

Tracerco - Optimising efficiency of shutdowns and turnarounds to improve processes



We've been operating for more than 60 years now, globally across five continents, and really what we do is provide our customers with products and services that measure the difficult to measure offering real time insights into their processes, empowering them to make better informed decisions, be safer and more productive. Generally as a business we provide these goods and services in a variety of different applications such as reservoir characterization, fuel security and assurance programs, nucleonic instruments and our on demand diagnostics service – both of which will be the focus of today's presentation.

What we do



Each of our products and services allows customers to make insight-driven decisions, optimise processes, reduce costs and increase profit.

We measure the 'unmeasurable', access the 'inaccessible' and help solve the 'impossible'.

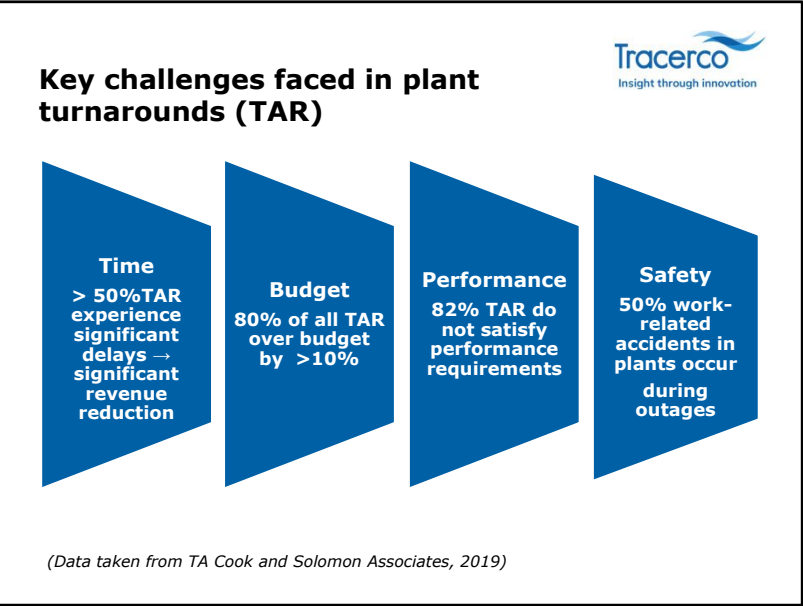
Presentation agenda



- 1 Key challenges faced in plant turnarounds**
- 2 Radiation awareness and safety**
- 3 Overview of diagnostic services**
- 4 Overview of measurement instruments**

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As I’m sure you may have experienced, there’s really 4 main challenges to overcome when it comes to plant turnarounds. The first, delivering on time – more than half of all turnarounds suffer from significant delays which then leads to significant revenue reduction the more downtime that the plant incurs. The second challenge is delivering in budget with 80% of all turnarounds being over budget by more than 10%. The third challenge is performance requirements – with 82% of turnarounds not satisfying performance requirements and the final, most important in my opinion, is safety – almost 50 % of work related accidents in plants occur during plant maintenance outages. These statistics demonstrate there’s a lot of room for improvement in turnaround projects. But the question is how can you achieve this improvement?



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We have developed diagnostic services which are specifically aimed at helping plant personnel to address each of these challenges. Many engineers and planners are tasked with comprising a list of assets to be inspected during the turnaround but how do you know which assets to put on the list? Wouldn't it be great if you could effectively see inside the assets to determine if there were any process or mechanical issues without having to physically enter them? This is information that our diagnostic scanning services can give you, identifying which assets have process and mechanical issues and need to be entered, saving you time from entering ones that don't.

By ascertaining the mechanical integrity of the internals from our scans, it enables you to quantify and identify how many need internals need replacing while you are shutdown. I know many facilities will just order a standard 10% or 15% but what if you can save money by ordering less or what if you need to order more? By scanning before turnaround, it enables plenty of time for you to order the replacement parts- avoiding having to pay premium costs and being at the mercy of lead times.

In terms of optimizing process efficiency, you can only really do this by understanding what is happening in your processes from the data that you have which will come from your level gauges, differential pressure gauges, temperatures indicators and flow meters. But how do you know if they are working? How long will you spend trying to solve a problem with information that may not be correct or incomplete information? Our diagnostic services will give you a real time understanding of what is happening in your processes so you can make the most educated decisions. The more you understand your processes, the more you will be able to optimise them.

