the group of people who had been together at Raycon and AAM bought the assets of AAM Company and formed AA EDM Corporation to continue doing what they do best – make Microhore and Aerospace production EDM machines.

Some of the advantages we have over others in the microhore EDM business are:

- Fastest cycle times while also producing the highest quality holes. Our sensing circuitry and high speed pulse control maintain that speed/quality relationship over many years of maintenance free operation.
- The EDM heads (there are several to choose from) use a brushless DC motor and DSP microprocessors to control the electrode precisely in the super-hard, super precise wire guide. Our standard straight hole has been in production for years, our K-Factor (reverse taper) patent pending head is fully programmable from straight holes to K-Factor of 5.5. We also make dual and triple wire guide heads that can make parts with multiple hole sizes or be used to quickly change from one part to another as the proper guides and electrodes are already loaded on the machine.
- Changing the machine from producing one part to another normally just involves selecting the proper part program from the computer screen and loading the correct electrode diameter. You may not even need to change the wire guide due to their wide range capability. However if the guide needs to be changed that can be done in less than 20 minutes. We even have a feature that can increase or decrease flow with just a press of a button without even changing the electrode.
- Our wire guides cover a wide range of electrode diameters – so you don’t need to stock lots of sizes. Five wire guide sizes cover a range of electrodes from 75 microns up to 400 microns (0.003” to 0.015”). Our guides cost $25 and last 500,000 holes – the competition charges almost 4 times that and they only make one fourth the holes! Our electrodes are available from several sources and cost less than $2.00 each. Compare that to proprietary electrodes that cost $28.00 each that our competitors require.
- Our machines are mechanically robust and reliable. They are easily serviced and maintained due to this design. Our customers report to us that they achieve a 96% uptime using our equipment (the highest uptime of any machines in their factories). Uptime means your machines are making your parts not waiting for service. It is reported to us that our competitor’s machines need a full time maintenance person just to keep their machines running.
- Our competitor’s machines are multiple EDM heads bolted together and have spindles that rotate the electrodes. We don’t spin the electrode which gives us many advantages over those that do. A lot can go wrong when you rely on spinning. Any run out of the spindle is disaster when making small holes. Bearings, contamination, complex expensive electrode guides that wear out, and electrode clamps as well as special electrodes all become ongoing problems. Repairs are expensive and time consuming. When one head is down all four heads have to be shut down to fix it. Spare parts are expensive because of the high tolerances involved. Even the electrodes are special and expensive.
- In contrast our machines are simple to maintain – no balancing or microscopes are required. Over 96% of our EDM heads are still in production and we have not had to replace a single component.
- Our wire guides are inexpensive and last for 500,000 holes. The electrodes make 2000 to 2250 holes per piece and cost less than $2.00 each. That translates to less than 1/10 of a cent per hole.
- The cost to run and maintain AA EDM microhore EDM machines is significantly lower than other suppliers. Our uptime is better and consumables such as electrodes and wire guides last longer and cost less. Simpler maintenance and more flexibility in setting up the machines for different parts all contribute to saving the customer money. Our machines don’t require dedicated maintenance personnel either.

In summary our advantages are:
- Fast cycle time (more parts per hour), precise repeatable holes.
- Simpler, easier to use machines with lower maintenance costs.
- Much lower costs of consumables.
- Higher uptime.
- Fast part change over.
- Multiple EDM head choices – single straight holes, programmable K-Factor or EDM heads with multiple wire guides. In a four headed machine you can mix and match the head to your needs.
Demo Work

Special EDM Machines

Special Electrode Cartridges

Diesel Injector Machines

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