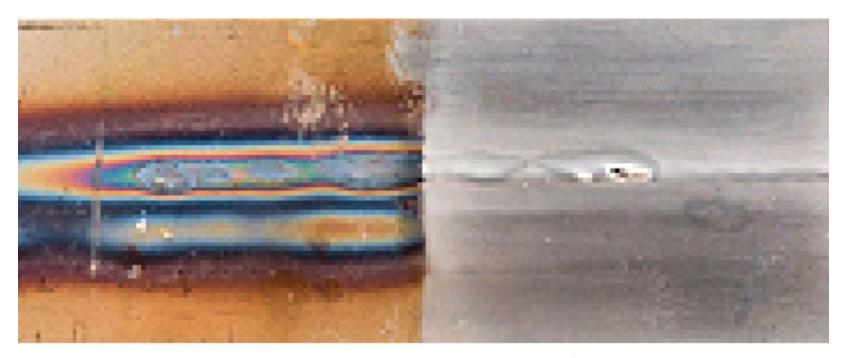
Cleaning Stainless Steel After Welding



Before After

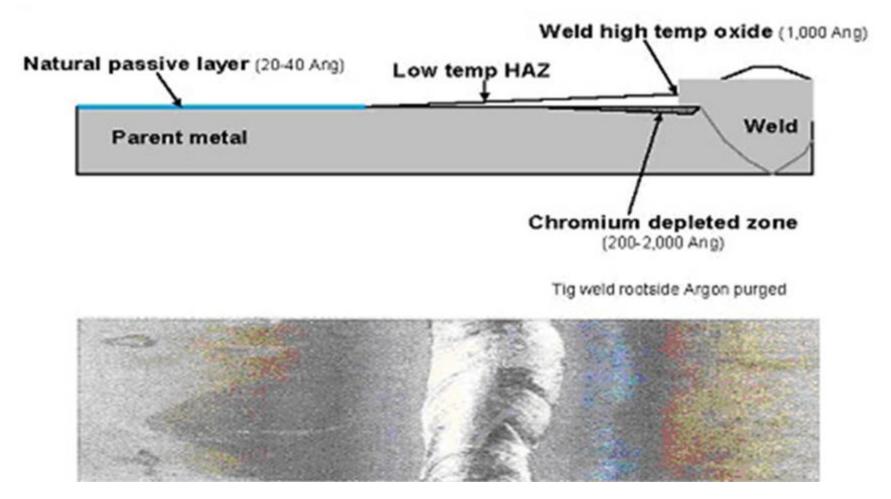
By *Dick Kostelnicek*Home Metal Shop Club – August 2013

Stainless Steel

Corrosion Resistant Iron

- Contains Chromium
- Passive surface film of chromium oxide
- Chromium oxide turns brown when heated
- Iron oxide (rust) appears when Cr-to-Fe ratio is reduced
- Nickel provides malleability and renders iron non-magnetic (300 series)
- Molybdenum prevents pitting and inhibits marine corrosion (300 series)

Weld Oxidation



http://www.electropolish.com.au/download/071002%20Electrocleaning%20Technical%20Brief.pdf

Note: HAZ is **Heat Affected Zone**

Pickling vs Passivation

Pickling is remedial. It removes oxides, scale and other impurities from surfaces.

Passivation is preventative. It provides a protective surface to resist corrosion.

Pickling Methods

Pickling Gel



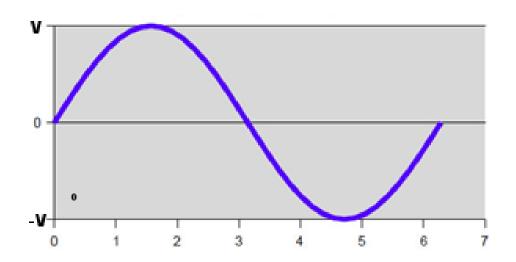


Electro Cleaning

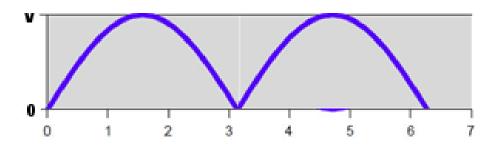


Electro Cleaning and Polishing

AC => Cleaning



DC => Polishing



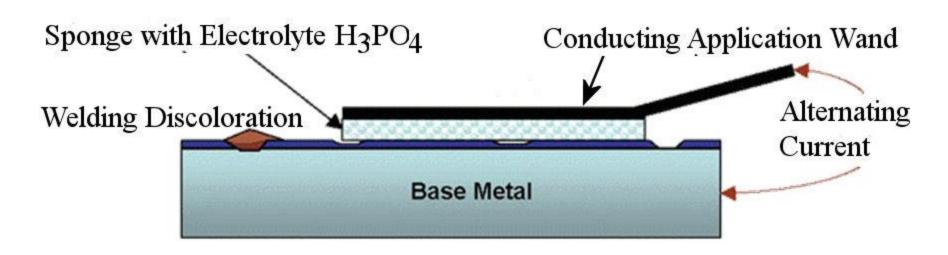


Electro Cleaning

- Electric current in combination with a mild electrolyte
- Uses Alternating Current (clean not etch)
- Dissolve surface rust, iron contamination, and inclusions
- Reform original protective chromium oxide layer
- Performed in situ without immersion



