

## Background

Steam Generation packages are commonly deployed in Combined Cycle power generation or other utility functionality eg. desalination, heating, enhanced recovery.

The HRSG (Heat Recovery Steam Generator) is a large multi-pass segmented unit, with the OTSG (Once Through Steam Generator) being of a smaller and more simple construction.

With the temperatures under consideration, the feed water can precipitate impurities creating a scale on the inside tube surfaces, which if unchecked can lead to a compromise in efficiency, corrosion, overheating and failure.

## Challenge

Cokebusters was contacted by an operator in the Middle East who had significant scaling problems and has suffered a number of tube ruptures in a variety of their generators.

Cokebusters worked a schedule with the customer whereby the packages were progressively taken offline for cleaning, inspection and repair, before re-commissioning. This minimised production upset and optimised the time on site.

Figure 1 – Typical Set Up



## Descaling

The average scale removed, per OTSG, was 250-500kg and up to 2,000kg in the HRSGs. Scale thicknesses up to 10mm were evident, which is not uncommon.

Initially scale would appear in the pig launchers, but later was captured in the pumping unit filtration baskets.

## Inspection Results

In order to assess the tubing for signs of corrosion or creep (caused by overtemperature), Cokebusters deployed their single bodied Smart (Intelligent) Pigs.

Figure 2 – Scale Collection



The Cokebusters' Smart Pigs are patented ultrasonic devices which collect vast quantities of internal and external data. Upon post-processing, this data provides a unique 3D view of the tube network.

Any areas of corrosion or diametric growth can be located and quantified.

Inspection results highlighted a number of external 'defect' features which on closer examination of the construction matched to hanger fixings (Figure 3).

## Conclusion

Left unchecked scaling can not only lead to less efficient steam generation, but also increase the risk of corrosion, creep and tube rupture. Regular descaling will minimise this risk. Scheduled Smart Pigging will both ensure and assure asset integrity.

Tube failures of this nature, as well being costly and disruptive, would likely be considered as a Tier 2 Process Safety incident (OGP 456/API 574).

Figure 3 – Extract from Inspection 3D

