CASE STUDY

Large Global Refinery in the U.S. Midwest

Coke Drum Through-Wall Repair Project

A 173,000-barrel-per-day refinery receives crude from the Gulf of Mexico and Alberta oil sands, producing 85,000 bpd of gasoline and 70,000 bpd of diesel, jet fuel, and coke through four coke drums. When two 30-inch through-wall cracks caused an outage, the refinery required an emergent response.

Project Scope

Code of Construction: ASME Section VIII, Division I

Vessel: V-3511 Coke Drum

Base Material: SA387 Grade 12 Class 2

Thickness: 2.05 in. nominal cone thickness

Dimensions: 30 ft. ID x 89 ft. H

Repair Requirements:

- Filler Material – ERNiCrMo-3 / Alloy 625
- Two repairs/cracks of approximately 30 linear inches each:
  - One on north side of seam CWAA4
  - One on south side of seam CWAA4

Key Challenges

Emergent Through-Wall Cracking: Cyclic thermal fatigue caused drum wall bulging, threatening a premature and costly unplanned shutdown.

Unplanned Loss of Production: The client was faced with a cost totaling at least $1 million per day, driven by lost gross margins, fixed labor/utility overhead, emergency logistics, and market penalties.

Technical Proficiency and Expertise: Seeking a partner for complex industrial repairs, the client chose WSI for our 45+ year track record and proprietary technology as the industry's leading specialty welding contractor.

Limited Timeframe: The client required simultaneous depth and responsiveness, and WSI's readiness culture enabled a safe, rapid restart through parallel tasks and critical path optimization.

High Risk of Unforeseen Work Scope: The initial plan addressed external symptoms, but WSI prepared for "unforeseen" hidden corrosion by bringing specialized kits onsite for the likely discovery scenario once the drum was opened.

The WSI Difference

Emergent Response Readiness: WSI rapidly mobilized personnel, equipment, and engineering support to enable onsite execution.

- Management support in 24 hours
- Setup crew in 24 hours
- First arc in 48 hours
- Two machines operating 24/7 in parallel

Advanced Welding Technology: WSI deployed proprietary and automated equipment to optimize weld quality and productivity.

- DragonX AutoGouge to remove cladding
- BPV HotPulse Orbital GTAW™ on all seam repairs
- Waveform technology
- NG4 GMAW automated weld machines SWOL

Industry-Elite Field Craft: Supported by 2,000+ ASME procedures and 1,000+ active welder certifications.

Results

"A very well-organized, high-speed team that I would be happy to work with again. High scores all around in my book. Quality of work was top shelf." — Turnaround Coordinator

WSI delivered a rapid-response repair solution while minimizing downtime and meeting critical outage demands.

Execution Highlights

- Two 30-inch through-wall cracks repaired simultaneously
- One boilermaker/welder assigned to each repair
- Crack excavation, bevel prep, GTAW root and GMAW temper bead fill/cap
- Mobilized within 24 hours of initial contact

Production Metrics

- Parallel repairs reduced onsite critical path duration
- Proprietary Waveform Semi-Automatic GMAW System improved speed and weld quality
- Spatter-free welds eliminated post-weld cleanup
- No repairs, rework, or corrective actions required

Organizational Readiness for Emergent Response
WSI mobilized rapidly, applying specialized coke drum expertise to support an efficient return to operations.

Optimized Schedule with Concurrent Work
Automated equipment and critical path planning accelerated schedule performance.

Right First Time: First-time quality with no repairs or rework.

Goal Zero: Zero injuries, zero lost time, and zero downtime.

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