



PORTABLE EDM BROKEN TAP REMOVER
EDM-2000H OPERATOR MANUAL



Introduction

The Haas EDM-2000H is a high-powered electrical discharge machine (EDM) designed for the removal of broken taps, drills, reamers, screws, plug gauges, and other metallic obstructions, without damaging the workpiece. It is suitable for components of various sizes, and is particularly effective for large machine parts, where traditional removal methods may be impractical or risk further damage.

This machine features a split-structure design, consisting of a separate chassis and storage box, which enhances operational flexibility, accessibility, and convenience.

PORTABLE EDM MACHINE

EDM-2000H Specs

EDM	S.A.E	Metric
Input Voltage	110 VAC	220VAC
Input Power	2000.0 W	2000.0 W
Output Voltage	DC75-80V	DC75-80V
Working Liquid	Purified, Distilled, or Deionized Water	Purified, Distilled, or Deionized Water
Electrode Chuck Diameter	0.039 - 0.393 in	1.0 - 10.0 mm
Max Travel of Work Head	2.756 in	70.0 mm
Short Hole Processing Speed (Material: Hardened Steel)	Electrode Ø0.157" (0.059 in/min) Electrode Ø0.393" (0.039 in/min)	Electrode Ø4 mm (1.5 mm/min) Electrode Ø10 mm (1mm/min)
Dimensions of the power box (L*W*H)	15.94 in × 8.66 in x 14.56 in	405 mm × 220 mm × 370.0 mm
Work Head Size (L*W*H)	12.40 in × 1.96 in × 1.96 in	315 mm × 50 mm × 50 mm
Pump Size (L*W*H)	2.36 in × 1.77 in × 2.16 in	60 mm × 45 mm × 55 mm
Packing Size	20.78 in x 12.71 in x 18.50 in	528 mm x 323 mm x 470 mm
Net Weight (kg)	35.3 lb	16.0 kg
Gross Weight (kg)	41.9 lb	19.0 kg

I. Overall Appearance



Figure 1: Overall Appearance

II. Components of EDM

1. The EDM-2000H is mainly composed of the work head (1), power box (2), and integrated case (3), which houses the external water pump and accessories.

2. Power box: The main control responsible for power, adjusting servo speed, and running the workhead.

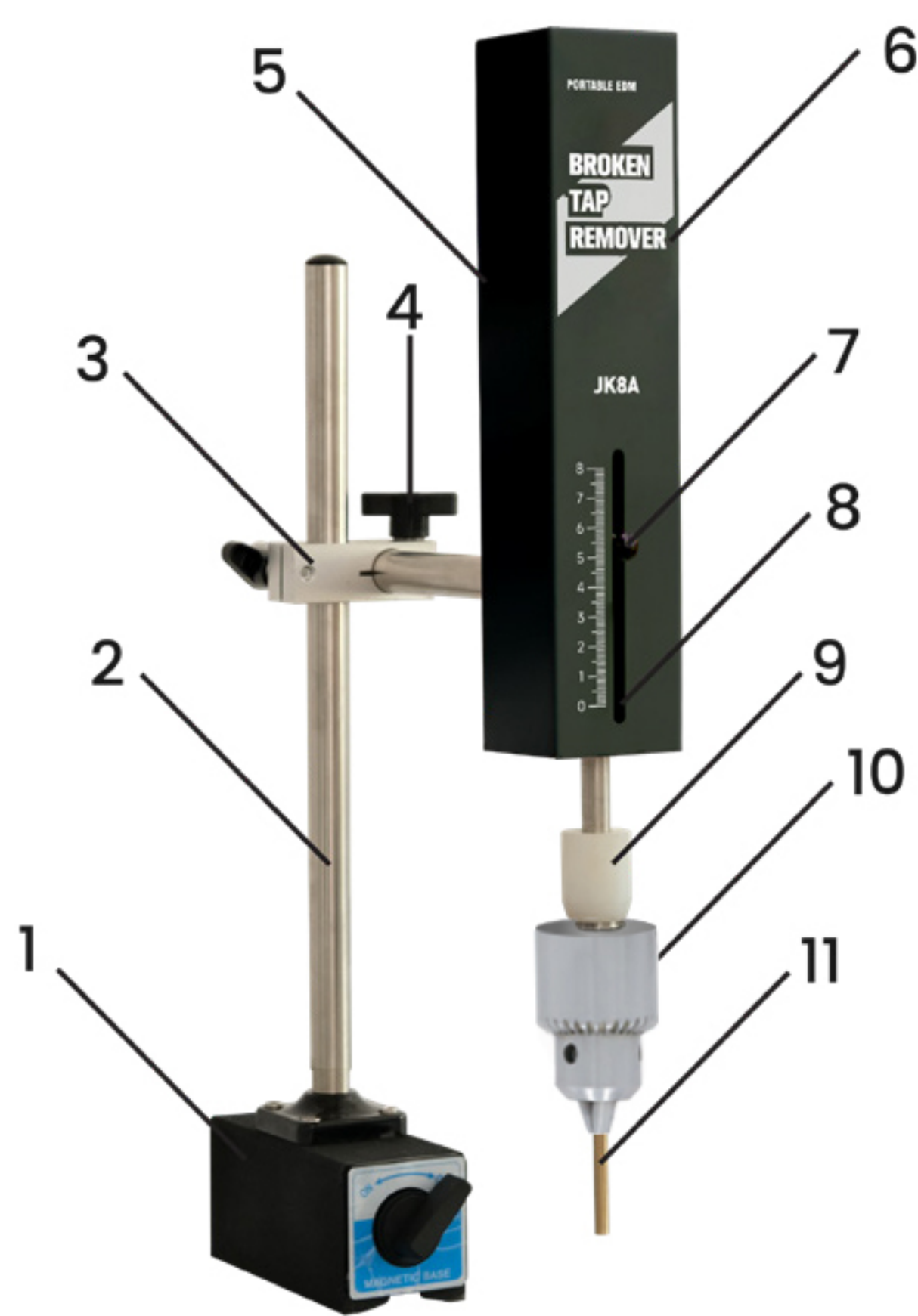
3. Integrated Case:

