

PENNSYLVANIA MACHINE WORKS

QUALITY ● SERVICE ● PARTNERSHIP

PRESENTS

ELECTROPOLISHING



WHAT IS ELECTROPOLISHING?

***THE BEST WAY TO MAKE
CORROSION RESISTANT FITTINGS!***

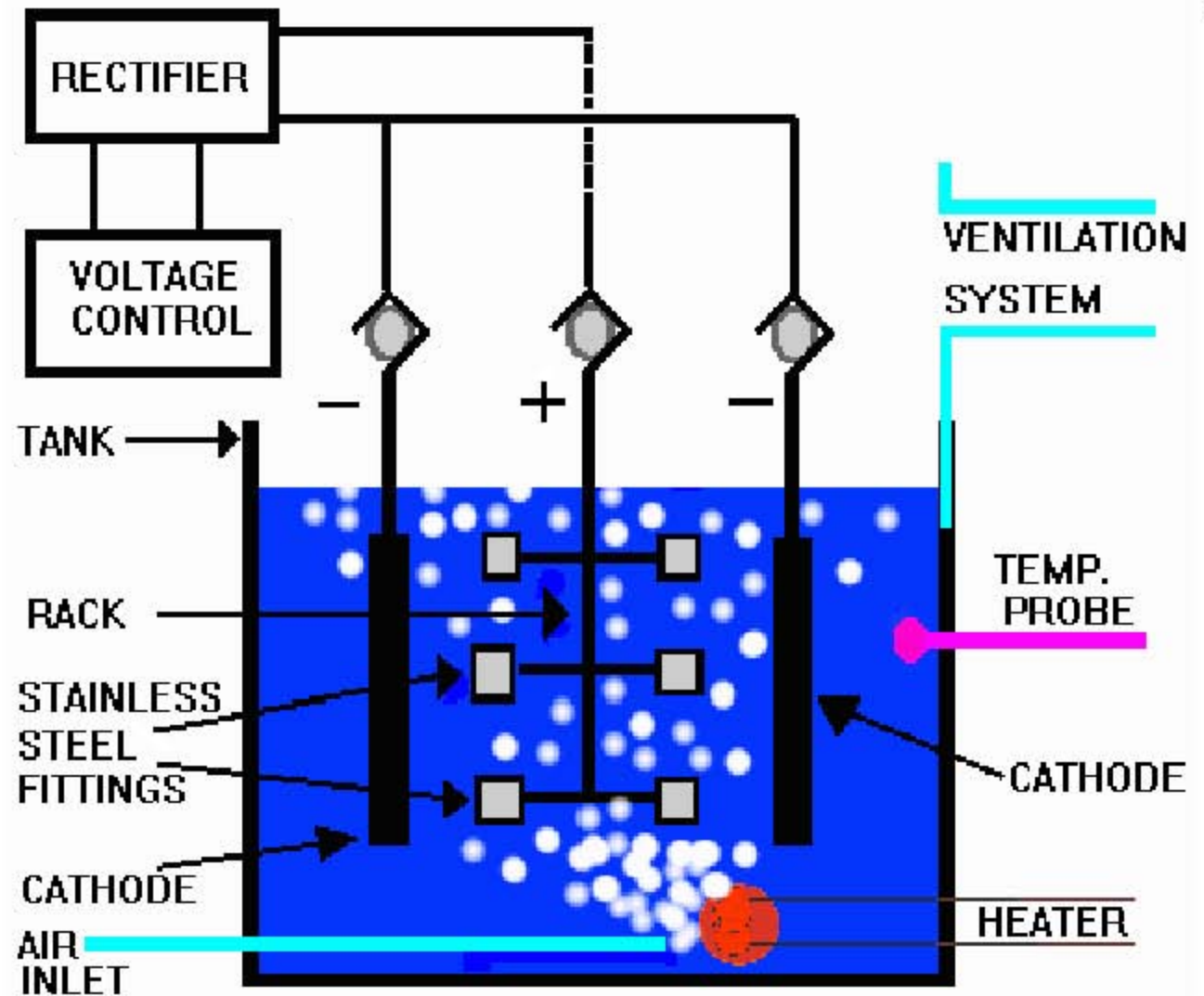
Think of peeling an onion!

