

## CASE HISTORY: Desalter Continuous Improvement

Overhead Corrosion Reduction Lowers Cost by \$380,000 USD/yr

### Problem

A fully integrated southern US refinery processing approximately 50,000 bbls of crude oil was concerned about overhead corrosion due to salt concentrations in the desalted crude, chlorides in the distillation tower overhead water, and oil content of the desalter brine. The incumbent chemical vendor had proposed purging the interface from the desalter via the effluent brine water. Prior to Champion evaluating the system, the desalter washwater was added just upstream of a globe mix valve with the mix valve  $\Delta P$  being set at 20 psi. This procedure did not allow for adequate mixing of the oil/water phases, resulting in elevated salt concentrations and fluctuating chlorides in the overhead system. The mud washing procedure at the refinery was unsatisfactory and could only be accomplished by injecting fresh water into the vessel via the mudwash header. During this period, the desalter vessel remained in a condition of upset that was caused by the erratic water level control that resulted from the introduction of fresh water directly into the vessel from an external source.



### Solution

Champion implemented a field trial in a series of phases; each consisted of modifications in the desalter operation.

**Phase 1:** Champion employed several bench evaluations, using portable laboratory desalting equipment, over a period of several weeks. A desalter field trial including demulsifier modifications of operational procedures was recommended.

**Phase 2:** The field trial was started to gain control of the desalter and reduce the amount of oily undercarry and salt residuals in the desalted crude.

**Phase 3:** Operational personnel were advised to move the washwater injection ahead of the unit's booster charge to enhance salt/solid removal. It was determined that the mix valve  $\Delta P$  could be set at zero psi with no detrimental effects.

**Phase 4:** It was suggested that the addition of caustic to the desalter washwater, combined with an effective demulsifier desalting aid, would remove the metal salts and produce quick/complete phase separation.

### Result

The results were a reduction in crude solids and salt concentrations – and a drastic improvement in desalter effluent quality.

	Desalted Salt	Overhead Chlorides	Brine Oil Content	Salt Removal Efficiency
Pre-Champion	1.5 to 4 ptb	35 to 50 ppm	Percentage	97 to 98%
Champion	0.5 ptb	5 ppm	<200 ppm	>99%

With Phase 3, the water injection being moved ahead of the unit's booster charge pumps resulted in increased mixing/residence of the water and crude oil. Since this change, the average salt content of the desalted crude has been < 0.7 ptb. The unit's overhead chlorides have averaged 7 ppm – virtually non-existent. This increased the exchanger life, while reducing exchanger fouling and leaks due to crude distillation overhead corrosion. The use of overhead neutralizer stopped, reducing overall chemical costs. The total cost reduction was \$380K USD annually.