Tracerco

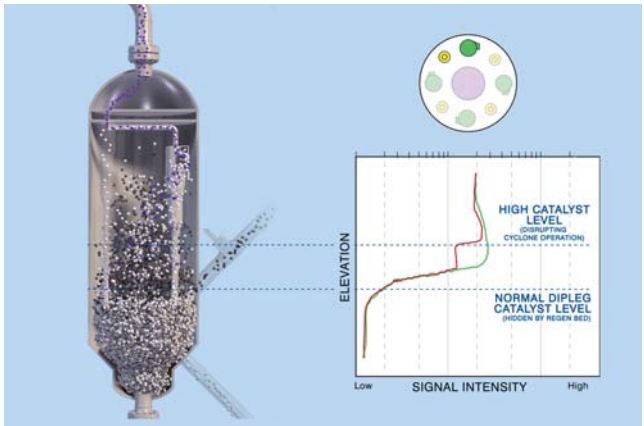
Providing Insight Onsite

FCC Reactor or Regenerator - Plugged Cyclones

The loss of catalyst through the reactor or regenerator cyclones is a fairly common problem. Identifying the reason for the loss is often difficult. The use of a Tru-Scan™ can be a powerful tool for gathering needed information about the problem.

When a specific isotope source is positioned on the outside of an FCC reactor or regenerator at the top tangent line and a sensitive detector is positioned on the other side and also at the top tangent line, the varying amount of radiation that the detector records is directly dependent on the density of the material inside the vessel.

If the area inside the vessel is vapour, then most of the radiation passes through. If the area contains dense material, like catalyst, most of the radiation is absorbed, never reaching the detector. Lowering the source and detector synchronously down the side of the vessel can generate a density profile of the internals and catalyst.

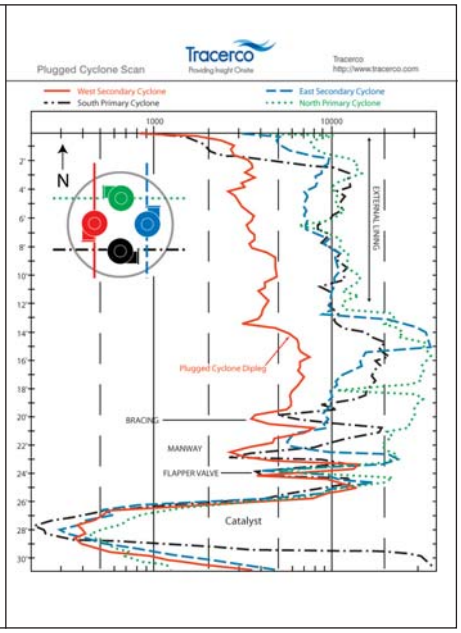


Tru-Scan™ results produce a density profile of a reactor or regenerator internals indicating where cyclone problem areas exist.

Project Field Test

For one refinery, the primary cyclones were scanned as shown in Figure 1.

Figure 1 - Scan results indicated one of the four diplegs had become plugged with catalyst.



Project Analysis

Results indicated one of the secondary cyclones and its dipleg were shown to be denser than the other three. This was due to the fact that a blockage had developed in the dipleg and catalyst had filled the cyclone and dipleg. This problem meant that the catalyst entering the plugged secondary cyclone was not removed from the vapour but exited the reactor.

Customer Conclusion

Occasionally, a dipleg or cyclone is found to be blocked. Scan results provide confirmation of the problem cyclone so that critical operating decisions can be made.

Process Diagnostics

FCC Regenerator - Bed Level Studies

The dense bed level of an FCC regenerator can be determined by using Tru-Scan™ technology.

A single Tru-Scan™ through the regenerator will produce a density profile at the catalyst bed level area that will indicate dense phase and dilute phase levels. This procedure can be performed over varying operational conditions to assess the changes in level and can assist in the calibration of level control instruments.

Project Field Test

A refinery was having trouble with loss of catalyst from the regenerator when the catalyst bed level was dropped too low, but running the bed level too high risked flooding the cyclones. The plant personnel were suspicious of the calibration of the level gauge that indicated the bed was at the right height to seal the ends of the dip legs, but not flood the cyclones.

Project Analysis

Tracerco was contacted to perform several Tru-Scan™ tests on their regenerator to determine the catalyst bed levels. The results from three scans are shown in Figure 2. The scan lines were chosen to avoid the cyclones and diplegs. It was found that at the low level, the bed was so low that the bottoms of the secondary diplegs were uncovered, allowing vapour and catalyst to pass up the diplegs. The third scan revealed an appropriate height to cover the diplegs and the level instrument was recalibrated from the scan data.

Customer Conclusion

These three scans helped the plant personnel recalibrate their level gauge. Whether benchmarking an FCC after a turnaround, planning modifications for the next turnaround, or troubleshooting abnormal operation, the FCC process engineer can pull Tru-Scan™ technology from their tool bag to better understand operational and mechanical issues. This leads to greater efficiency and higher profitability.

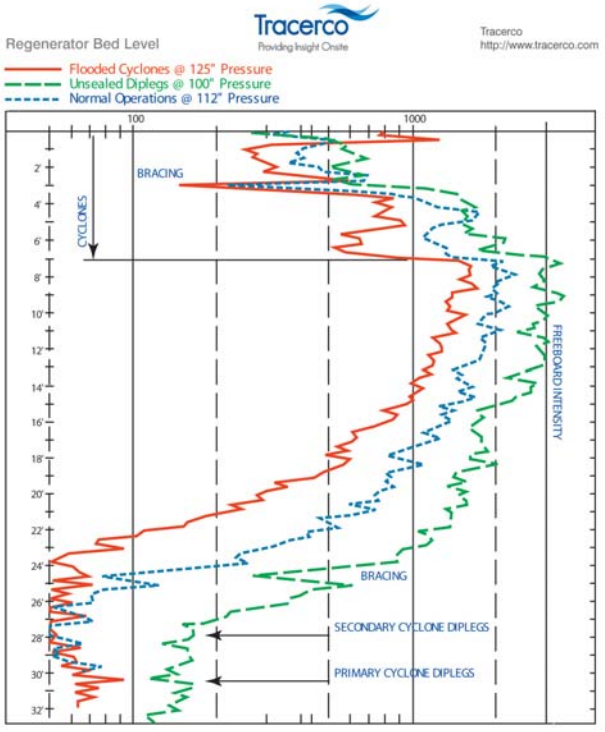


Figure 2 - A Tru-Scan™ test was performed on a FCC regenerator to determine the bed levels to help verify plant personnel suspicions of the level gauge calibration.

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For our worldwide offices: www.tracerco.com/processdiagnostics/our-people