Electropolishing is a chemical machining process.

FREE IRON and HYDROGEN molecules are drawn from the surface of the pipe fittings using electrical current and a mild acid solution.

This exposes the corrosion resistant CHROME and NICKEL molecules below the surface.

The fittings have a positive charge while the cathode rods are negative. Both are submerged in the solution forming a complete electrical circuit using the acid as a medium. High current areas such as iron and nickel are removed at a faster rate.



THE ELECTROPOLISH TANK

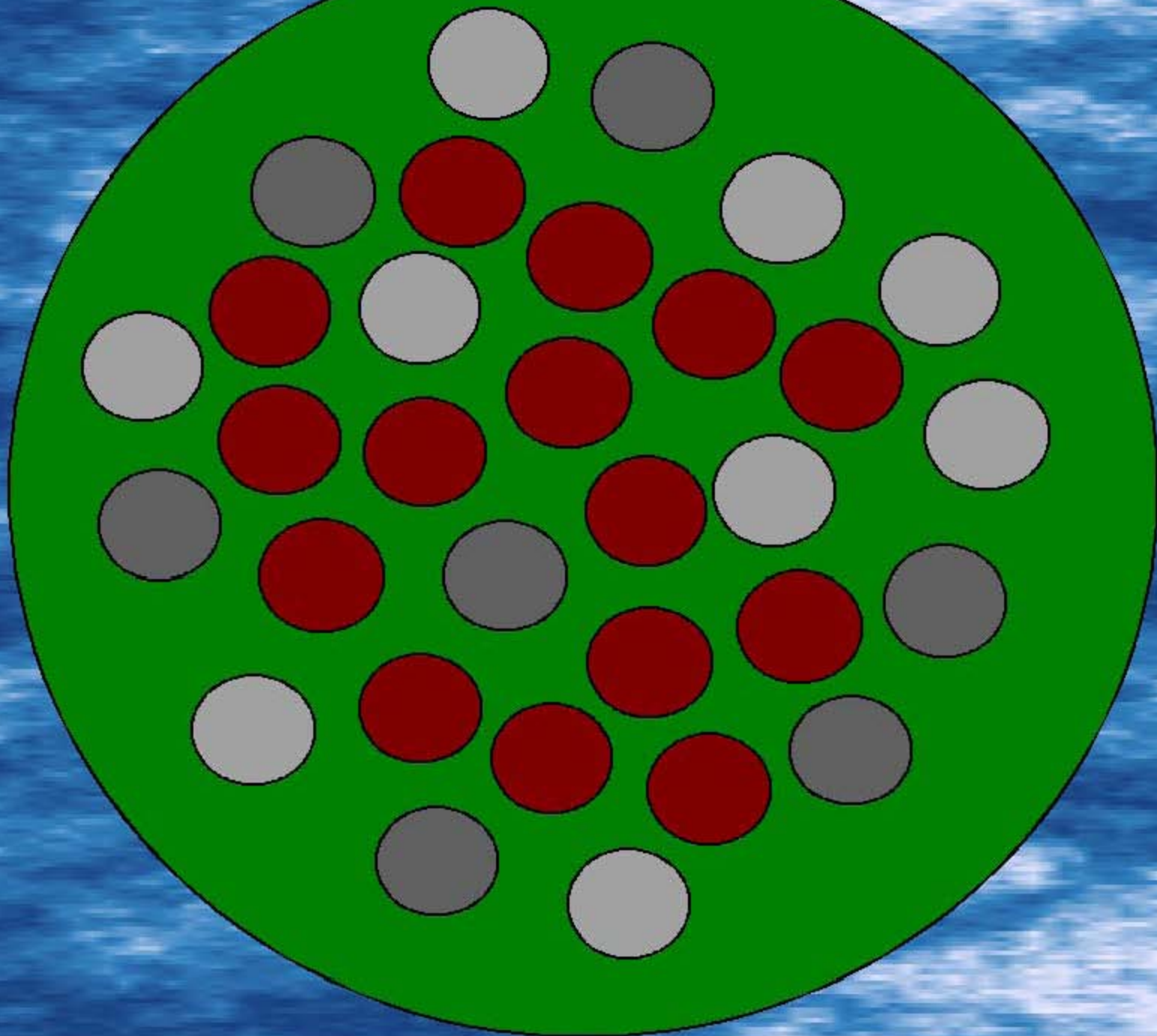


Stainless Steel fittings are placed on special racks and then dipped in the electrolytically charged solution.