Electro Cleaning



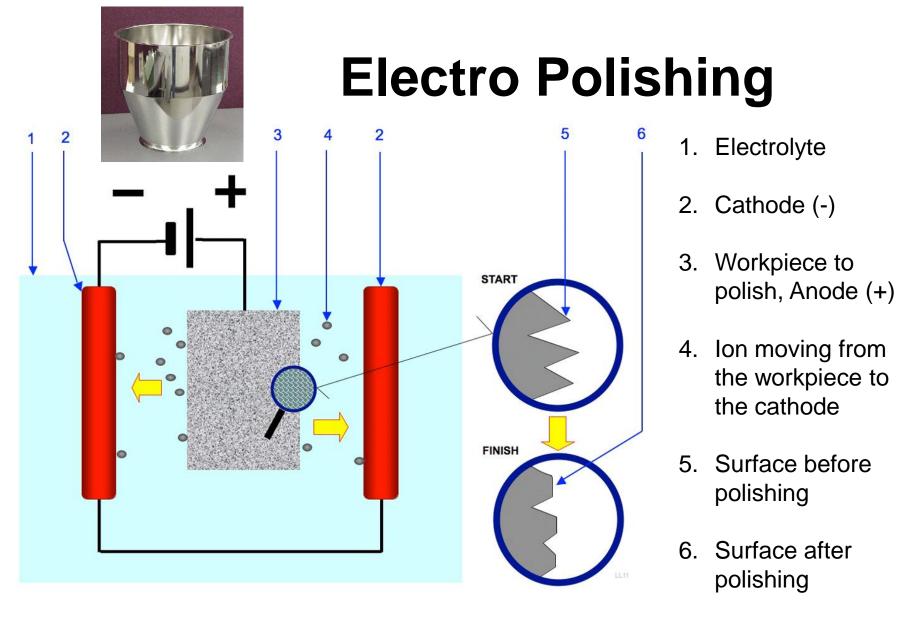
http://www.electropolish.com.au/download/071002%20Electrocleaning%20Technical%20Brief.pdf

Note: 20% phosphoric acid H₃PO₄ solution in water used as an electrolyte



Electro Polishing

- Remove oxides and iron from the surface
- Use DC current with work as (+) anode
- Requires immersion and lengthy time period
- Dissolves surface iron to improve Cr-Fe ratio
- Levels surface by selectively de-plating high points
- No messy abrasives

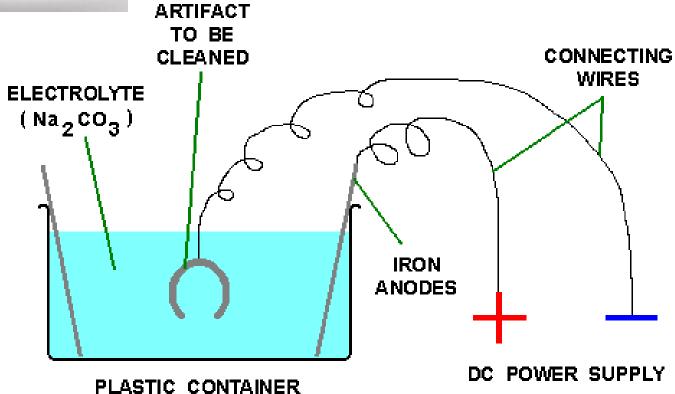


http://commons.wikimedia.org/wiki/File:Electropolishing_principle.png

Note: Electrolyte is a combination of nitric and hydrofluoric acids



Electrolysis of Rust



http://myweb.tiscali.co.uk/andyspatch/rust.htm

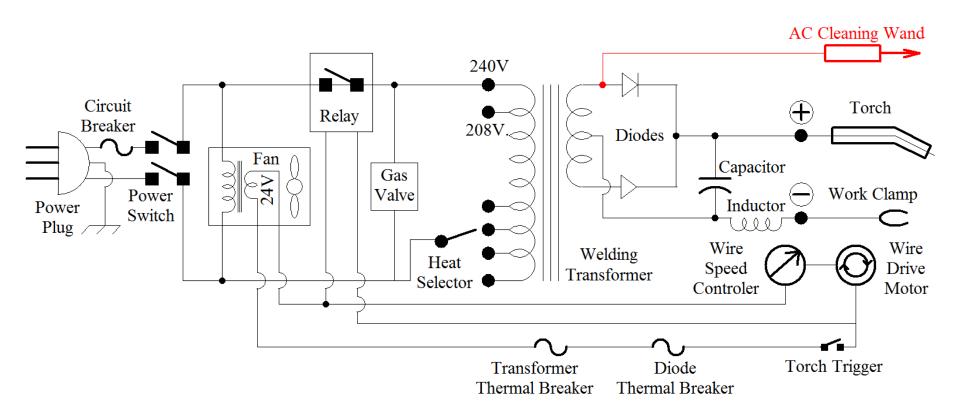
Washing Soda - Na₂CO₃ Sodium Carbonate - Electrolyte

- Salt-based good conductor of electricity
- No chlorine gas produced
- Not corrosive to anodes (ph slightly basic)
- Solid, air stable, and easy to weigh accurately
- Available at grocery store as Washing Soda



Note: Not to be confused with Baking Soda = NaHCO₃ – Sodium Bicarbonate

Use a Welder as an Electro Cleaning 25 Volt AC Electrical Source



Electrical Source Summary

Process	Polarity of Work
Electro Cleaning	Alternating Current
Electro Polishing	DC (+) Positive
Electrolysis of Rust	DC (-) Negative





Safety



- Old clothing may develop holes after washing
- Protective eyeware
- Protective gloves
- Standby bucket of water and large box of baking soda
- Old leather shoes, preferably rubber boots
- Beware of shocks from electricity and wet floor







Cleaning Stainless Steel After Welding

Fin