CASE STUDY

Large Global Independent Refinery

Coke Drum Repair

A Texas Gulf Coast refinery processing 435,000 barrels per day of heavy sour crude delivered by rail, marine docks, and pipeline required urgent drum repairs during its largest planned outage to address cracking and bulging caused by low-cycle thermal fatigue.

Project Scope

Code of Construction: ASME Section VIII, Division I

Drums 3100 & 3200: WSI performed engineering analysis on all six drums, evaluating two drums simultaneously alongside a competitor

Base Material: SA387 Grade 11 Class 2

Thickness: 1.88" + 1/16" cladding

Dimensions: 29' ID by 112' H

Seam Repair Requirements:

- Gouge Cladding
- Preheat: 350° F
- Temper Bead Filler: ER70S-B2L
- Structural Weld Overlay (Temper Bead Process): ERNiCrMo-3 / Alloy 625

Bulge Repair Requirements:

- Preheat: 350° F
- Temper Bead: ERNiCrMo-3 / Alloy 625
- 8:1 taper

Key Challenges

Limited Real Estate: Limited space and multiple contractors required WSI to collaborate closely with the customer to streamline scheduling.

Peak Season Craft Shortage: WSI's skilled craftsmen and advanced equipment ensured confident execution and mitigated risk on unexpected work.

Largest Turnaround Activity in Site History: This was the facility's largest and most complex scheduled shutdown to date.

Engineering-Based Maintenance: WSI engineers used proprietary analysis to optimize repair strategies with machine-welding systems.

Complex Contracting Strategy: WSI partnered with our client and sub-trades to deliver a complex project on time and with precision.

Adverse Weather Conditions: Crews worked through the Gulf Coast's coldest January since 2007, facing freezing temperatures, heavy rain, and flooding.

The WSI Difference

BSF Analysis (Bulge Severity Factor): WSI assessed all six drums and developed repair and mitigation plans, classifying bulges by severity and risk per API TR 934J guidelines.

WSI Owned/Built/Maintained All Equipment Deployed:

- DragonX AutoGouge for precise cladding removal
- BPV HotPulse Orbital GTAW™ for all seam repairs
- NG4 GMAW automated weld machines for SWOL
- Equipment mobilized to work both drums simultaneously

Results

"WSI provided expertise in planning, which condensed our schedule. Along with that, quality, reporting, housekeeping, and safety were exceptional." – Turnaround Manager

WSI sets the standard for coke drum repair and maintenance.

Drum 3100: Work completed in 23 days (46 shifts)

- Seam repair: 90 ft. across 5 sections
- Bulge repair: 936 sq. ft.

Drum 3200: Work completed in 18 days (36 shifts)

- Seam repair: 60 ft. across 4 sections
- Bulge repair: 216 sq. ft.

Showcasing DragonX AutoGouge: WSI's automated system increases productivity, reduces prep time, and delivered a smooth, precise finish.

Minimized Craft Exposure: Automation enabled six WSI specialists to complete work typically requiring 20 or more craftsmen, reducing exposure to hazardous environments.

Proprietary Machine HotPulse GTAW™ Application: Wire preheating, precision dabbing, and controlled waveforms reduced porosity, improved grain structure, and delivered superior weld quality, even in challenging field joints, while increasing production rates and reducing risk.

Optimized Schedule and Critical Path: WSI's automated systems accelerated critical tasks, shortened the project timeline, and ensured key deadlines were met.

In-House Engineering Support: WSI's in-house engineers and technicians delivered expert solutions and 24/7 support, eliminating the need for external vendors.

Goal Zero: WSI's safe work practices resulted in ZERO injuries, lost time, and downtime.

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