After the hydrogen and iron molecules have been released, the fittings are then dipped in nitric acid, which guarantees passivation.



STAINLESS STEEL DURING ELECTROPOLISHING



iron

nickel

chrome

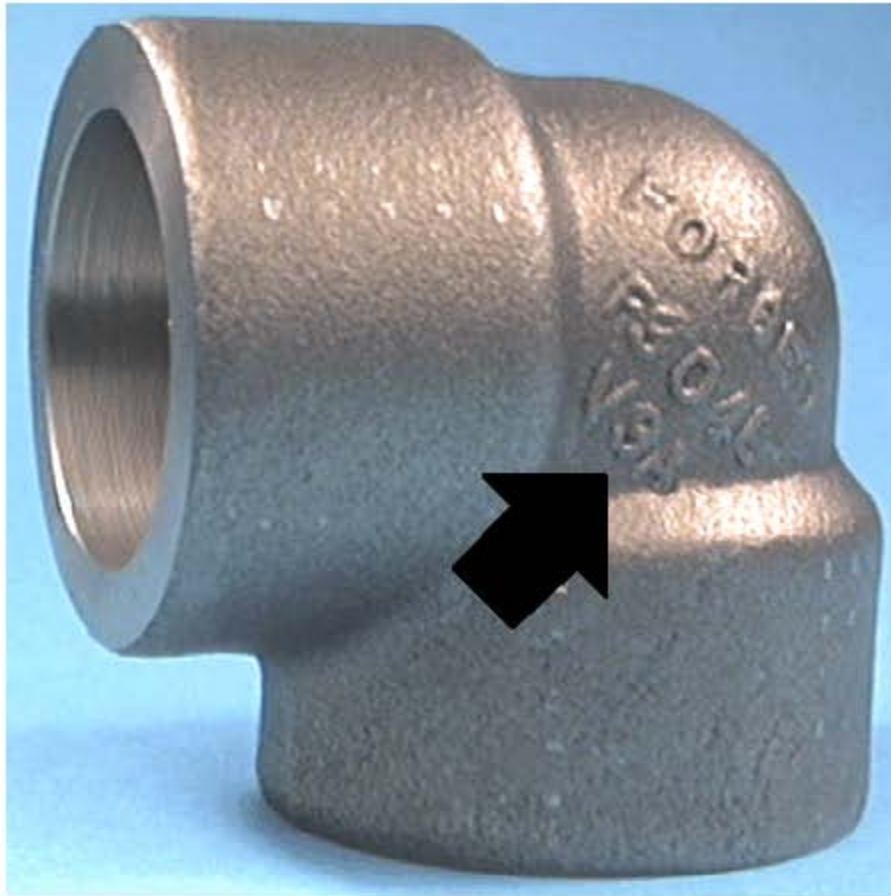
hydrogen

WHY BOTHER ELECTROPOLISHING?

THE METAL SURFACE BECOMES SMOOTH
HIGHER SURFACE REFLECTIVITY
FITTING SURFACE IS CLEANER
HYDROGEN IS REMOVED FROM THE FITTING
INCREASED RESISTANCE TO BACTERIA
REDUCES SURFACE FATIGUE
IMPROVED CORROSION RESISTANCE
REDUCED SURFACE FRICTION
REDUCED PREP TIME IN WELDING
MEETS ALL CODE REQUIREMENTS
NO ADDITIONAL COST!

