

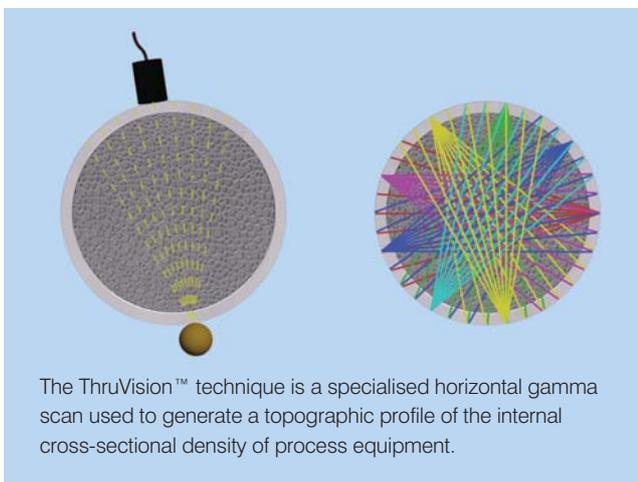
Packed Column - Density Profile

Determining the best approach to help diagnose your process problem is Tracerco's area of expertise. In the case of troubleshooting packed towers Tracerco has developed the ThruVision™ scan procedure that provides data similar to a medical CT scan.

The ThruVision™ scan technology is used to obtain a density profile of a cross-section of a piece of process equipment such as a packed tower, piping, or FCCU riser at one elevation but with 360-degree coverage at that elevation. The ThruVision™ scan provides a more detailed density profile than a conventional gamma scan and helps address the situation when different phases are poorly distributed or solids build-up occurs.

Project Field Test

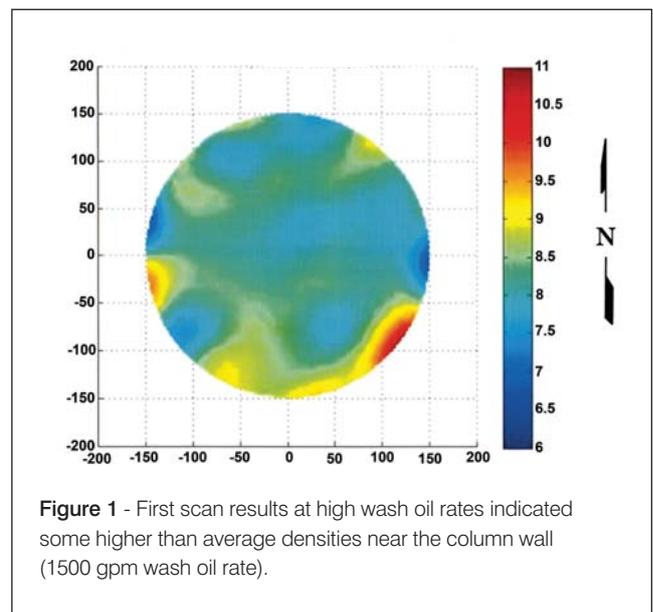
A refiner wanted to reduce their wash oil rates to their vacuum column wash bed as a cost saving to the refinery. A conventional Tru-Grid™ Scan had demonstrated good liquid distribution into the top layers of packing. The liquid distributor was a typical pipe ladder type distributor. When trying to minimise liquid rates the concern was that some dry areas may develop that the Tru-Grid™ Scan may not detect across the large diameter of the vacuum column. One way to observe if the wash bed packing was being properly wetted at different wash oil feed rates was to use a ThruVision™ scan.



The vacuum column wash oil bed was scanned using the ThruVision™ scan application to determine the liquid distribution patterns at two different liquid rates. The inspections were performed to provide comparative data at the different flow conditions. The scan was performed at an elevation 30cm into the wash oil bed at low and high wash oil rates.

Project Analysis

The first ThruVision™ scan results at 1500 gpm wash oil rate revealed a relatively uniform density profile (120kg/m³ to 144kg/m³) across the majority of the bed (Figure 1). However, concentrated near the column wall there were several pockets of higher than average densities and areas of lower than average density.



