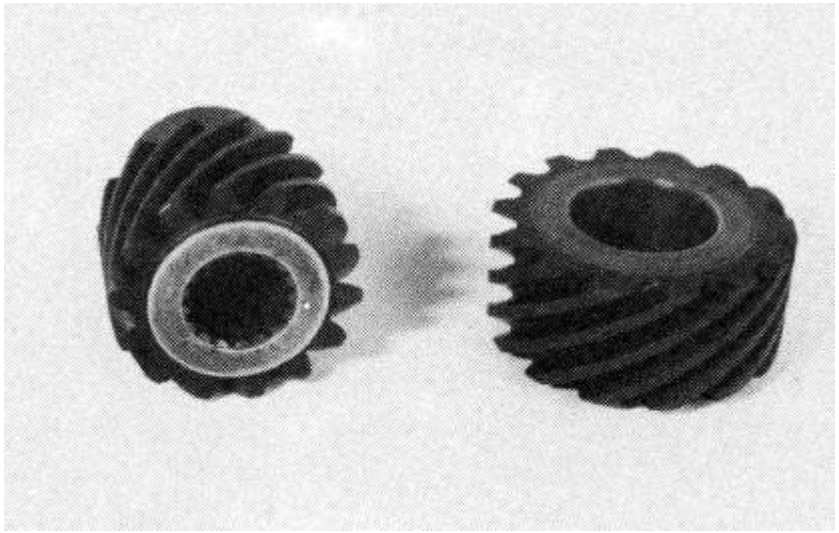
Boronizing

Bodycote

Boronizing – What is it?

- Boronizing is a boron diffusion process where a hard wear resistant case can be formed under the surface of a wide variety of ferrous and non-ferrous material.

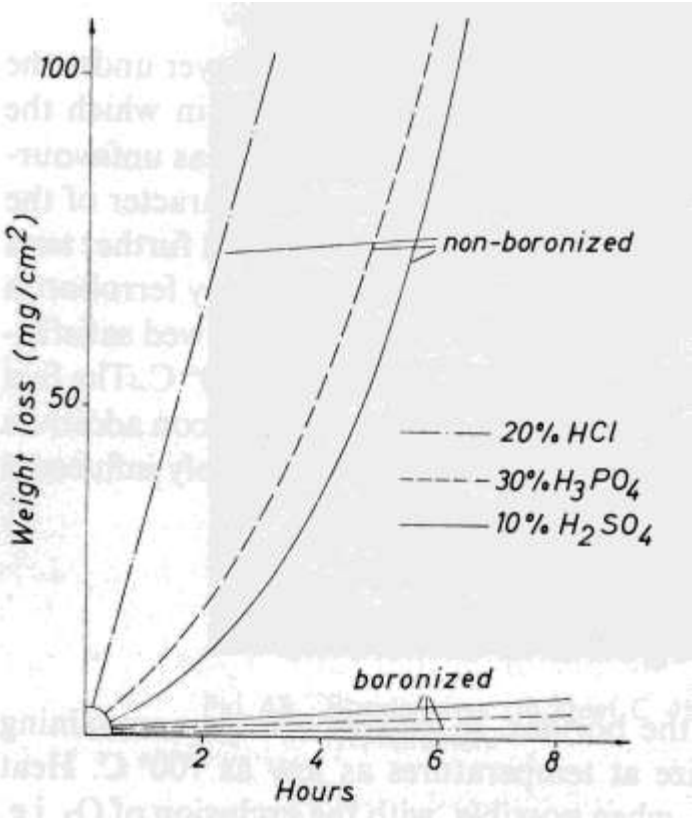
- During the boronizing process, boron atoms diffuse into the metal surface and form metal borides. With ferrous materials, the boride layers attain a hardness of between 1500HV to 2300HV



Boronizing – Results of process

- Typical case depths range from .0005”-.006” (12–150 um)
- Iron - boride compound hardness is 1500-2300 HV
- Hardness is not affected by temperatures up to 1200F.
- Good corrosion resistance to acids
- Reduces coefficient of friction
- Increases fatigue life
- Can often be combined with other heat treatments to improve the properties of the base metal as well.
  - Neutral hardening
  - Carburizing
  - Induction hardening
  - Solution Treat & Age (PH steels, Inconel