BEFORE AND AFTER

Electropolishing smooths and brightens the surface of the stainless steel fitting



SHOT BLASTED



ELECTROPOLISHED

A SMOOTH CLEAN SURFACE HAS A HIGHER CORROSIVE RESISTANCE



COMPETITION'S 304L

average roughness of 350 RA

PENN MACHINE'S 304L

average roughness of 125 RA

ASTM A182 CALLS FOR A MAXIMUM AVERAGE ROUGHNESS OF 250 RA

**These photographs were taken at 8X zoom*

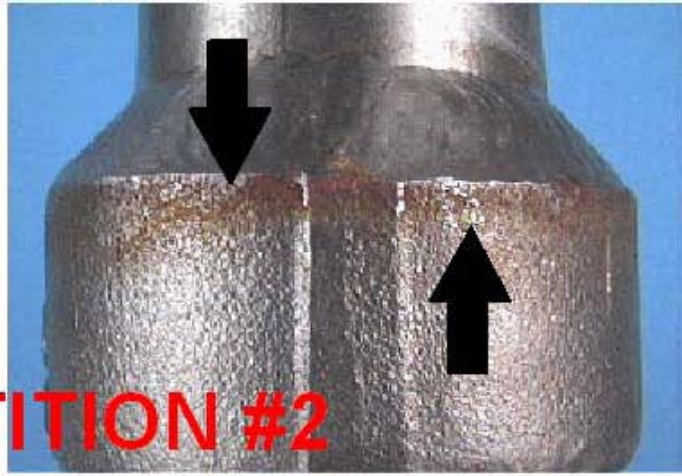
THESE ARE THE RESULTS OF A TWO HOUR, 316/L SALT SPRAY TEST IN ACCORDANCE WITH ASTM B117

TESTING WAS 5% SOLUTION AT 95 DEGREES FAHRENHEIT FOR A TOTAL OF TWO HOURS

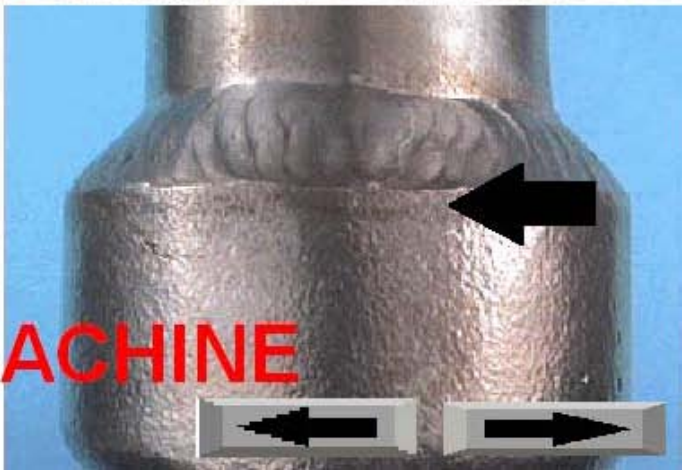
ALL WELDING WAS PERFORMED BY AN ASME WELDER FROM AN INDEPENDANT FABRICATION SHOP



COMPETITION #1



COMPETITION #2



PENN MACHINE



THE FEATURES OF HYDROGEN REMOVAL

- **SURFACE FATIGUE IS REDUCED**
- **PREVENTS MICROBIOLOGICAL CORROSION**
- **RESISTANT TO ANAEROBIC BACTERIA**

146 Angstroms



Before

166 Angstroms



After

THESE RESULTS WERE OBTAINED USING SECOND ION MASS-SPECTROSCOPY

COMPLIANT WITH:

- **ASTM A380**
- **ASTM A967**
- **ASTM B117**
- **FEDERAL QQP-35**
- **MIL STD 753**

WELDING FEATURES

A welder wearing a dark protective suit and a white mask is working on a large, cylindrical metal component. Bright sparks are flying from the welding point, illuminating the scene. The background is dark, making the sparks and the welder's suit stand out.

