# Coke Chute Protection

## Investigate Design Build Approach to Improve Reliability of Delayed Coking Unit Chutes

A refinery in the American West had a Coking Unit that was experiencing failure of the coke chutes, a difficult and costly item to repair, and desired a more reliable and cost-effective solution. Previous solutions failed due to stresses caused by thermal shock, abrasion, and corrosion. Brindley Engineering partnered with a specialty structural repair company for a turn key, Investigate, Design, Build approach to ensure close integration to meet the technical and logistical demands of the turnaround window for repair.

### BE the Solution

The analysis proved that the root cause of the problems was from two primary issues. First, the existing wear plate design was rigidly attached and didn't allow for thermal relief. Second, the materials of construction used previously were less appropriate for the operational conditions the materials were subjected to. The solution was to switch to a floating wear plate design to allow for thermal growth, alternative metallurgies for the wear plates and support system, and specialty concrete mixes for the chute repairs. To meet the schedule and logistical demands of the turnaround, the wear plate assembly had to be completely remote from the Coker then transported in and lifted into place. Brindley was awarded the International Concrete Repair Institute (ICRI) Award of Merit for the innovative approach.

### Our Challenges

We have designed and conducted follow-up inspections on similar projects in the past and have applied our long-term knowledge to best practices in the wear plate support design to ensure it meets the rigors of this highly demanding environment of high heat, sulfur, water, abrasive coke, impact loading, etc. The wear plates are very large (nominally 800 square feet) and require special welding details to prevent them from warping or having high residual stresses post fabrication. The size of the wear plates also creates significant logistical challenges to transportation and rigging. Brindley conducted a Finite Element Analysis (FEA) of the plates and lift points and developed the Engineered Lift Plan to ensure the safety of the lift and to be able to maximize off-site development to meet the demanding turnaround window.

### BE the Result

Our focus on infrastructure evaluation and rehabilitation, together with our unique expertise in constructability techniques, material selection, engineered lift planning, and turnaround project execution resulted in a reliable product for the Owner, completed within a demanding time-frame.

### Contact Us

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Reliability Project Case Study

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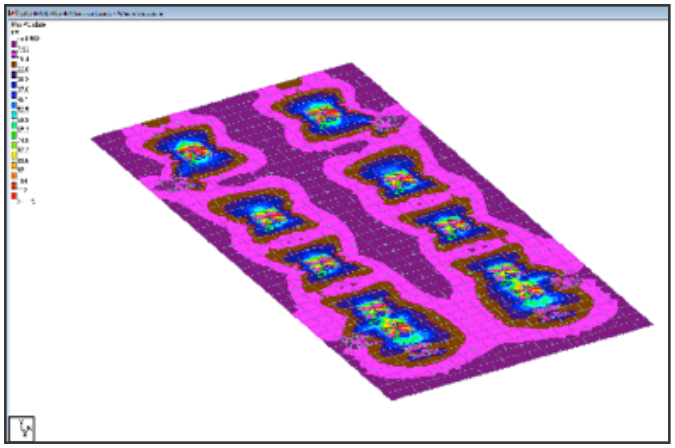
View of Wear Plate Being Lifted

View of Wear Plate Being Installed



Finite Element Model During Lift


ICRI Award of Merit for Excellence in Repair of Industrial Structures

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