The second ThruVision™ scan at 900 gpm wash oil rates revealed a higher degree of non-uniformity, translating to poorer liquid distribution (Figure 2). Most notable was an area of low density (96kg/m³ to 112kg/m³) from the NE to the SW in the middle of the bed (along the distributor's inlet header) where low liquid flow would tend to allow coke to build-up. There was also larger, more pronounced areas of higher densities (over 144 kg/m³) where excess oil was being applied.

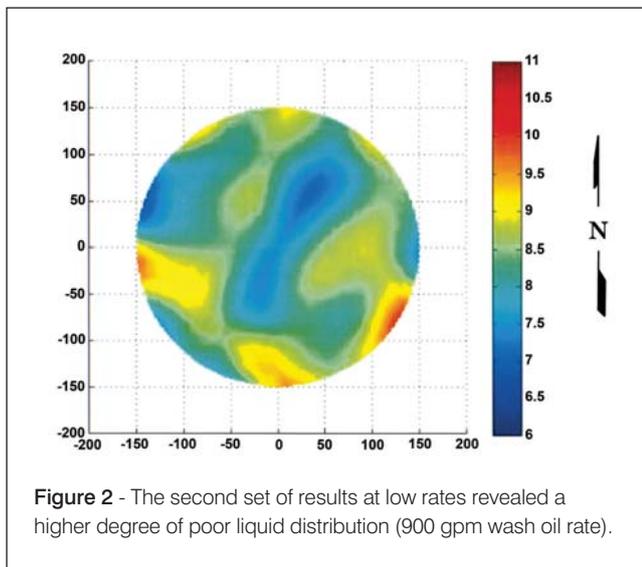


Figure 2 - The second set of results at low rates revealed a higher degree of poor liquid distribution (900 gpm wash oil rate).

The following day the wash oil bed was scanned again at an intermediate rate of 1100 gpm using the same orientation as used before. This scan showed results in between the two extremes (Figure 3). There was a small area near the NW wall with higher than average density readings of 136kg/m³ - 144kg/m³. There were areas of lower than average densities along the SW wall and in the middle of the eastern quadrant. This profile however showed an improvement over the profile at 900 gpm and did not show the high liquid traffic along the wall as experienced at 1500 gpm. Based on this data alone the optimal wash oil rate was determined to be in between 1100 and 1500 gpm.

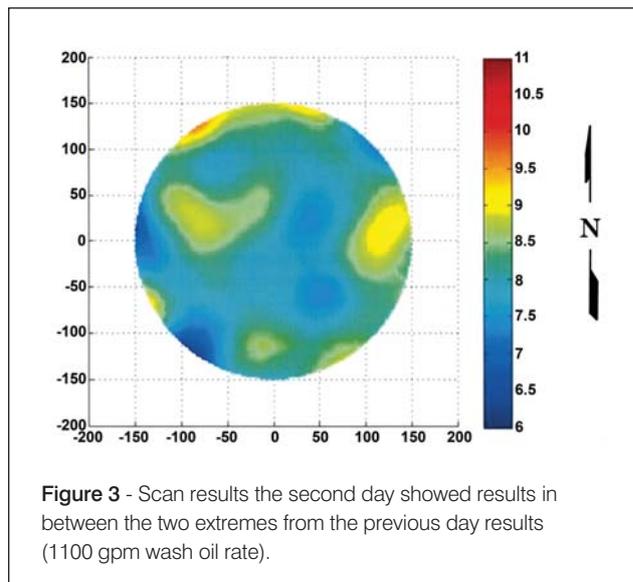


Figure 3 - Scan results the second day showed results in between the two extremes from the previous day results (1100 gpm wash oil rate).

Customer Conclusion

The ThruVision™ scans showed that the pipe distributor did not appear to work well when the oil rates were set at 900 gpm. At 1500 gpm there was areas along the column wall that had higher than average densities and also some areas with lower than average densities. The intermediate test at 1100 gpm showed improved liquid density distribution compared to the 900 gpm rate, but overall worse than the 1500 gpm. While there may be a rate somewhat lower than 1500 gpm where good liquid distribution is achievable it appears that with this distributor design the rate reduction possible without a decrease in efficiency may be minimal.

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