Finally, in terms of safety as I mentioned our scans reveal which assets have process and mechanical issues and which don't enabling you to reduce vessel entry only to the assets where issues are identified.

The other feature to mention about our diagnostic services are that they are non-intrusive and can be performed without any interruptions to your production.

How can Tracerco's Diagnostic Services help?

Save Time
Detect process issues, pinpointing where your maintenance efforts need to be focused

Reduce Cost
Identify which internals need replacing ahead of time

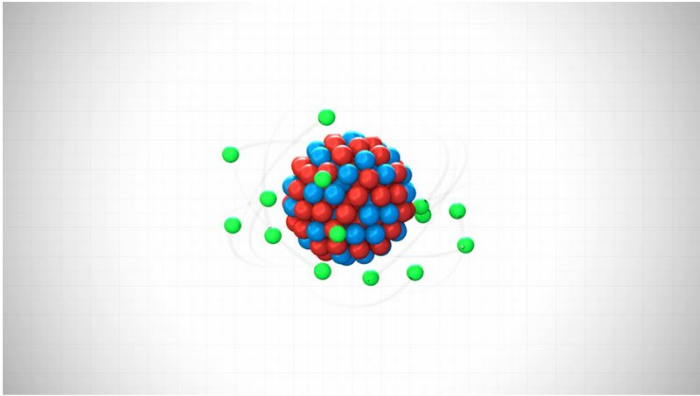
Optimise process efficiency
Provide real-time data to allow you to make better educated decisions

Improve Safety
Reduce vessel entry to those where process/mechanical issues identified

□ Diagnostic services are non-intrusive and performed whilst plant online.

Most of the diagnostic services I will cover involve the use of a radioisotope. In all radiation, there's four primary emissions: alpha (which can get stopped by a sheet of paper), beta (which can get stopped by a thin sheet of Al), gamma (which is attenuated) and neutron (which can get stopped by a hydrogen rich material, such as water or polypropylene). For our industrial applications, we use gamma and neutron emitting radioisotopes because they are the two emissions that can penetrate metal so they can see into your process whereas the other two can't.

Radiation awareness
Work Safe. Home Safe



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This might sound a bit daunting but I'm sure most of you will be familiar with radiography being carried out on site- in comparison to that the size of the radioisotope sources we use are about 1000x smaller as we work to the principle of ALARP (As low as reasonably practicable) using small sources optimized for each specific measuring application. We use both sealed and unsealed sources, for sealed we have licenses in place in most regions across the globe and for regions where we don't, we can work with local companies. For unsealed, the plant requires a license as well as the material will stay in the process downstream.

Radiation safety

Work Safe. Home Safe

- ❑ Tracerco's Field Engineers are RPS trained and certified by Tracerco's Radiation Protection Advisor.
- ❑ Tracerco is licensed by the local authorities or assisted by a local company with regards to the use, handling and transport of any radioactive materials.
- ❑ There is no danger to plant personnel working around process equipment outside of the safety barrier, which is typically a few metres.
- ❑ We use small radioactive sources (e.g. Co-60, Cs-137, Am-241/Be, Kr-79) that are optimised for each application.



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So, starting off with our column scanning. Here, we can scan both trayed and packed columns. This animation demonstrates how we scan the trayed columns – we have a radioisotope sealed source on one side and a detector on the other and scan through the active areas of the tray. That enables us to build up a real time density profile of the material between the source and detector from the attenuation in radiation – the more dense the material is, the more the radiation will be attenuated and vice-versa. From this density profile we can see if all the internals are in place in the column and if there are any process issues such as fouling, foaming and weeping.

Column scanning



Tru-Scan™ (trayed columns)

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For packed columns, the methodology is very similar to what we've seen for the trayed columns but rather than a scanline through an active area of the tray we tend to do four chord scans through the packing and compare one to the other to see how the liquid is distributed through the packing, as one of main process malfunctions is liquid maldistribution. All four chords should overlay each other perfectly if there's no liquid maldistribution. And as you can see from the example there, we can see liquid maldistribution and correct placement of the distributor.

Our column scans will enable you to assess the mechanical integrity of the internals and process issues in advance of a turnaround without having to shutdown for internal inspections.