**REDUCED PREP TIME
DUE TO A CLEAN SURFACE**

**PREVENTION OF OXIDATION
IN THE WELD AFFECTED ZONE
DUE TO INCREASED SMOOTHNESS**

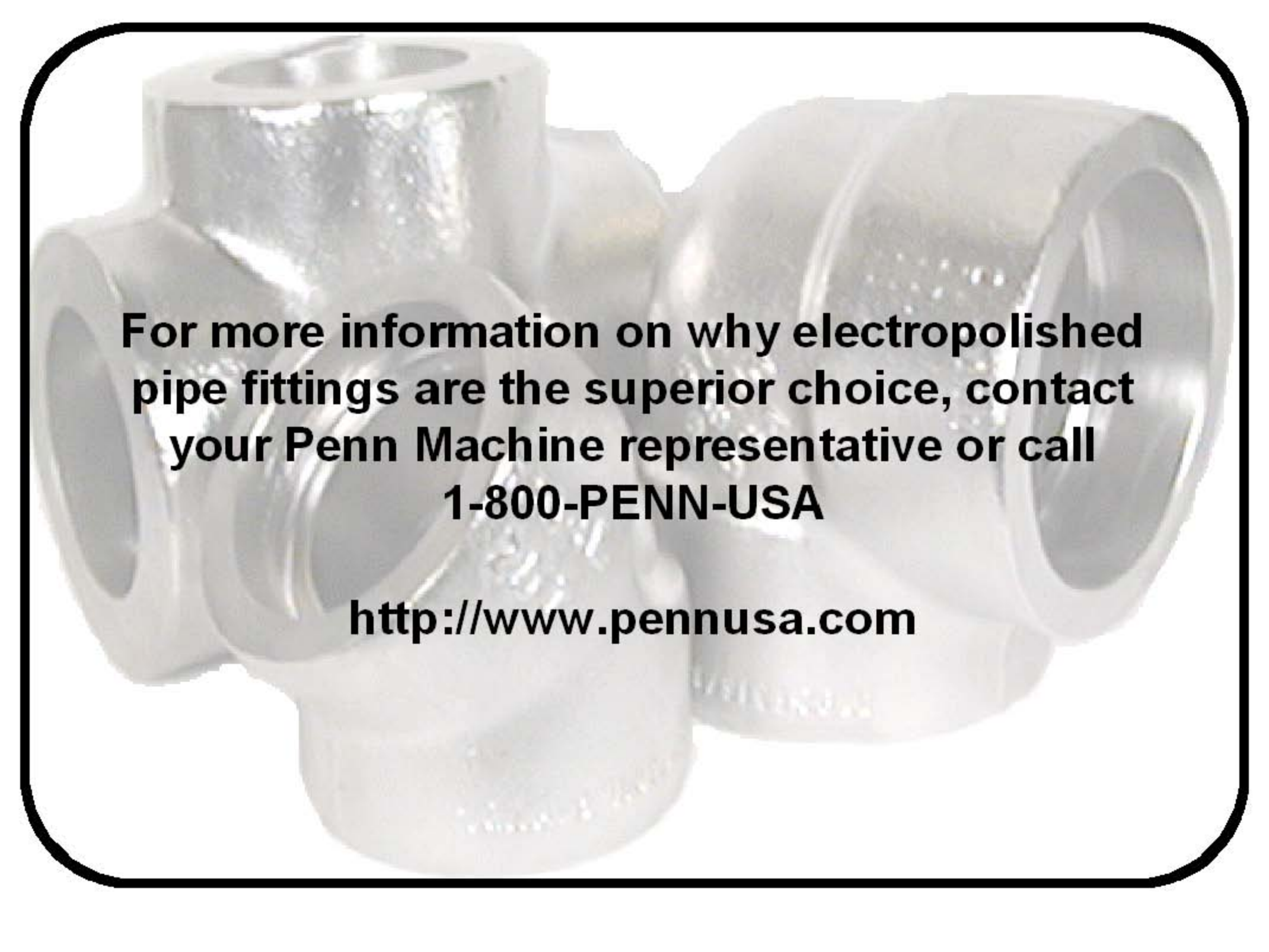
**SURFACE CONTAMINATION REMOVAL
ENABLES A STRONGER WELD**



ELECTROPOLISHED FITTINGS ARE USED EVERYWHERE BY EVERYONE!



- EXXON
- DOW
- SHELL
- FLUOR
- ARCO
- AMOCO
- BP OIL
- MOBIL OIL
- MW KELLOG
- NEWPORT NEWS
- BECHTEL
- GENERAL MOTORS
- ALLIED CHEMICAL
- ROHM & HAAS CO.
- ARAMCO SERVICES



**For more information on why electropolished
pipe fittings are the superior choice, contact
your Penn Machine representative or call
1-800-PENN-USA**

<http://www.pennusa.com>