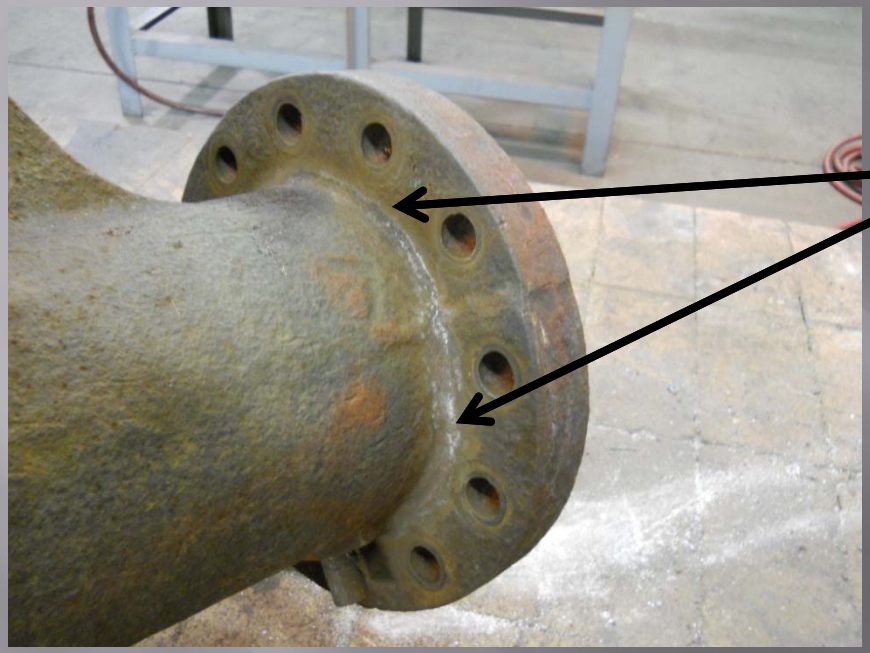
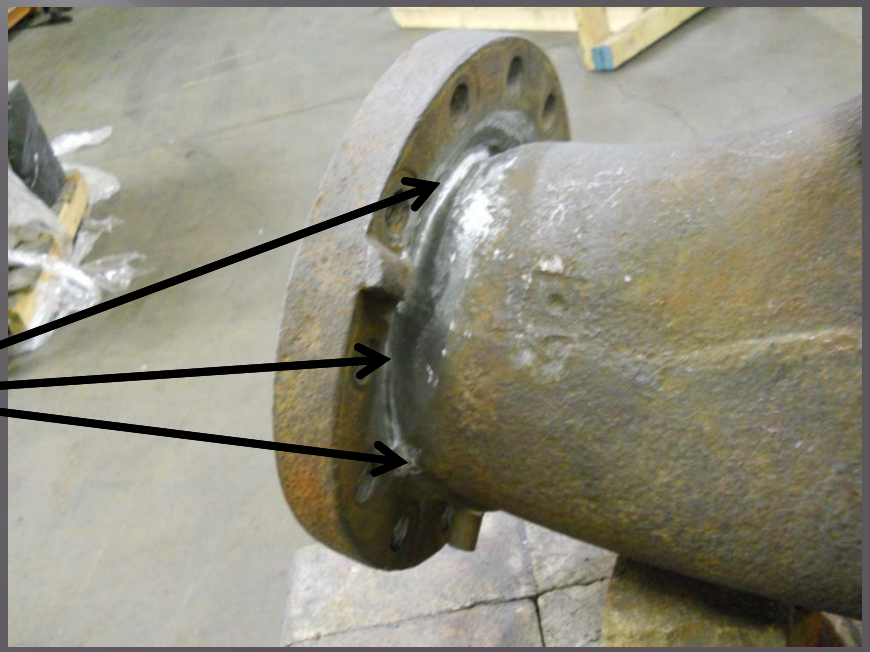
CHEVRON RICHMOND P6 PUMP AT 21 PUMP STATION

P6 Pump prepped



Crack damage before prep work is done to the crack.