Column scanning



Tru-Scan™ (trayed columns)



Tru-Grid™ (packed columns)

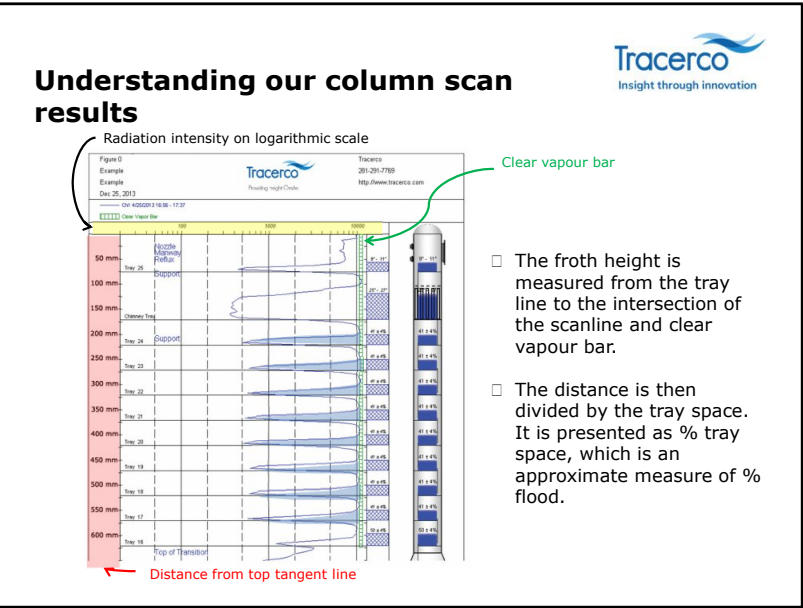
Tracerco
Insight through innovation

- Valuable data output:
 - Mechanical integrity of internals such as trays, packing, distributors and collectors
 - Reveals process issues, e.g. flooding, foaming, fouling, liquid maldistribution

Before going through some case studies to demonstrate the value of the column scans, I'd just like to cover how to interpret our scans so this can help you understand the results from the case studies.

Here is an example of a column scan for trayed columns, The axis in yellow is the radiation intensity on log scale, so the higher count rate the lower the density and the lower count rate the higher the density. The axis in red is the distance from the top tangent line. The green bar on the right hand side of the graph represents a clear vapour count rate which is a real time measurement of clear vapour in vessel.

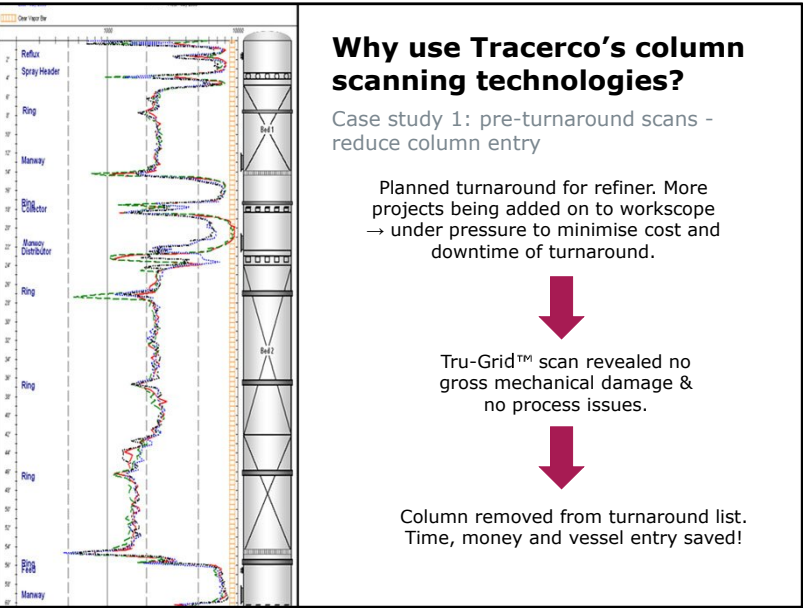
I've picked this scan deliberately as an example as it shows ideal results as we see consistent peaks indicating consistent density on each tray, with parabolic curves between each of the trays returning to the clear vapour bar. By returning to the clear vapour bar, its an indication of good liquid vapour disengagement. We can also measure the froth heights from the scans by extrapolating the curves to the clear vapour bar and measuring the distance from that to the tray. That froth height, which we will report as % tray space, is a good measure of % flood.



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In this first case study we were contacted by a refiner who was entering into a planned major turnaround. As you can empathise with, more and more projects kept being added to the scope putting them in jeopardy of having to add additional downtime, or remove other projects originally scheduled in order to get them all completed. They called us out to scan a packed bed which was not presenting any issues but had not been entered for quite a while and was on a unit which had experienced several upsets over the years.

