Welding Hazards

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Introduction

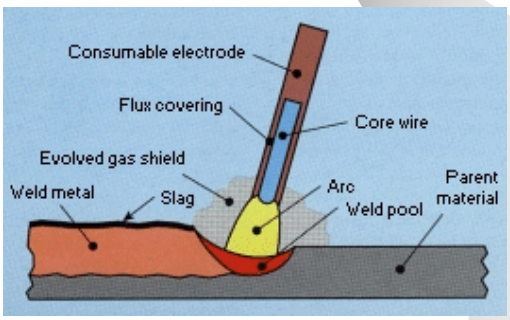
- Welding fuses metal parts together
- Hot process, generates toxic gases, fumes and physical hazards
- It is a common process, encountered in many situations

Learn About Welding Hazards and Processes

- SMA, MIG, TIG, and other processes
- Fumes and gases that are generated

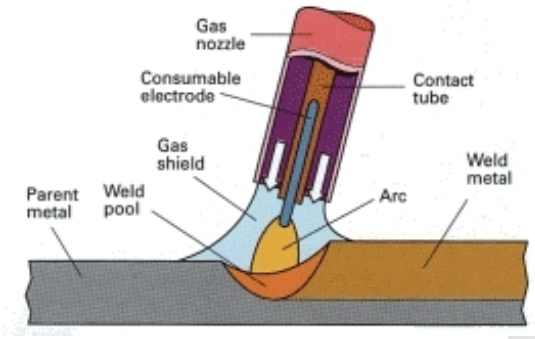
Shielded Metal Arc Welding

- Manual metal arc welding
- Cellulosic electrodes
- Rutile electrodes
- Basic electrodes
- Video



Gas Metal Arc

- Carbon dioxide
- High UV
- Little slag
- Mechanized



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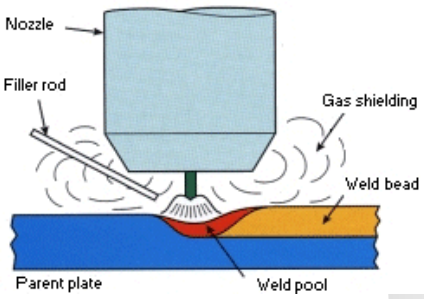
Gas Tungsten Arc

- Tungsten Inert Gas (TIG)
- Tungsten electrode, filler metal
- Helium or argon shield
- Ozone and NO_x
- http://www.youtube.com/watch?v=X9LGKKrncas&feature



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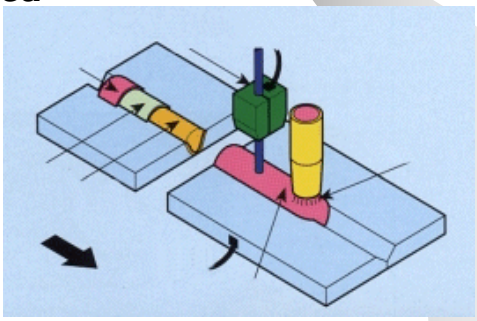
Submerged Arc Welding

- Continuous fed, in flux powder
- Reduced UV and fume
- HF may be generated

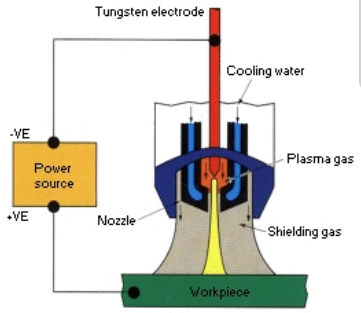


Flux Core Arc Welding

- Metal surrounds flux core
- May be a shielding gas used

Plasma Arc Welding

- 30,000 C (ionize argon).
- Transfer metal ions.
- Noise (115 dB), ozone (8.3 ppm), NO_2 (9.6 ppm), metal fume.



Soldering and Brazing

- Lower temperature operations.
- Soldering less than 450 C.
- Brazing above 450 C.
- Oxyacetylene process uses oxygen and acetylene. MAPP gas is methylacetylene-propadiene. Flame up to 3200 C.
- Soldering low hazard.
- Brazing potentially high fume exposure.

Respiratory Hazards

- Metal fumes
  - Stainless 18 % Cr, 10 % Ni
  - Steel may have lead
  - Mild steel, low alloy steel: no Cr
  - Metal coatings
- Gases generated
  - Ozone from UV
    - GTA, GMA on Al
    - Oxyacetylene cutting

Air Concentrations Generated

- Fume Generation rate
  - SMA 300 – 800 mg/min
  - GMA 200 – 500 mg/min
  - Flux core 900 – 1300 mg/min
  - GTA 3 – 7 mg/min
  - Oxyacetylene cut 200 – 700 mg/min
- Particle size < 1 um
  - Concentration up to 30 mg/m^3

Acute Respiratory Hazards

- Metal fume fever
  - Zinc oxide, polymers, other metals
- Pneumonitis
  - Alveolar damage
  - Phosgene, ozone, cadmium, NO_x, phosphine, manganese

Chronic Respiratory Hazards

- Arc welders pneumoconiosis.
  - Iron oxide exposure.
  - Shadows on x-ray.
  - Unknown physiologic damage.
- Lung cancer.
  - IARC classifies welding as possibly carcinogenic to humans.

Safety Hazards

- High current
- Fire and explosion
- PPE Required