

HOMC APPLICATION NOTE-2

Corrosion Assessment at Trunnion Supports

Corrosion at Trunnion Supports

Pipework support trunnions are common in oil & gas installations, where a short length of pipe (trunnion) is welded to the process pipework and often has an end closure plate welded on to seal it, resulting in an enclosed volume. The enclosed volume is most often uncoated. There is no corrosion protection on the parent pipe or the internal surface of the trunnion inside the enclosed volume.

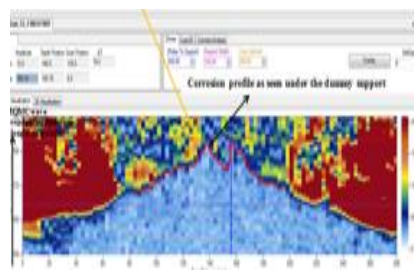
The potential failure of the carbon steel process pipework within the trunnion is due to water ingress or moisture through a small diameter 'weep hole' drilled in the trunnion as part of the welding process. The nature of the trunnion means that moisture is retained and corrosion rates are often higher than the external surfaces of the adjacent process pipe, resulting in corrosion of the process pipe wall within the trunnion, as well as the trunnion itself. Drying and rewetting inside the trunnion may contribute to accelerated corrosion rates. Failure of process pipework supported by trunnions is time dependent. The risk of hydrocarbon release increases with the age of assets.

Challenges to Trunnion Support Corrosion Assessment

A direct visual inspection and wall thickness measurement of the process pipe inside the trunnion is not usually possible. The end cap is not generally removed because it provides structural strength to the trunnion (and therefore the supported process pipe). If the process pipe is severely corroded, then removing the end cap might cause a leak or rupture because of the additional stress. Trunnions can also be seen in different configuration and inspection by Ultrasonic means has the challenge of weld interference with Ultrasonic signals affecting the assessment of the damage in the corroded area under the trunnion and Radiography is a challenge for larger diameter pipes. Added to that bends on the pipe can also affect the inspection process

HOMC Guided Waves as Reliable Solution

The Higher Order Mode Cluster (HOMC) Ultrasonic Guided waves are unaffected by the welds in the trunnion area and also unaffected by weld and can resolve closely spaced defects. It also provides accurate sizing along with a cross sectional profile of the corrosion for easy visualization and engineering integrity assessments.



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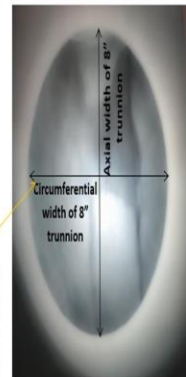
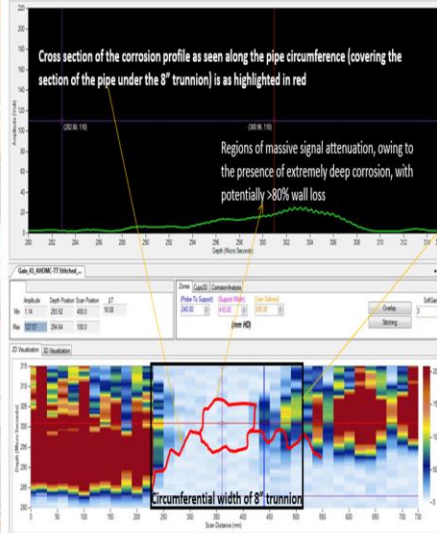
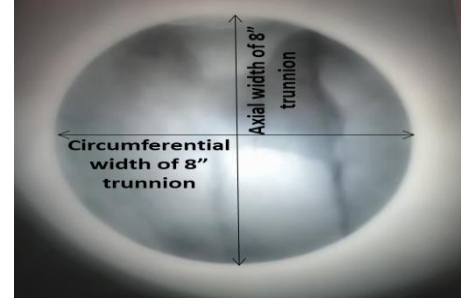
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HOMC INSPECTION of 14inch Hydrocarbon Line

A 14inch Pipe in service at a leading refinery failed at the Trunnion Support. Initial Radiography carried out showed crack like indication but due to pipe size and access restrictions did not yield clear results of the wall loss or depict profile. The client in the meanwhile arrested the failure and welded another pipe over the leaking trunnion.

Axial HOMC (AHOMC) in the through transmission TT Mode was conducted post leak mitigation and the profile of the corrosion in the trunnion region was identified. The X-ray image of cracks were the rupture points in the deepest section of wall loss estimated to be > 80%. Average wall loss was 65-75% based on the measured wall thickness of 9.5-10mm.

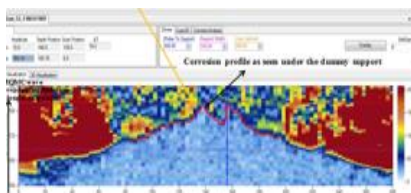


Radiography of the section post welding of the 1st Trunnion of 8" pipe



HOMC Inspection of 2inch Pipe with Corrosion at Bend near the Trunnion

A 2Inch Pipe with a Trunnion had suffered severe wall loss near the bend and within the trunnion region on the parent pipe.



Axial HOMC (AHOMC) in the through transmission Mode was conducted points of the pipe A wall loss of 71-80% measured wall thickness of 10-11 mm was estimated along with the cross-sectional profile of corrosion.

HOMC

RELIABLE- PRECISE -ACCURATE

FOR CORROSION ASSESSMENT AT TRUNNION SUPPORTS