

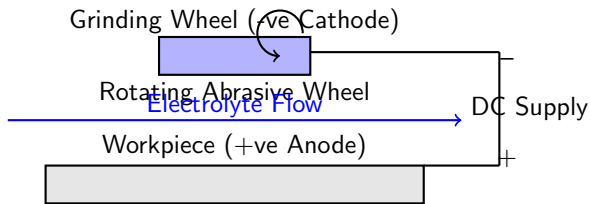
Electrochemical Grinding (ECG)

Advantages, Disadvantages, and Applications

Based on PC Pandey's *Modern Machining Processes*

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ECG Process Diagram



Advantages of Electrochemical Grinding

- Minimal grinding wheel wear due to dominant electrochemical action.
- Produces smooth, burr-free, and stress-free surfaces.
- No thermal damage to workpiece (cool electrolyte).
- Ideal for hard, brittle, and heat-sensitive materials.
- High accuracy and excellent surface finish achievable.

Disadvantages of Electrochemical Grinding

- Low metal removal rate; not suitable for large-volume production.
- High initial cost and complex setup.
- Requires conductive materials only.
- Handling and disposal of electrolytes require care.
- Limited to surface and profile grinding operations.

Applications of Electrochemical Grinding

- Sharpening of surgical needles and other medical instruments.
- Grinding of turbine blades and aerospace components.
- Reconditioning of carbide tools.
- Removal of fatigue cracks in critical components.
- Machining of fragile or thin-walled parts without deformation.

Summary and Conclusion

- ECG combines electrochemical and mechanical processes.
- Offers high precision and surface quality with minimal damage.
- Best suited for small, delicate, and difficult-to-machine parts.
- Limitations include low productivity and high setup cost.
- Valuable in aerospace, medical, and tool reconditioning industries.