



Next Generation DCU Vessel Repair Technologies

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Structural Overlay Surface Profilometry System

Structural Overlay for Bulge Mitigation



- Structural Overlays are a common practice in the mitigation of bulge growth and associated cracking in coke drums.
- Volumetric quality of the deposit and the careful control of welding parameters are critical to success of the execution. These parameters are successfully controlled with the use of closed loop welding automation.



Coker Structural Overlay



<u>**Cross-Section View**</u> – A view that displays a cross-section line view of the data at a given point. This view accompanies a 2d topographical view.



<u>Measurement Tools</u> – A series of tools (ruler, depth gauge, taper gauge, etc.) to measure and characterize identified surface discontinuities.



Structural Overlay for Bulge Mitigation



- Currently, the surface profile of the deposit is inspected by certified individuals, but because the inspected areas are large, this inspection is time consuming and interpretation can be challenging.
- The profile of the edges of the overlay and how it transitions onto the existing cladding also has to be carefully controlled.
- The goal is to create a good quality deposit with surface geometry that does not cause unacceptable stress risers.
- A better method for evaluating structural overlay surface quality is currently in evaluation.

Structural Overlay for Bulge Mitigation



- In some cases we run across scopes that have been performed by unqualified vendors.
- Although typical overlays with reasonable quality are visually inspectable, when you have large areas with significant deficiencies, the visual inspection becomes extremely challenging.



Process Evaluation



- Data Collection with Laser Profilometry System
- Designed to be weld system track mountable for in-process quality monitoring



Laser Head Mockup



Surface Scan of Weld Deposit

Collected Surface Data



3D Zoom Scan Data View

A 3D view of the zoomed in topographical data. The 3D van be rotated to obtain the best view angle for visual interrogation. Can be viewed in color or grayscale mapping.



Collected Surface Data



Hot Spot Tools

A series of filter tools (derivative, bounding boxes, colorization, ect.) to identify and locate surface discontinuities.



Mapping System in Fabrication



- Tool mounts to the same track that is used to mount the automated welding systems.
- Mapping is performed immediately after completion of a welded section.
- Collected data is evaluated and any local repairs are made on location.
- System currently in fabrication



Surface Scan of Weld Deposit

Thank You!



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