The results of the scan are as shown. From the scan, we can see consistent density through each bed, overlaying scan lines which indicate good distribution and the distributors and Chimney Trays in place and operating as expected. So this scan highlighted no mechanical damage and no process issues. This data, combined with the refiner's knowledge of this column's operation, led to them removing the column entry from the turnaround list saving them time, money & vessel entry.



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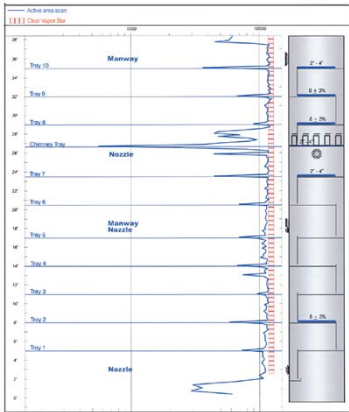
Moving on to another case study. In this example, plant personnel were concerned with the poor separation efficiency of a high-purity column and wanted to verify the condition of the tower internals before pursuing other troubleshooting options. We carried out a Tru-Scan™ across the active tray area and generated these results. I'm hoping you can see when comparing it back to the ideal scan result I showed a few slides ago, it's very different, we don't have consistent peaks with consistent density on each tray. Instead, the majority of trays 1-10 are not holding a detectable froth level at all, suggesting widespread damage.

Why use Tracerco's column scanning technologies?



Case study 2: plan ordering of replacement parts

- Plant personnel concerned with poor separation efficiency of high-purity column.
- Tru-Scan™ revealed low liquid levels on Trays 1 -10.



Based on these results, plant personnel decided to schedule a shutdown of the tower and as can be seen from the customer testimonial in the blue speech bubble on the slide our scan data allowed them to plan for the repair work properly and have minimal downtime by identifying in advance how many replacement trays were needed and define the scope of work for the shutdown. The customer also sent us a picture from the shutdown confirming the tray damage that was indicated from our scans.

Why use Tracerco's column scanning technologies?



Case study 2: plan ordering of replacement parts

- Scan data enabled plant personnel to order replacement parts in advance of shutdown and reduce outage time.



"You guys nailed it! All the trays you identified were down. We were able to buy new trays prior to the shutdown and schedule contractors to install the trays. This allowed us to plan ahead and have the column down and back up in 5 days. As of yesterday morning, the columns are producing on spec material at full rate again. Thank you and your team for your expertise!"

The last case study I'd like to cover for our column scans is the value of baseline scans. These are scans which are carried out when the column is operating well, generally after a turnaround. Given how I've shown with the last case studies how our column scans can help diagnose process issues this might seem a bit counterintuitive, why would you scan when there are no issues?

Really, it's in 2 scenarios we would recommend these scans – the first when you're coming out of a turnaround to check you haven't left any water in the column which could blow out the first half dozen trays or so and second for structurally complex columns which this case study demonstrates.

In this example, we carried out a baseline scan of a main fractionator tower. When you compare this result to the ideal result I showed a few slides earlier it's apparent that its dramatically different. You might think it suggests jet flooding from top to the bottom of the column in the trayed section. However this baseline scan has been carried out after the tower has been cleaned and is operating perfectly. So why are the results like this?

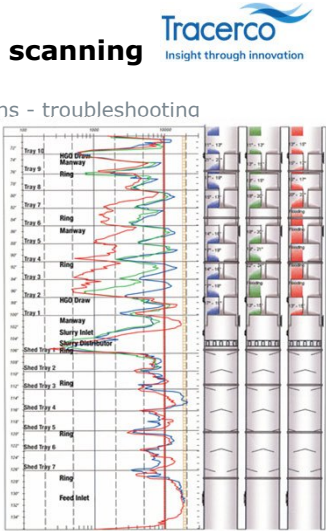
What we're seeing is the results of numerous external obstructions and well pads along with very large tray supports in tower. However, because we had the baseline scan available we were able to identify a problem 6 months later that was occurring on tray number 2 when fouling material went through the tower and started causing problems That build up continued 7 months later where we were able to identify that it was causing liquid stacking. So in some circumstances baseline scans are imperative as they allow us to see what the tower looks like under your normal operating conditions so we can then better identify issues that come up in future.

Why use Tracerco's column scanning technologies?

