

#440C — Stainless Steel Corrosion Resistance Study

INDUSTRY:

Hydraulics and Pneumatics

MFG/METHOD:

Machined Part

ALLOY:

440C Stainless Steel



PROBLEM:

The customer was concerned with their 440C, machined valve components rusting in the field and did not have success passivating these parts. Since the pictured 440C parts work alongside other metal components inside a valve assembly, and friction is involved, the customer did not want to risk corrosion inhibiting the function of the components. Passivation is risky specifically when it comes to 440C and 416 Stainless Steel alloys which, based on their elemental composition, are more susceptible to flash attack when in contact with passivation solutions.

SOLUTION:

At Able we help many customers avoid the risk of flash attack and produce a better functioning metal component that will resist corrosion by electropolishing their 440C or 416 SS parts. In the case of the parts pictured above, Able's customer corrosion tested an electropolished part against a passivated and a raw "control" part. All three parts were placed

in a pan lined with aluminum foil with the oven at 190° F for 8 hours a day while spraying the parts with water a few times per day – the test ran for 7 days. After the test was completed the raw and passivated parts both showed obvious red rust while the electropolished part remained clean.

Not only does electropolishing remove free iron from the surface of the part like passivation, but it goes further by removing the outside “skin” of metal that may contain imbedded contaminants (bits of tooling, shop dust containing iron particles, etc.) that can lead to corrosion down the line. By removing that amorphous layer containing foreign material imparted by various fabrication steps, electropolishing can eliminate corrosion initiation sites and enhances the chromium to iron ratio on the surface restoring a passive layer which naturally occurs on stainless. There are additional benefits to electropolishing a 440C metal component which passivation cannot offer such as electropolishing’s ability to micro-deburr and micro-finish.

