

## Case study on cokerPLUS

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### Coke break

Control of fatigue damage in coke drums has a significant impact on the profitability of a refinery. ERA is helping Conoco optimise the operation of their coke drums at the Humber refinery, helping to decrease costs by reducing the rate of damage accumulation in drums.

ERA's approach to plant operation and life management is also helping Conoco improve their confidence in plant integrity, decrease business and technical risks and extend the life of existing plant.

Coke drums are large, thin-walled pressure vessels that experience some of the most severe thermal cycling conditions of all the components on a refinery. This can lead to drum failure in the form of cracking. Each through-wall crack can result in millions of dollars in lost production. ERA has unrivalled experience of in-service monitoring of coke drums and has developed a unique understanding of the deformation processes involved and the key parameters affecting the integrity.

Conoco, which operates four pairs of drums at the Humber refinery, engaged ERA to measure cyclic strains and perform probabilistic crack growth assessments on two selected drums. Thermocouples to monitor surface temperature and gauges to measure strain were installed at six critical locations on each coke drum. These measurements were carried out to determine the interactions between operational parameters and the strain levels responsible for cracking.

ERA's tasks were to install the on line monitoring systems, to assess the remaining lives of the coke drum shells using probabilistic life assessment methods and provide Conoco with direct probability of crack initiation and fatigue failure versus cycles. ERA also identified and evaluated those parameters having a dominant effect on integrity that could be operationally modified to optimise the lives of coke drums.

Following the analysis, recommendations given by ERA for the modification of these parameters have now been implemented and are currently under evaluation. Meanwhile Conoco has asked ERA to repeat the exercise on two more drums.

The analysis enabled both technical and economic factors to be reconciled when decisions were made regarding future maintenance, inspection and replacement strategies.

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