



# PROJECT REPORT

PR2730/97

## HiTRAN<sup>®</sup> Thermal Systems Technology

**CORRECTS VAPOUR FLOW MALDISTRIBUTION, DEBOTTLENECKING  
HYSOMER UNIT FOR DEUTSCHE SHELL**

### *PLANT*

Köln-Godorf Refinery, Germany

### *SERVICE*

Hysomer Feed/Effluent Exchanger

### *EXCHANGER*

2 shells in series (countercurrent).  
For each shell: Floating head,  
TEMA type BES, horizontal, 1 tube pass,  
1763 tubes: 20.0 x 2.00 x 6100mm



### *PROBLEM*

With effluent vapour condensing tubeside against a feed stream shellside, the existing equipment was failing to deliver design performance. As well as low tubeside heat transfer, phase separation with partial condensate flooding in the tubes was also suspected. The underperformance placed a large burden on the reactor furnace, limiting throughput.

### *SOLUTION*

Thermal and hydraulic analysis by Cal Gavin pointed to severe tubeside fluid maldistribution in the large single-pass bundles. Low vapour phase coefficients and varying degrees of phase separation and flooding phenomena throughout the headers, tube bundles and pipework, were all contributing to a low U value.

HiTRAN<sup>®</sup> Matrix Elements would enable the effluent stream to distribute evenly across the inlet tubesheet, and provide coefficient enhancement particularly in the vapour phase. As part of a revamp and scheduled turnaround programme, the refinery were able to modify the hydraulic arrangement of the outlet pipework to prevent condensate hold-up in the lower tubes and a HiTRAN<sup>®</sup> Thermal System was selected for installation in the hot shell to achieve the above objectives.

### *BENEFIT*

Following a quick and straightforward retrofit at the shutdown, the enhanced performance of this feed/effluent unit was seen immediately at start-up. By correcting flow maldistribution, the entire installed surface of the hot shell is now utilised and overall heat transfer performance substantially enhanced. As a result the unit has been substantially debottlenecked.

### *INSTALLATION*

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