1. Surface must be free of dirt, dust, oil and any other contaminants. Also, porous or rough surface is desirable to improve adhesion

2. 
1) Particular manufacturing process 
2) Work piece material 
3) Tool or die material 
4) Processing parameters 
5) Compatibility of the fluid with the tool and die materials and the work piece. 
6) Required surface preparation 
7) Method of fluid application 
8) Removal of fluid and cleaning after processing 
9) Contamination of the fluid by other lubricants 
10) Storage and maintenance of fluids 
11) Treatment of waste lubricant 
12) Biological and Environmental considerations 
13) Costs involved in all of the aspects listed

3. Stabilize the arc 
Stabilize the arc 
Generate gases to act as a shield against surrounding atmosphere. 
Control rate at which the electrode melts 
Acts as flux to protect against formation of oxides, nitrides, and inclusions 
Add alloying elements to the melt zone, enhance the properties of joint

4. 
• High Quality 
• Minimal pores 
• Uniform material structure 
• Low distortion 
• Little microstructural changes 
• No shielding gases 
• No surface cleaning required 
• Thickness of weld in a single pass ranges from 1mm to 50mm

5. The system of classification refers to the number of .5 micrometers (10^-6) or larger particles in within a cubic foot of air

6. Process by which the geometric patterns that define devices are transferred to the substrate surface. 
Types: Ultraviolet (Photolithography), X-ray, and Electron beam.
7.
• Sparks
  – Sparks produced from grinding are actually glowing hot chips.
• Tempering
  – Excessive heat, often times from friction, can soften the work-piece.
• Burning
  – Excessive heat may burn the surface being ground. Characterized as a bluish color on ground steel surfaces.

8.
• Process capabilities/advantages
  – Can be used on any material up to 1” thick
  – Cuts can be started at any location without predrilled holes
  – No heat produced
  – No flex to the material being cut
    • Suitable for flexible materials
  – Little wetting of the workpiece
  – Little to no burr produced
  – Environmentally safe

9.
An operation used to make an existing hole dimensionally more accurate and/or to improve surface finish

10.
Bench
Special-purpose
Tracer
Automatic
Automatic screw machines
Turret
Computer Controlled (CNC)

11.
• Continuous
• Discontinuous
• Serrated or Segmented
• Built Up Edge

12.
1. Surface finish and surface integrity of the machined part.
2. Tool life.
3. Force and power required.
4. The level of difficulty in chip control.
13. Both thermosets and thermoplastics

14. • Produces an example of a part from a CAD drawing before production.
   • Additive, subtractive and virtual.

15. The powder metallurgy process
   – Powder production
   – Blending
   – Compaction
   – Sintering
   – Finishing operations

16. • Metal powders are explosive because of the high surface area-to-volume ratio (mostly aluminum, magnesium, titanium, zirconium, and thorium)
   • Must be blended, stored, handled with great care
   • Precautions
     – Grounding equipment
     – Preventing sparks
     – Avoiding friction as a source of heat
     – Avoiding dust clouds
     – Avoiding open flames
     – Avoiding chemical reactions