- 1. Which process utilizes electrolysis to remove metal from a workpiece?
- a) Chemical machining
- b) Electrochemical deburring
- c) Electrochemical grinding
- d) Electrochemical honing

Answer: c) Electrochemical grinding

Explanation: Electrochemical grinding is a process that uses electrolysis to remove metal from a workpiece. It combines the advantages of grinding with those of electrochemical machining.

- 2. What is the primary function of the electrolyte in electrochemical machining (ECM)?
- a) Lubrication
- b) Cooling
- c) Material removal
- d) Electrical insulation

Answer: c) Material removal

Explanation: The electrolyte in ECM acts as a medium through which the dissolved ions facilitate the removal of metal from the workpiece by electrochemical reactions.

- 3. Which type of power source is typically used in electrochemical machining?
- a) Direct current (DC)
- b) Alternating current (AC)
- c) Pneumatic

d) Hydraulic

Answer: a) Direct current (DC)

Explanation: Direct current is commonly used in electrochemical machining to provide the necessary electrical energy for the electrolytic process.

- 4. What is the purpose of the control system in electrochemical machining?
- a) To regulate the flow of electrolyte
- b) To adjust the voltage
- c) To maintain machining accuracy and consistency
- d) To control tool wear

Answer: c) To maintain machining accuracy and consistency

Explanation: The control system in ECM ensures that the machining process proceeds with the desired precision and consistency by regulating various parameters.

- 5. Which factor primarily determines the metal removal rate in electrochemical machining?
- a) Voltage
- b) Current density
- c) Electrolyte temperature
- d) Tool speed

Answer: b) Current density

Explanation: The metal removal rate in ECM is primarily determined by the current density, which influences the rate of electrochemical dissolution of the workpiece material.

- 6. Electrochemical deburring is primarily used for:
- a) Sharpening cutting tools
- b) Removing burrs from machined components
- c) Smoothing rough surfaces
- d) Adding surface texture

Answer: b) Removing burrs from machined components

Explanation: Electrochemical deburring is a process specifically designed to remove burrs, which are unwanted projections or rough edges, from machined components.

- 7. In electrochemical honing, the tool acts as:
- a) Anode
- b) Cathode
- c) Electrolyte dispenser
- d) Insulator

Answer: b) Cathode

Explanation: In electrochemical honing, the tool is connected to the negative terminal of the power source, making it the cathode in the electrochemical cell.

- 8. Which of the following is a common electrolyte used in electrochemical machining?
- a) Water
- b) Oil
- c) Sodium chloride solution
- d) Nitric acid

Answer: c) Sodium chloride solution

Explanation: Sodium chloride (salt) solution is commonly used as an electrolyte in electrochemical machining due to its ability to conduct electricity and facilitate the electrochemical reactions.

- 9. Electrochemical machining is a process suitable for machining:
- a) Only conductive materials
- b) Only non-conductive materials
- c) Both conductive and non-conductive materials
- d) Magnetic materials only

Answer: a) Only conductive materials

Explanation: Electrochemical machining can only be used to machine materials that conduct electricity, as the process relies on electrochemical reactions between the workpiece and the electrolyte.

- 10. What distinguishes electrochemical grinding from conventional grinding processes?
- a) Use of abrasive wheels
- b) Utilization of electrolyte
- c) High-speed rotation of the workpiece
- d) Absence of heat generation

Answer: b) Utilization of electrolyte

Explanation: Electrochemical grinding differs from conventional grinding processes by incorporating electrolyte to facilitate electrochemical dissolution of the workpiece material.

- 11. What type of surface finish is typically achieved through electrochemical grinding?
- a) Rough
- b) Smooth
- c) Matte
- d) Textured

Answer: b) Smooth

Explanation: Electrochemical grinding typically produces smooth surface finishes due to the combined mechanical and electrochemical action on the workpiece material.

- 12. Which of the following is NOT a common application of chemical machining?
- a) Etching patterns on semiconductor wafers
- b) Fabricating microfluidic devices
- c) Removing material from aerospace components
- d) Sharpening cutting tools

Answer: d) Sharpening cutting tools

Explanation: Chemical machining is not typically used for sharpening cutting tools, as it is more commonly employed for etching, shaping, or removing material from larger components.

- 13. Chemical machining primarily relies on:
- a) Mechanical abrasion
- b) Thermal energy
- c) Chemical reactions

d) Electrical discharge

Answer: c) Chemical reactions

Explanation: Chemical machining relies on chemical reactions between the workpiece material and the etchant to selectively remove material, rather than mechanical or thermal means.

- 14. What is the main advantage of electrochemical deburring over mechanical deburring methods?
- a) Higher material removal rate
- b) Greater precision
- c) Lower cost
- d) Reduced tool wear

Answer: b) Greater precision

Explanation: Electrochemical deburring offers greater precision compared to mechanical deburring methods, as it can target specific areas with burrs without affecting surrounding surfaces.

- 15. Which of the following is a common material used as a tool electrode in electrochemical machining?
- a) Copper
- b) Aluminum
- c) Titanium
- d) Stainless steel

Answer: a) Copper

Explanation: Copper is commonly used as a tool electrode in electrochemical machining due to its conductivity and compatibility with the electrochemical process.

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