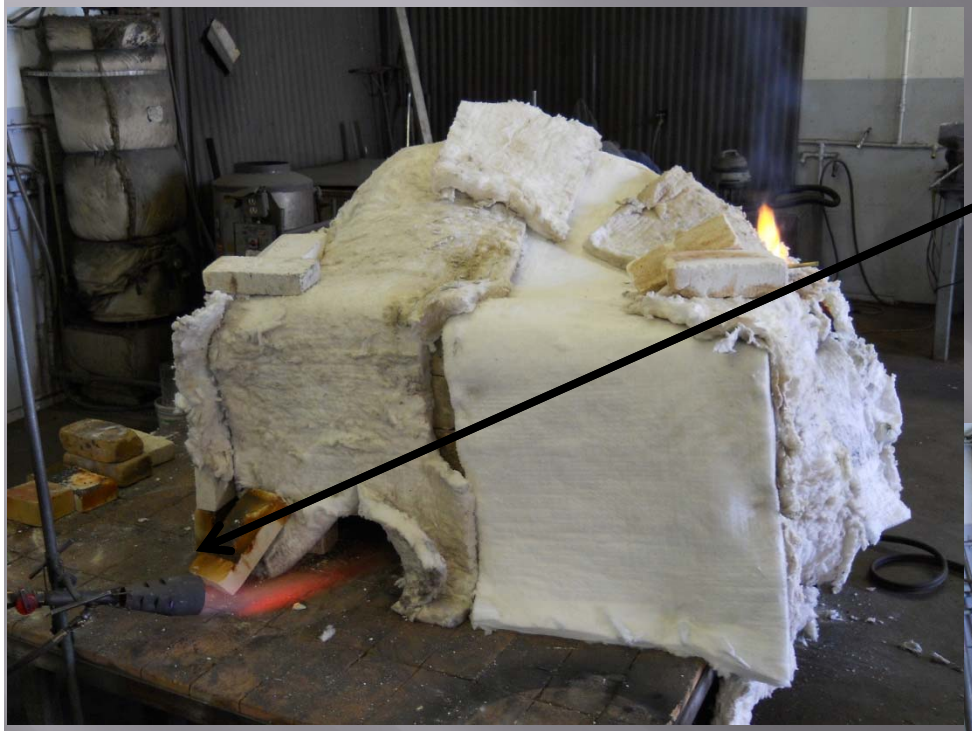


"V" out crack damage ready to accept bronze.

Pump positioned to be Furnace Brazed

Oven built for Pump and ready for Pre-Heat

1200 degree pre-heat



Gas blow torches set up to bring
Pump up to 1200 degrees

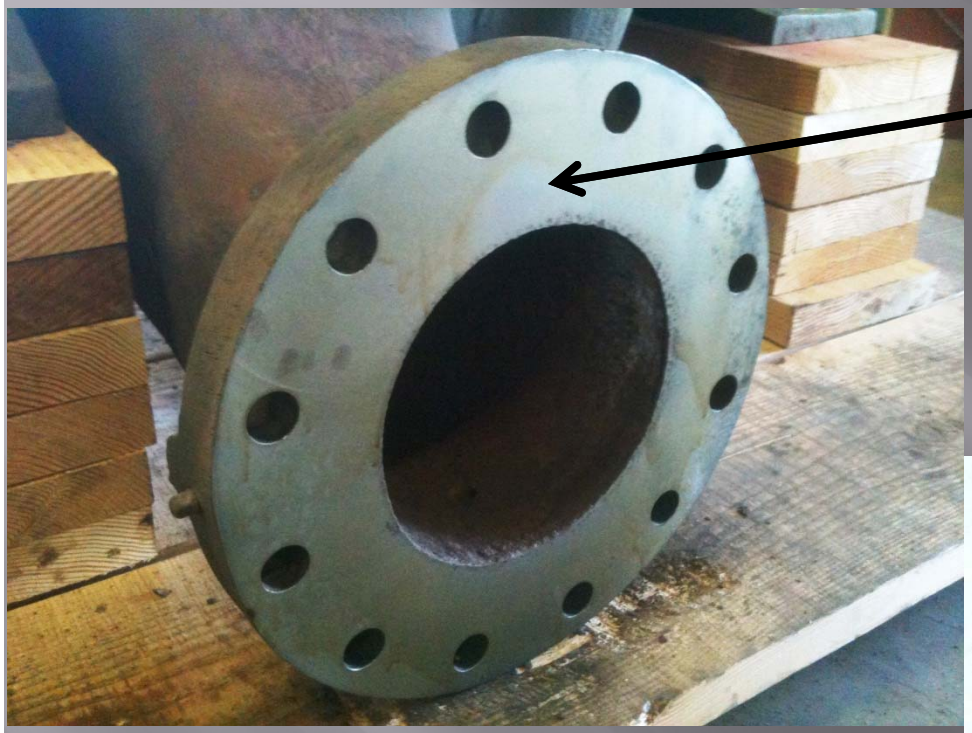
Furnace brazing in process

With the part pre heated to 1200 degrees the bronze will melt at 1800 degrees. You can see Alaa using Acetylene torch to melt the bronze

Post Weld

After hand finishing the repair

Machined Flange



Machined flange ready for assembly

The repair on the cracked flange is complete.

Additional damage discovered

Additional repairs completed

Getting ready for Hydro Testing

Hydro Test Report

On 2-29-12 Hydro test was done by Alaa Al'Robaie, Brian Schoppet of *LOCK-N-STITCH* Inc. and Rob Wieben of Chevron, Richmond, CA.

Hydro test was done at 400 psi for a duration of one (1) hour. No leaks where present during this time.

The test was verified by Rob Wieben on 2-29-12

Scope of work

The filer metal is standard low fuming bronze rod.

NOMINAL CHEMICAL COMPOSITION:

Copper 58-62 % Zinc Balance
Tin .30-3.00 % Manganese .25 % max
Iron 1.50 % max Silicon .30 % max
Aluminum .01 % max. Lead .05 % max.

PHYSICAL PROPERTIES:

Melting Point 1620° F (882° C)
Working Temperature 1600-1720° F(871-938° C)
Tensile Strength 60,000-65,000 psi
Brinell hardness 80-90
Machinability Excellent

We have been using this process for over 40 years with 100% success. The part is pre-heated to 1100-1200˚F until the entire casting temperature is uniform. While in the oven it is brazed with an acetylene torch. This requires heating the area to be brazed to 1750˚F. The part is not removed from the oven during the brazing process.

After the brazing is completed the part is kept in the oven for about 15 minutes and allowed to stay in the oven overnight or until it reaches 200˚F.

We do this process just about every day.