- Accessories Included:
 - Power cable
 - High-frequency cable
 - Servo cable
 - Water pump
 - Flexible pipe hose with magnetic base
 - Electrode chuck
 - Adapter sleeve

4. Consumables:

- Brass rod
- Hexagonal electrode (not included)
- Brass sheet

1. Work head parts:



- 1. Magnetic base
- 2. Lifting arm
- 3. Cross connector
- 4. Arm
- 5. Principal axis servo input interface
- 6. Work head
- 7. Depth setting locking screw
- 8. Depth ruler
- 9. Electrode chuck Connector
- 10. Electrode chuck
- 11. Electrode

Work Head Assembly (Figure 1.1)

2. Power Box:

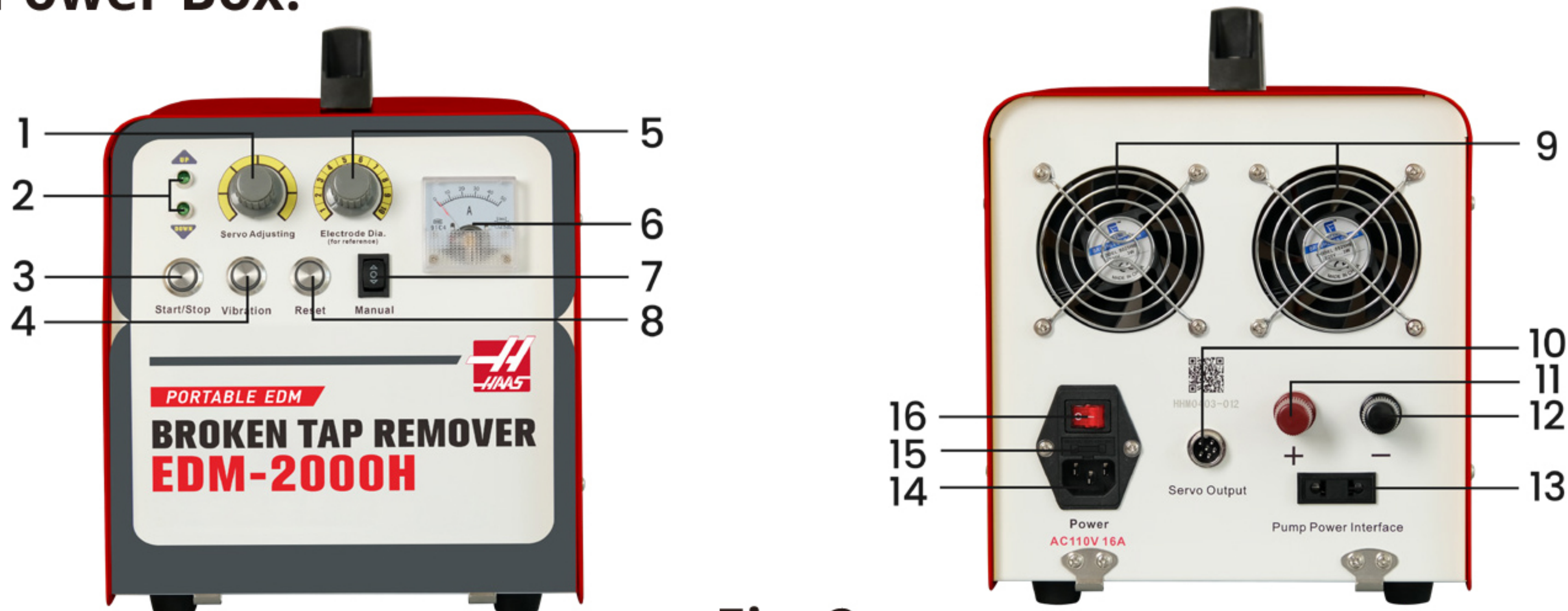


Fig. 2

- 1. Servo adjusting knob
- 2. LED indicators
- 3. Start/stop
- 4. Vibration
- 5. Electrode Dia. (for reference)
- 6. High-frequency current
- 7. Manual adjust
- 8. Reset
- 9. Fans
- 10. Servo output
- 11. Positive armature terminal
- 12. Negative armature terminal
- 13. Pump power output
- 14. Power socket
- 15. Protective fuse
- 16. Power switch

III. Operation Instructions

1. Installation Steps:

1.1 Work Head Assembly:

- Place the **magnetic base (1)** on a flat metallic surface and turn on the magnetic switch.
- Fasten the **lifting arm (2)** securely to the **magnetic base (1)**.
- Attach the **cross connector (3)** to the **lifting arm (2)**.
- Screw the **arm (4)** onto the rear of the **work head (6)** and connect it to the **cross connector (3)**.
- Assemble the **electrode chuck connector (9)** to the **work head (6)** using the screw found on the work head.

