Online, Non-intrusive Trouble Shooting and Process Characterization of FCCU's using Gamma Ray and Tracer Technology
Presentation Agenda

• Introduction
• Tracerco Technology
  – Gamma Scanning
  – Tracer study
• Case study
  – Cyclone Blockages
  – Feed Nozzle performance
  – Stripping Steam Ring Damage
  – Catalyst Bed level
  – Regenerator Air Grid problems
  – Cyclone overloading problems
What we do…

Provide technologies that enable visualisation of plant processes to characterise operations and deliver optimisation to the end user
Tracerco can comprise any individual element or combination of the techniques below:

- Unsealed tracer injections to follow various phases
- Gamma scanning to determine levels or detect damage
- Gamma Scanning to assess standpipe density
Applications of the Technology – FCCU’s

- Residence times
- Distribution
- Coke Deposits
- Velocity - slip ratios
- Distribution of feed, steam & catalyst

- Air distribution
- Catalyst distribution
- Cyclone efficiency
- Cyclone blockage detection
- Catalyst bed level

- Catalyst slugging
- Catalyst density profile

- Dip-Leg Catalyst Levels
- Residence times
- Velocities
- Distribution
- Steam underflow
- Catalyst Bed Level
- Riser Density Profile
- Coke Deposits
- Dip-Leg Catalyst Levels
- Residence times
- Distribution of feed, steam & catalyst
Technology Overview
Cyclone Gamma Scan

Reactor/Stripper bed level and primary cyclone scan

Non-intrusive on-line identification of catalyst level using gamma scanning technology

- Locate top of catalyst bed
- Identify catalyst level in primary cyclone dipleg
- Scan results help recalibrate level instruments and gather essential information to make needed repairs
- Identify problem areas to avoid shutdowns
Feed Nozzle Performance

ThruVision Scan Orientation
Tracer Study
Case Studies
The unit was operating at reduced rates due to the increase in catalyst within the slurry pump around.

- 6 Internal cyclones.
- Cyclone A was blocked.
- Catalyst level increased as circulation rate was increased.
Case Studies – Catalyst Distribution in the Riser
Case Studies – Catalyst Distribution in the Riser

Low Rates

3048mm Above Feed Nozzles
17 April

High Rates

3048mm Above Feed Nozzles
18 April

1371mm Above Feed Nozzles
17 April

1371mm Above Feed Nozzles
18 April
FCC Reactor Stripper – Catalyst/Vapor Flow Distribution

• Measures steam & catalyst distribution through the stripping section
• Identify problem areas for upcoming turnarounds to assist in scheduling maintenance, resulting in an on-time turnaround performance
FCC Reactor Stripper – Catalyst & Vapor Distribution

Catalyst Distribution

Steam Distribution
Case Studies – Stripper Maldistribution

Before

TRACERCO Diagnostics FCCU Study
Stripping Steam Distribution

Radiation Intensity

Stripper Top N Stripper Top E Stripper Top S Stripper Top W

Time (seconds)
Case Studies – Stripper Maldistribution

TRACERCO Diagnostics FCCU Study
Stripper Steam Distribution - Top

After

Radiation Intensity

Time (seconds)

Stripper Top N
Stripper Top E
Stripper Top S
Stripper Top W
Strip Steam In
Case Studies – Regenerator Bed Levels

• Three different operating levels of the Regenerator

• Gamma Scan at each condition to optimize the bed level and reduce catalyst carryover.
Case Studies – Air Grid Problems

![Graph showing radiation intensity over time for different air grid problems.](image-url)
Case Studies – Blockage causing cyclone overloading issues
Case Studies – Blockage causing cyclone overloading issues

RTD Distribution

Cyclone Inlet Distribution
Conclusion

- Scanning and Tracer injection/detection are the only techniques that allow you to effectively ‘look inside’ your vessels whilst in normal operating conditions.

- The perfect technology to:
  - Troubleshoot operating problems
  - Carry out a Process Optimisation Study
  - Plan a Turnaround more efficiently
  - Carry out a ‘baseline’ study of the unit during Commissioning or after a Turnaround
  - Measure Efficiency gains after a Retrofit

- Tracerco measurement data can also be used to enhance CFD modelling for more accurate analysis

Thank you and any Questions?
Use our Technology Map to find out more!