

Concrete NDT

A Tall Order: Scanning a 300-Foot Chimney

The Project

Bentham Geoconsulting in the UK won a bid to team up with a UK access contractor to inspect concrete chimneys at an oil refinery. The purpose of the inspection was to obtain construction and defect details in order to assess maintenance requirements and life expectancy. The task was unique since the chimneys ranged from 91m to 120m in height (approximately 300-400 feet).



Project Description

The chimneys in question were built in the 1960's and are in continuous use. In the last ten years, an additional "outer skin" was applied in order to increase chimney life, and an internal refractory brick liner also protects the outer structural concrete.

The client wanted a means to obtain non-intrusive data over the height of each stack in order to make detailed assessments on condition. They were particularly interested in the condition around each corbel (an internal lip on the inner edge of the concrete skin which holds successive lifts of refractory bricks) and the inner face of the chimney, which is hidden by the refractory brick lining. Obtaining this type of detailed data from a live chimney, that also has obvious access difficulties, would make the job incredibly complex.

Bentham Geoconsulting suggested the use of ground penetrating radar as a reliable means to obtain both construction records and defect details. Using the skills of the access team, a platform was built just below the top of each stack. From these platforms, a motorized cradle was suspended to allow vertical access over the entire surface of each chimney.

The team used a GSSI SIR-3000 and a 1 GHz antenna to collect the chimney data.



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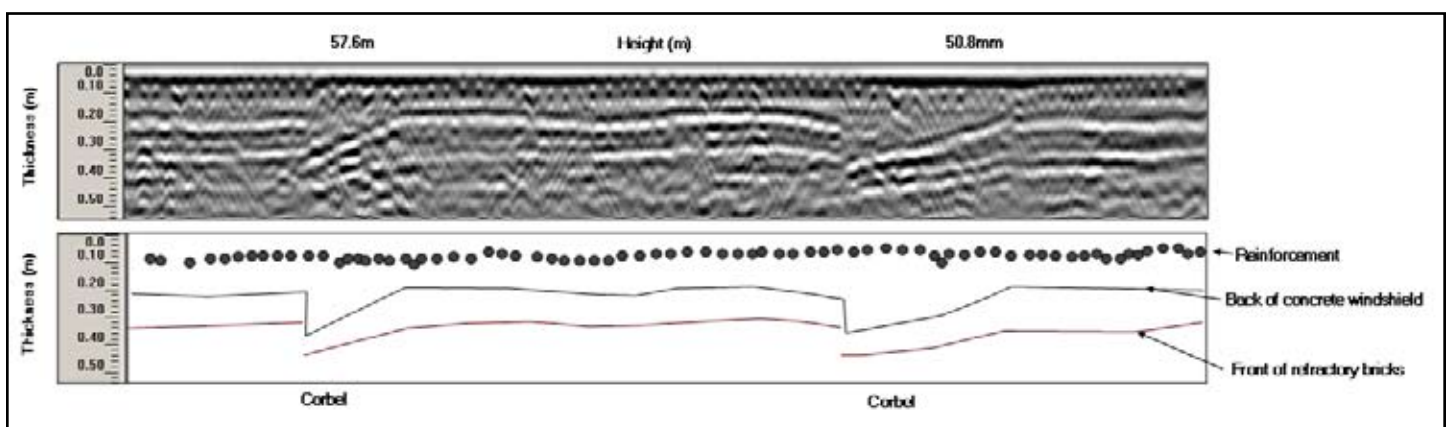
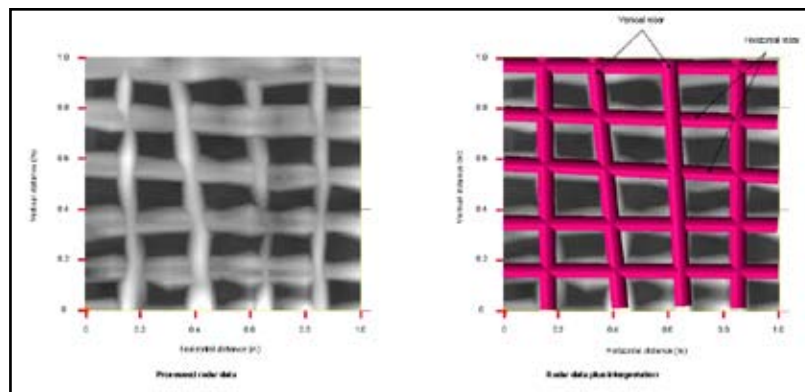
Courtesy: Bentham Geoconsulting
Lancashire, U.K.
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Outcome

Over 1500 radar profiles were collected from each chimney, and the data helped the client to form an opinion on the current condition of the stacks. Although the collection of radar data is nothing unusual, this job was different because it meant dealing with the difficulties of marking out accurate grids from very high in the air and using the system from a relatively unstable cradle. Overall, the work was carried out successfully in a hostile environment.

“The client was very happy with the radar data since it allowed them to make better predictions as to the likely life of the stacks and the need to commence immediate repairs, which would have otherwise been undetectable,” commented Steve Openshaw, Managing Director at Bentham. “This work put a novel twist on the term ‘near-surface’ geophysics. There were times when we wished we really were nearer the surface!”



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