1.2 Circuit Connections:

- Attach the negative (blue) ring terminal to the electrode chuck connector and screw on the **electrode chuck (10)** to the **electrode chuck connector (9)**.
- Connect the fork terminal of the blue cable to the **negative armature terminal (12)**.
- Attach the servo control cable to the **servo port (5)** on the back of the work head.
- Connect the other end of the servo control cable to the **servo output port (10)** on the back of the power box.
- Connect the positive (red) fork terminal to the **positive armature terminal (11)**.
- Insert the power cord plug into the **power socket (14)** and connect the unit to a power outlet.
- Verify that all connections are secure.
- Complete the circuit by attaching the red alligator clip to the workpiece.

Notice! Ensure the positive and negative terminals are plugged into the correct ports on the power box.

1.3 Fluid Hose Connections:

The EDM-2000H offers two methods for fluid delivery: Through the flex hose with magnetic base, and through the electrode chuck.

Flex Hose with Magnetic Base Installation:

- Connect the hose to the brass barbed hose fitting on the flex hose.
- Attach the other end of the hose to the external water pump.
- Place the water pump in a container filled with distilled, deionized, or purified water, ensuring it is fully submerged to prevent damaging the pump.
- Connect the pump's power cord to the **pump power output (13)** on the back of the power box.

Through the Electrode Chuck Installation:

- Screw the provided brass barbed hose fitting onto the electrode chuck connector. The fitting can be found in the integrated case.
- Attach the hose to the brass barbed fitting on the electrode chuck connector.
- Connect the other end of the hose to the external water pump.
- Place the water pump in a container filled with distilled, deionized, or purified water, ensuring it is fully submerged to prevent damaging the pump.
- Connect the pump's power cord to the **pump power output (13)** on the back of the power box.

2. Processing Steps:

2.1 Choose the appropriate electrode and install it in the electrode chuck (refer to Section **VII. Selection of Electrode Size** for guidance). Manually adjust the work head's position and height, while making sure the electrode and broken tool are aligned to avoid damaging the workpiece.

2.2 After ensuring the electrode is aligned to the broken tool, lower the electrode about 2-3 mm (~0.07 - 0.11 inches) above the broken tool. Use the **depth setting locking screw (7)** and the **depth ruler (8)** to set your desired depth in millimeters. Ensure the **electrode diameter knob (5)**, also known as the current adjusting knob, matches the chosen electrode diameter. This knob is for reference and can be used to adjust the current, if needed.

2.3 Once the tool is aligned and above the broken tool, press the **Start/Stop button (3)** to begin cutting. As the work head begins descending, the down indicator will light up. Once the electrode gets close to the broken tool, the up and down indicator lights will begin alternating. As the electrode begins breaking the broken tool, you can adjust the discharge gap through the **servo adjusting knob (1)** to make the current stable and control processing efficiency. When the depth setting locking screw reaches 0 on the depth ruler, the work head will begin auto-retracting.

3. Usage of Reset

3.1 When the work head reaches the set depth, it will trigger the limit switch, automatically retracting, and sounding the alarm. At that point, press the **Reset (8)** button to resume processing and silence the alarm.

4. Manual Up and Down:

4.1 While the machine has power, the **Manual (7)** switch can be used to raise the work head or lower the work head

4.2 Press the Manual switch after pressing the Stop Button or Reset button to switch the work head back to manual mode.

5. Usage of the Vibration Button

5.1 For holes that don't require high precision, pressing the **Vibration (4)** button can be used to double the processing efficiency. By turning on this feature, the vibration motor will begin oscillating the electrode to clear the hole at a faster rate.

Notice! For high-precision holes, disable the vibration function, as the oscillation may reduce accuracy.

6. Shutdown Procedures

To shut down the machine, press the Start/Stop button to stop the EDM-2000H. The pump will turn off and the up indicator light will light up. The work head will begin to rise, moving the electrode away from the workpiece. Once the electrode is safely away, press the **power switch (16)** on the back of the power box to shut down the machine.

IV. Important Safety Warnings

1. The external water pump is an important part in the system. To ensure reliable performance, handle and maintain it with care.

1.1 Ensure only purified, deionized, or distilled water is used with the external water pump to prevent damage. After use, clean the pump to prolong its life.

1.2 When first turning on the water pump, wait 3-5 seconds for the water to flow out.

1.3 Before shutting down the machine in freezing conditions, ensure the pump is fully drained of water, to prevent damage.

2. While the machine is running, do not touch the electrode. After the machine finishes processing, touch the electrode with the alligator clip to discharge the unit and prevent shock.

3. Avoid using the machine in areas where heat treatment or electroplating is performed. Keep the unit away from areas where corrosive materials or a large amount of dust are present. Keep the machine dry, and protect its circuits from exposure to corrosive substances. After use, store the machine properly to protect it from foreign objects. Do not operate the machine in hazardous areas, such as the fire-restricted zones.

4. When the work head is at its upper or lower limit, retract it from the limit using the Manual switch to prevent it from remaining at the limit for an extended period of time.

5. The EDM-2000H is equipped with precision electrical components. When moving the unit, handle it carefully to avoid impact. Keep the unit away from machinery, such as stamping equipment or planers, that generate vibrations. After use, disconnect the unit, clean the machine, and store it properly.

6. The electrical conductivity of the workpiece and the placement of the positive alligator clip greatly influence the processing efficiency. Before running the machine, clean any rust or oxidation from the workpiece to attain better conductivity. The placement of the red alligator clip should be near the electrode to ensure the workpiece is not damaged by the electrical current.

