

# Magnetec Monthly Chronicle

Issue No.5

" FROM THE FIELD "

May 2005

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# Magnetec Inspection, Inc.

Excellence in Eddy Current Inspection Technology & Failure Analysis

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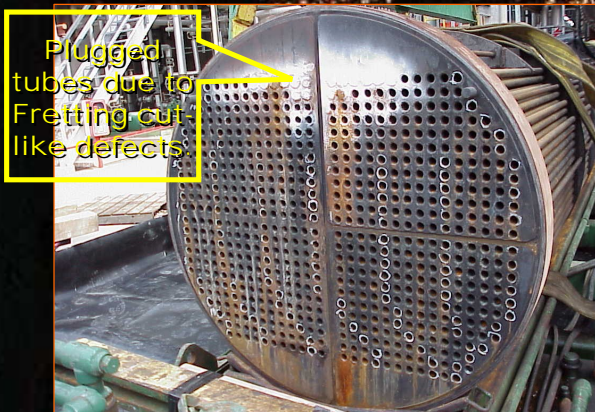
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## What Caused That? Can That Happen?!!!

The exchanger is found in a major Southern Gulf Coast refinery. The bundle was inspected to determine active corrosion mechanism and to aid in life expectancy and service reliability for an expected 5 year operating time frame.

The exchanger operates with a sister/parallel as MSTDP process Column Reboiler. The tubing consists of XXX U-tubes – 1" X .109 min wall X SA-213 T11 X 20 Foot long. The exchanger was reported with 1 possible failure prior to shutdown.



There was no previous inspection history as this was 1st – 10

Year internal inspection. Based on service the bundle was not expected to have any corrosion problems and the reported failure was not confirmed prior to bundle dismantle. The first inspection scheme was performed on 25% of the tubing across the entire bundle matrix with the bundle being in the shell and the inspection performed from the open channel head. The tubing was found to contain O.D. wall loss in the form of what appeared to be a sharp cut-like defects adjacent to the shell side middle inlet piping. The detected failure was found in the top row of tubing adjacent to a support and

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the center shell inlet piping. Based on Video probe visual the failure was a small defect that appeared like a hack saw cut into the tube from the O.D. with full wall penetration. Due to a failed gasket from the channel to shell the bundle was scheduled for pulling which revealed the strange mechanism that caused the failure and adjacent tube damage. Upon pulling of the bundle it was noticed that a stainless spiral-wound gasket had fallen on the top of the tube matrix at the center inlet deflection plate. The gasket was disintegrated with individual windings being spread across the top row of tubes and extending down into the bundle matrix. These single spiral windings had rubbed/fretted the tubing with many very deep defects and caused the thru wall failure. The high shell side flow and sharp side of the stainless gasket winding had cut the tube like a hack saw blade. Based on the amount and location of the gasket pieces found in the tube matrix a 100% inspection of the top 5 rows of tubes was performed and all gasket pieces were removed from the bundle matrix. All tubes with defects

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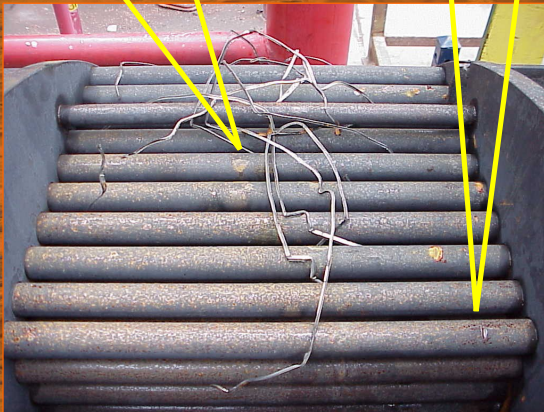
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were plugged to returning bundle to service. There was no indication of how the gasket got to its position as the original inlet piping gasket was intact.

Spiral-wound gasket. As found when bundle was pulled.

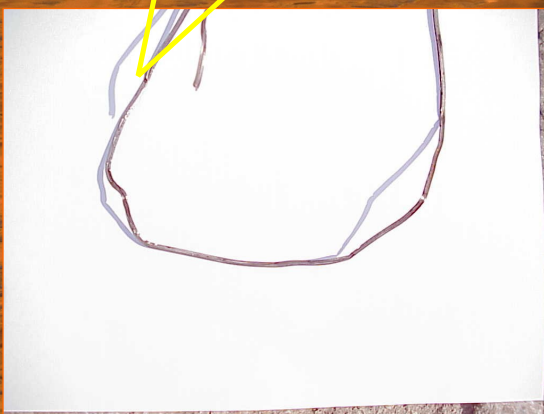
Note Defects.

Gasket extending into bundle matrix.



Removed Gasket Section

In-situ defect. Note defect contour "V" corresponding with gasket surface contour.



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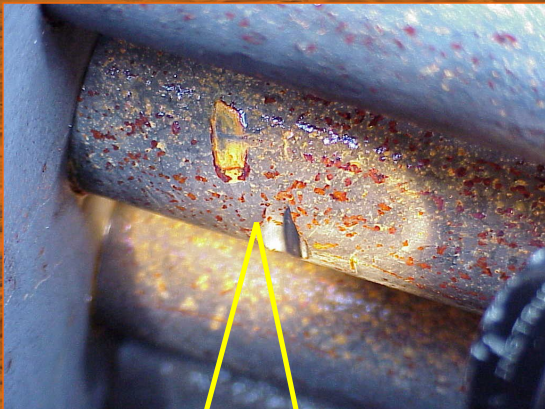
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60% depth defect.  
This tube is 2nd row  
down in bundle tube  
matrix.



Actual failure.  
Note deep defect.  
Gasket section was  
removed for photo.



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