Boronizing – Physical Properties

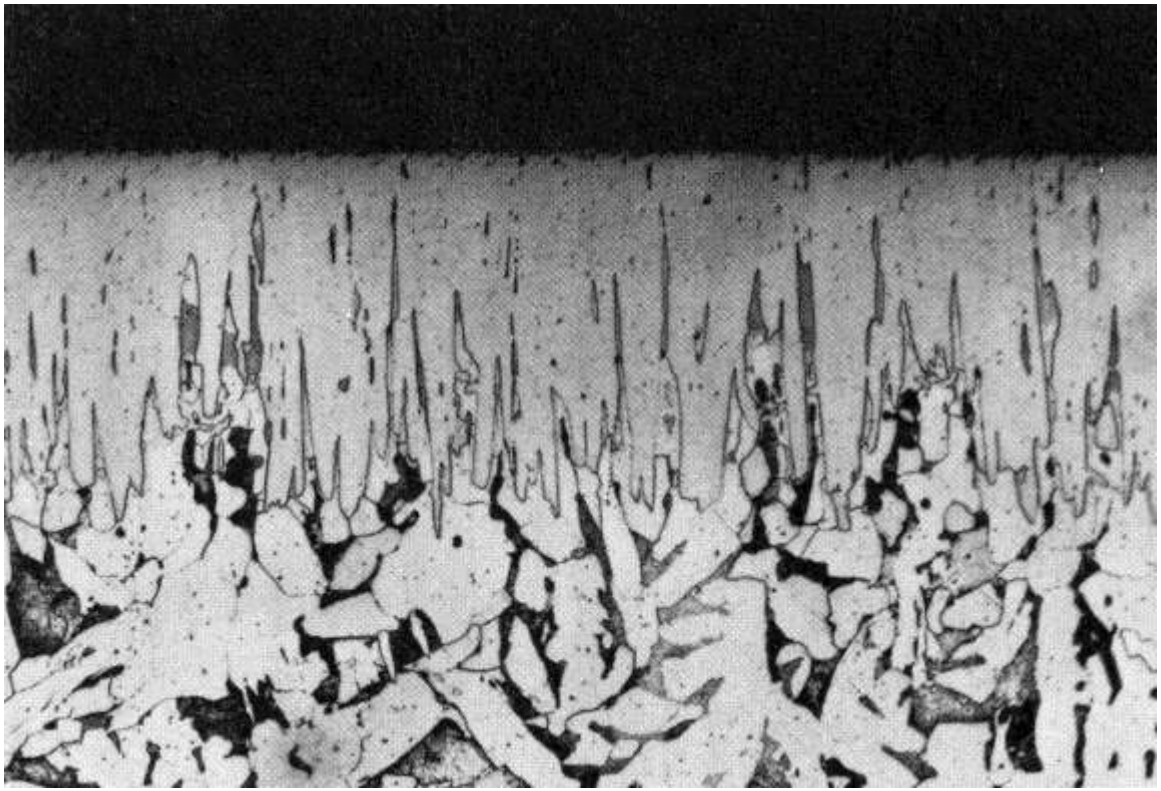


- Resistance to acids

  Boronized and un-boronized samples of 1045 steel were exposed to the following acids and measured for weight loss

  - 20% Hydrochloric acid (HCl)
  - 30% Phosphoric acid (H_3PO_4)
  - 10% Sulfuric acid (H_2SO_4)

Boronized microstructures



.006” (150 micron) deep single phase Fe_2B compound layer on 1015 steel boronized at 1650F for 4 hours

Boronizing Applications

- Materials that can be processed
  - Ferrous materials
    - irons, plain carbon, alloy, stainless, and tool steels are all possible. This is because the boride compound formed is an iron boride so we only need iron to be present in the material to do this
  - Nickel-based alloys
  - Cobalt-based alloys
  - Molybdenum
  - Sintered carbides