7. After a period of use, the work head should be lubricated to ensure the good condition of the work head.

8. To avoid accidents, service must be performed by authorized personnel only.

V. Selection of Electrode Materials and Working Liquid

Electrodes are typically made from materials that are easy to process and resistant to electrical erosion, such as brass, copper, graphite, and copper-tungsten alloys.

The working liquid is the dielectric medium, which plays the role of cooling and chip removal. Dielectric mediums with low viscosity, high flash point, and stable performance are commonly used. Purified, deionized, or distilled water are examples of dielectric mediums.

VI. Troubleshooting

Issues	Causes and Solutions
After turning on the machine, the work head does not move.	<div>1. The power cord is not connected. Please connect the power cord again.</div> <div>2. Something is wrong with the servo controller. Please contact customer support.</div>
The pump does not work	<div>1. The pump is not fully submerged. Ensure the pump is fully submerged under water.</div> <div>2. The pump is blocked. Open the pump to clean the rotor.</div>
When the electrode touches the workpiece, there is no electric spark.	<div>1. The positive and negative cables are not connected correctly. Unplug and replug the connections.</div> <div>2. If not working, contact customer support.</div>

<p>The processing speed is good, but the hole is not very deep, and the electrode consumption is large.</p>	<ol style="list-style-type: none">1. The red and blue terminal connections are incorrectly connected. Ensure that the red and blue cables are correctly connected to the matching terminals.2. The electrode diameter is too small, resulting in a large electrical current. Adjust the electrode diameter knob and the servo knob to reduce the current. Excessive current increases wear, reduces processing depth, and causes instability with large ammeter fluctuations.
<p>The processing is unstable, the pointer of the ammeter swings back and forth with a large amplitude.</p>	<ol style="list-style-type: none">1. The servo knob is not set at the optimal position. Please adjust until ammeter stabilizes.2. The workpiece is not stable or the electrode is not clamped securely. Reposition the workpiece to ensure stability, and ensure the electrode is secured correctly.3. The water flow is inadequate and improperly directed. Adjust the position of the flex hose.4. After the processing reaches a certain depth, the electrode swings too much, resulting in unstable discharge. Raise the work head, adjust the position of the workpiece, and begin reprocessing. If issue remains, replace the electrode.

VII. Selection of Electrode Size

The electrode discharge area is generally about 0.5 mm diameter larger than the electrode. For example, an electrode of 3 mm diameter could process a hole of 3.5 mm in diameter. Select the electrode based on the processing conditions to prevent damage to the threads, and consider the discharge area accordingly.

Electrode selection for removing general broken objects.
Refer the following table:

Broken Items	Size	Recommended Electrode Size (mm)	Note
Tap	M3	Ø1.5	For the electrodes, the shorter, the better (there will be less jitter with a short electrode).
Tap	M4	Ø2.0	
Tap	M6	Ø3.0	
Tap	M8	Ø4.0	
Tap	M10	Ø5.0	
Tap	M12	Ø6.0	
Tap	M14	7×2	Sheet electrode
Tap	M16	8×2	
Tap	M30	10×2 Sheet electrode	Taps larger than M20 may need to be processed several times.
Screw	M3~M20	Recommended Method: drill a straight, triangular, square, or hexagonal groove, and remove it with matching tools.	

VIII. How to Remove Broken Taps, Drills, Screws, and Similar Tools

Broken taps, drills, and similar tools have a solid center, which allows the EDM-2000H to drill out the central portion. Before processing, please clean off any rust or oxidized layer. When processing deep holes or a workpiece in a deep channel, using a hollow electrode and high-pressure water pump could help increase the processing speed. (Figure 3)

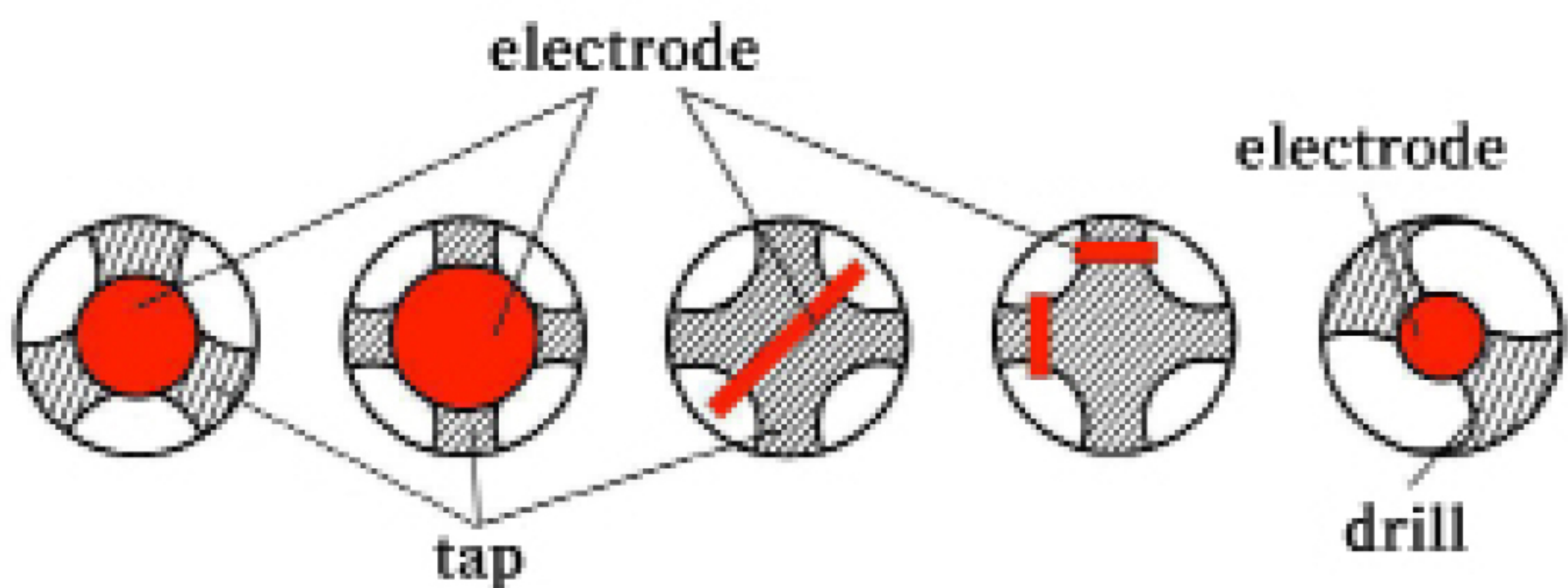


Figure 3

When the bolt’s diameter is too large or its grade exceeds 8.8, the standard processing method is unsuitable. You can create a groove of 2 - 3 mm depth with a sheet electrode and then unscrew the tap/screw using a screwdriver or hex wrench. If the processing position is too deep for general screw extraction, using a hexagonal rod and an Allen wrench would help. (Figure 4)

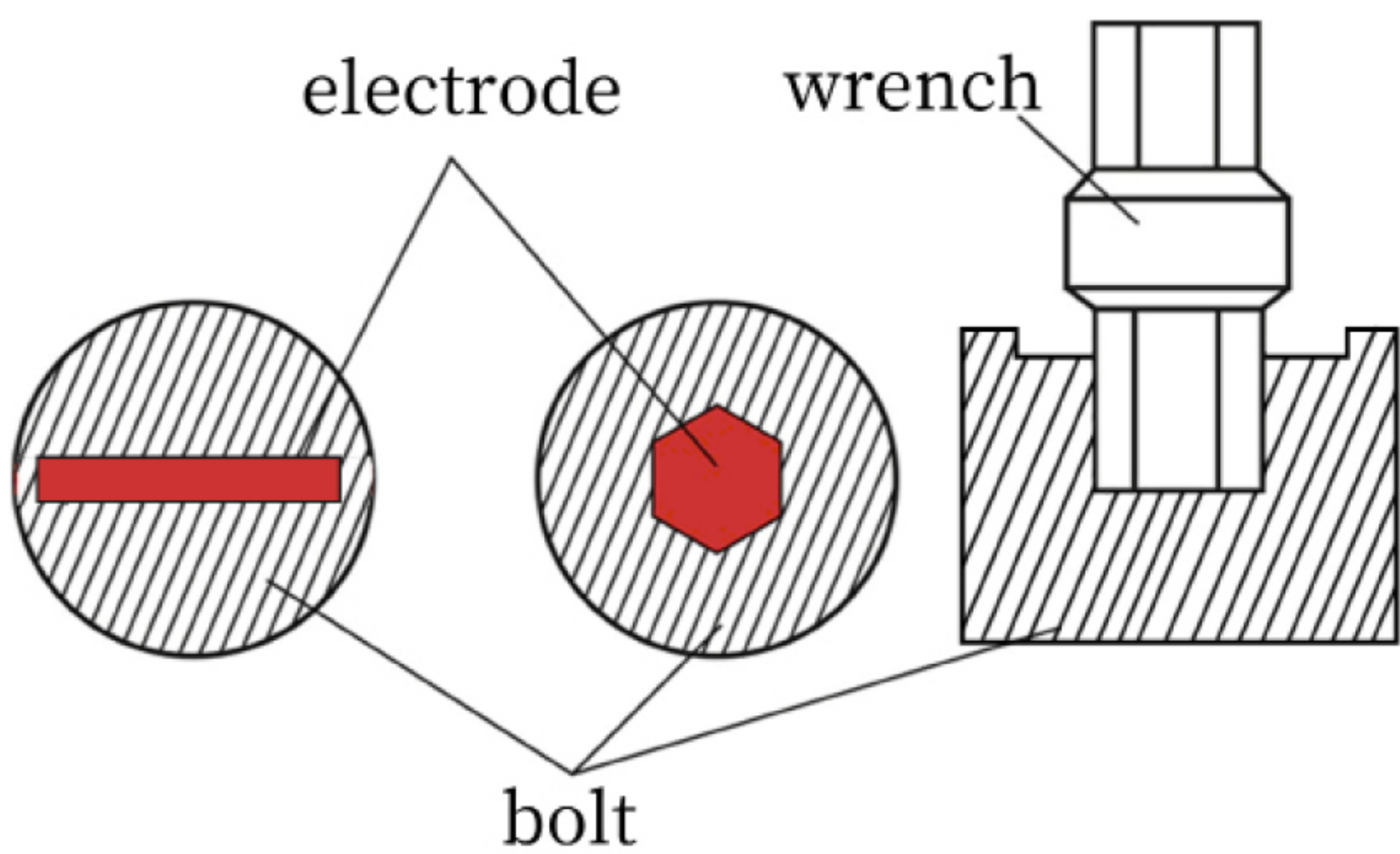


Figure 4

IX. How to Clamp the Electrode to Avoid Workpiece Damage

During electric discharge machining, the negative pole (blue line) should connect to the electrode chuck connector, and the positive pole (red line) should connect to the workpiece. As there is a slight gap between the alligator clip and the workpiece, the electric discharge may damage the workpiece. To avoid this, you can choose a threaded hole or insert a pin near the processing point to secure the red alligator clip, or clamp on a non-critical location. The clamping distance of positive and negative poles should stay close to each other to reduce the current loss. Ensure the workpiece is securely fixed and that the electrode is aligned with respect to the broken tool's center, as that is important for processing quality.

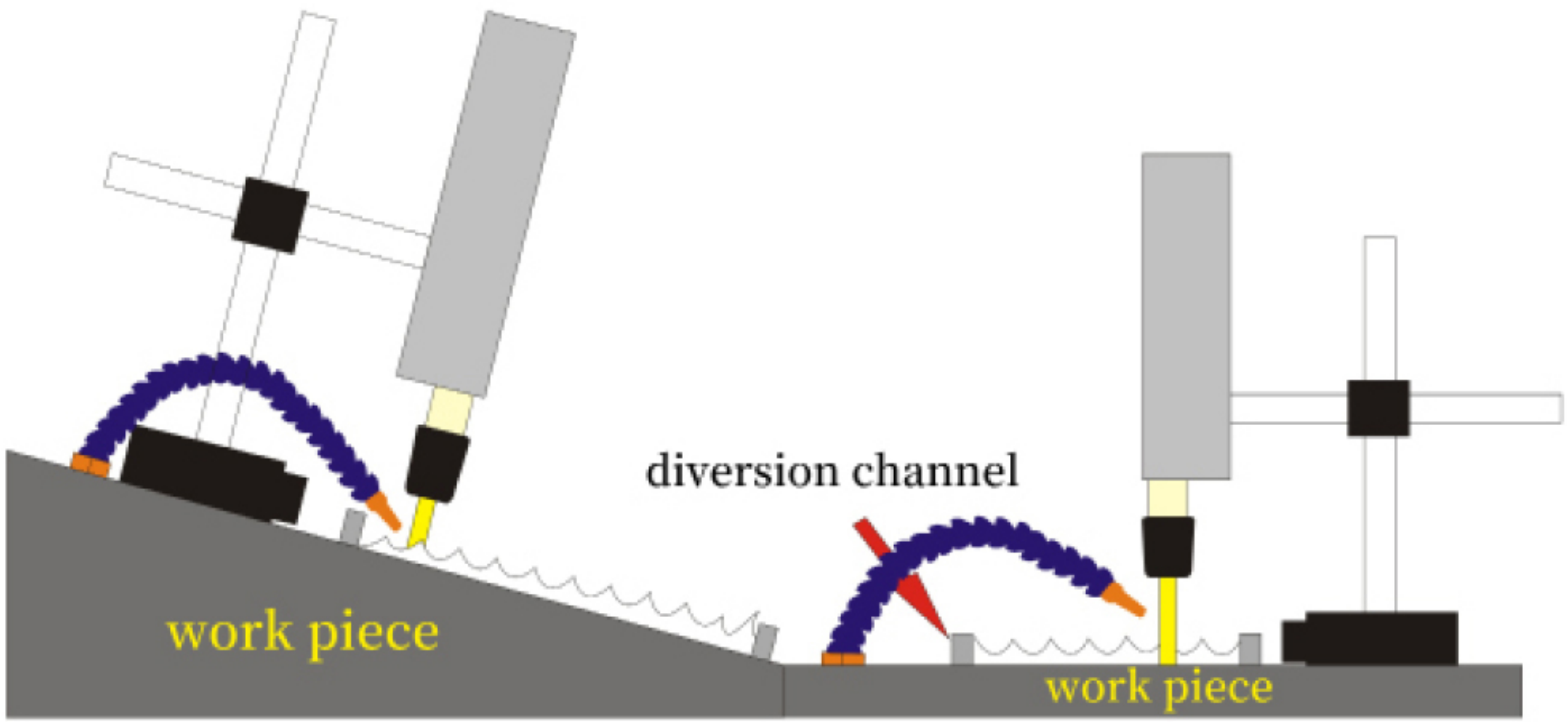
X. Schematic diagram of EDM processing methods

The portable EDM machine has a magnetic base and a cross stand to support the work head. It can be placed at any position and adjusted to the processing direction comprehensively. It can be applied to any size workpiece.

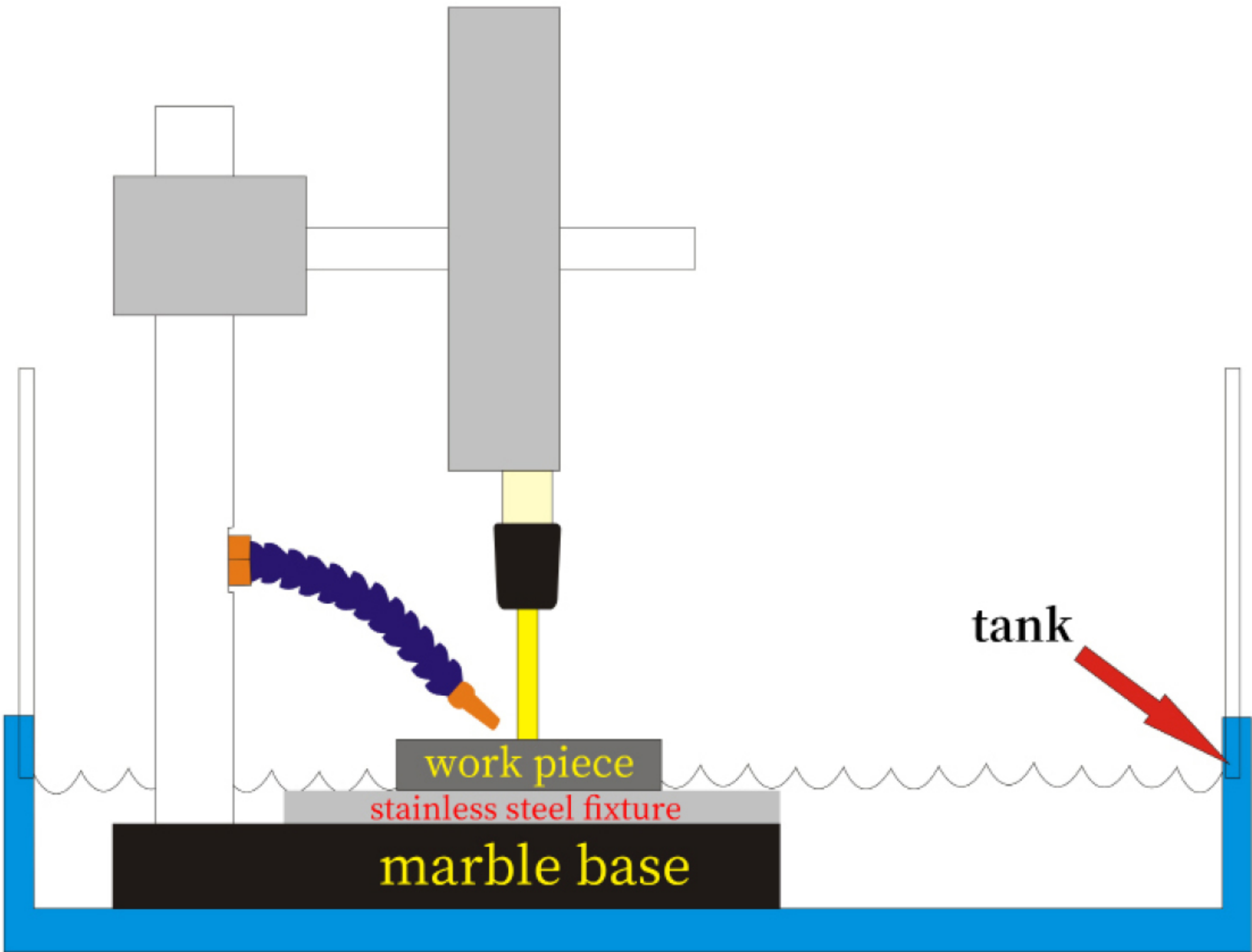
Here are examples of different processing methods:

Non-vertical Processing

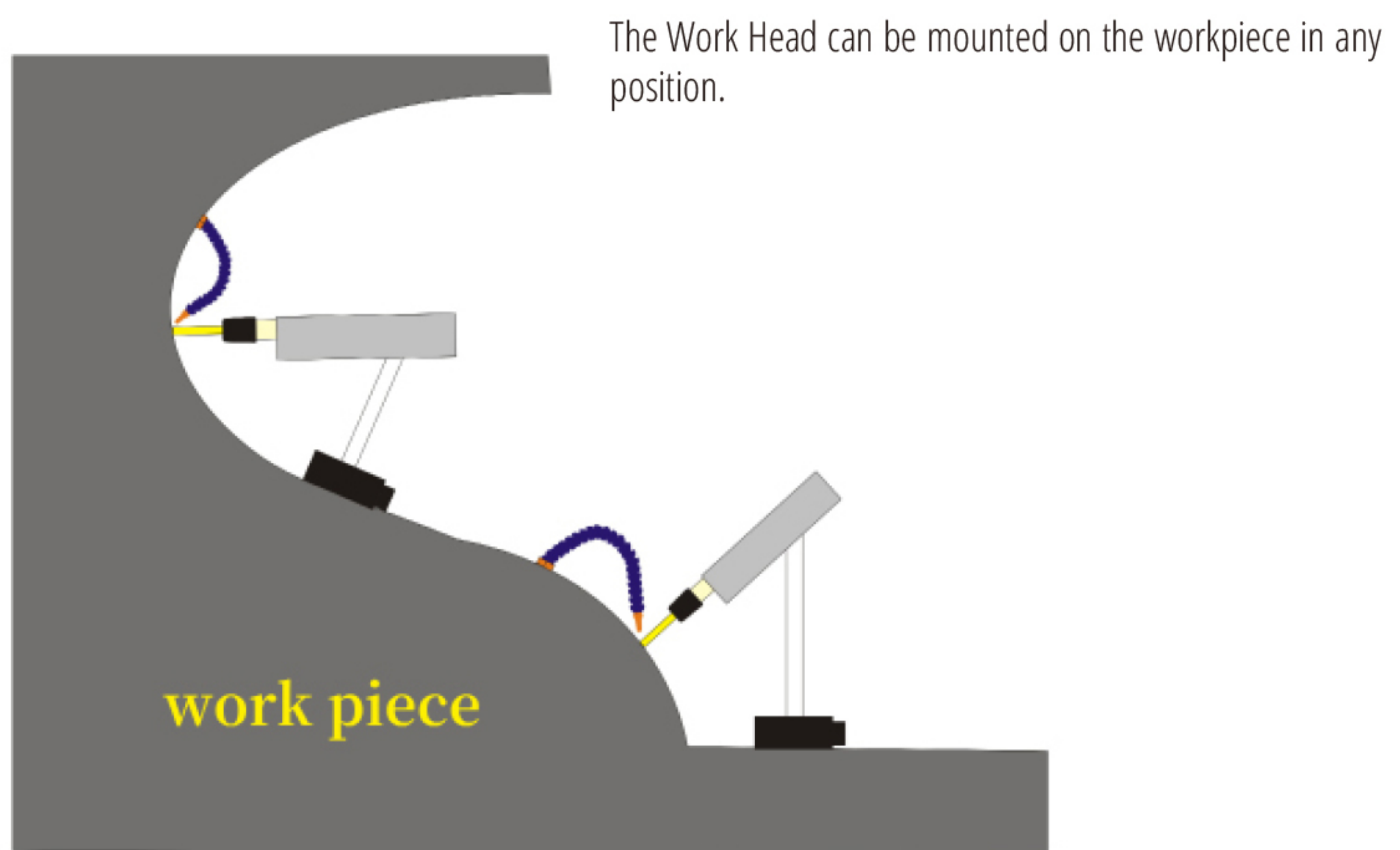
Build a diversion channel with a rag or tape



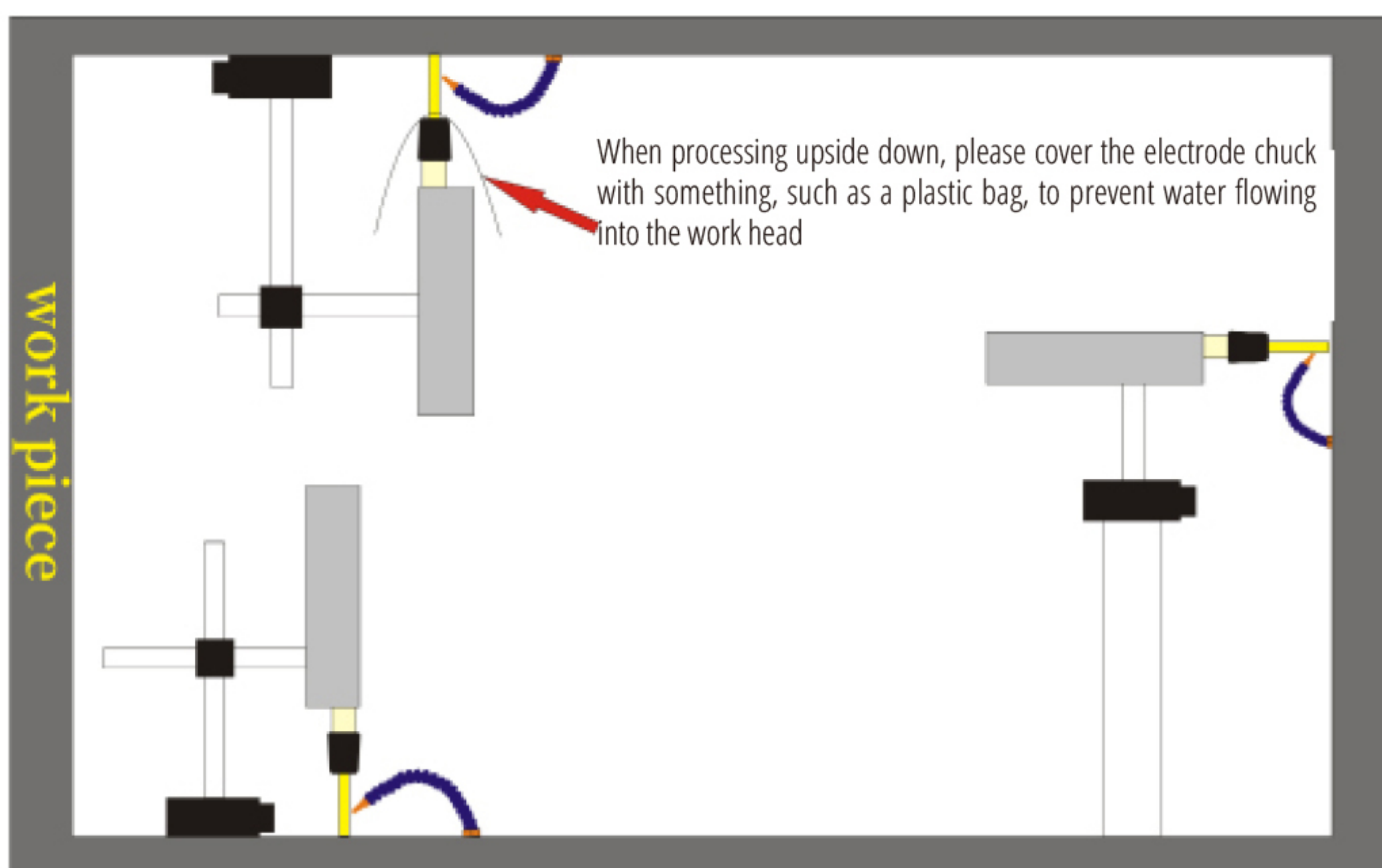
For vertical processing on a large workpiece: Attach the base directly to the workpiece and build a diversion channel under the work head to drain coolant outside.



For small workpieces: Use an appropriately sized container, and build a fixture to hold the work head and workpiece securely.



For large parts, such as castings: The machine can be directly attached to the workpiece, and the work head position can be adjusted to align with the broken tool. Ensure the flex hose is appropriately positioned.



When processing the inner wall of a large workpiece, the work head can be attached to the side part of the workpiece.

Notice! Depending on the orientation, ensure water does not enter the work head.



HAAS AUTOMATION, INC.

Address: 2800 Sturgis Rd, Oxnard, CA 93030

Tel: +1 (805) 278-1800

Website: www.HaasCNC.com