Case study 3: post start-up baseline scans - troubleshooting

- Baseline scan of main fractionator displays none of the characteristics of a vessel operating with good disengagement or a consistent profile.
- Six months later, we were able to recognize exactly where the issue is, due to the baseline comparison. Tray 2 is flooding while Tray 3 is heavily loaded.
- After another seven months, the coke build-up has led to extensive flooding from Trays 2 through 7.

Baseline scans allow us to see what the tower looks like under your normal operating conditions, so we can identify any issues that may be of concern.



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I'd also like to mention our new Insights platform which we have recently launched. This is a cloud based platform that enables you to have 24/7 access to your column scan data and manipulate it interactively.

It enables you to see the different towers for your sites, reports for column scans that have been performed and jobs that we are due to come onto site to carry out. By having all the information in one dashboard it can help you plan for your shutdowns more effectively by managing your data and enables all the stakeholders to access the information from one platform.

You can go into your reports in detail and manipulate the data interactively using the same tools we use to analyse the data. One of the most useful tools, is comparing scans – so in this case we are uploading a baseline scan and then can compare the two scans to identify where differences occur.



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The next technology we're going to talk about operates slightly differently to the column scans as it is based on neutron backscatter. For this, we use a device which I like to describe as a broom – it has a flat head with a neutron source and detector on an extendable pole.

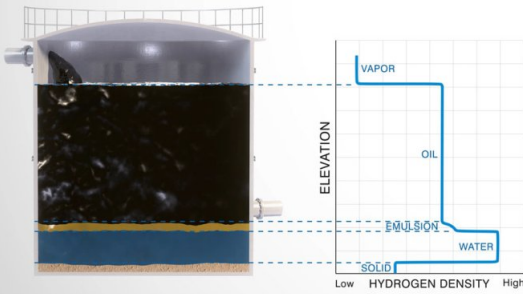
Our engineers carry this service out, in this case on a storage tank placing the device at one end and scanning from top to bottom. The neutron source emits a beam of high energy neutrons which pass through the vessel walls. When the neutrons come into contact with hydrogenous material, they collide with the hydrogen nucleus and are scattered back as lower energy neutrons which are then detected in the head. The detector response is therefore directly proportional to the hydrogen content of the media that is being measured – the more hydrogen, the more neutrons are scattered back and the higher response seen on the detector. In this way, this technology measures the levels of different phases inside your vessels and tanks.



We have a case study here to demonstrate the value of this technology during shutdowns/TARs. In this case, we were contacted by an engineer who was planning for tank cleaning during the shutdown. Our engineers carried out a PhaseFinder scan which revealed the different levels of vapour, oil, emulsion, water and solid. The scan also showed that the customer's level gauge was reading inaccurately. The customer used the results from our scan to immediately recalibrate their level gauge as well as working out how many vacuum tanks would be needed for the clean out.

Why use PhaseFinder™ ?

Case study 1: pre-turnaround scan – prepare for tank cleaning



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Engineer planning for tank cleaning during outage.

↓

PhaseFinder™ scan performed and showed levels of sludge, oil, emulsion, water and solids. Also revealed customer's level gauge reading inaccurate.

↓

Scan data enabled engineer to recalibrate level gauge accurately and work out number of vacuum trucks needed for clean out.

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Now, moving onto our pipe scanning technology. We have a number of different techniques that can be deployed for identifying deposits in pipes. The first being PhaseFinder to find deposits in hydrogenous media.

We walk along the pipe with the NBS device looking for changes in the hydrogen concentration of the media. As we find sections where the hydrogen concentration drops due to deposits we can mark these on your pipe.

The next method we can use is something we call a ThruPipe scan and is based on gamma radiation. For this we use a c-shaped yoke with a radiation source on one side and a detector on the other to take a reading through the vertical and horizontal plane. We can compare those readings to each other to work out the depth of deposit.

The final technology we can use is called a Thruvision where we place a source and detector 180 degrees apart on the pipe and rotate over 9 diff positions. From this, we can extrapolate 1000 points of data and obtain a density colour map where areas of blue relate to low density and red to high density. The information from the pipe scans can help you plan efficiently for pipe cleaning campaigns by revealing exactly which sections of pipe are fouled with deposit.

Tracerco's pipe scanning technologies


Insight through innovation



☐ Valuable data output:

☐ Locate deposit

☐ Quantify deposit

☐ Saves time and money by enabling you to plan location and extent of pipe cleaning schedule.

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The final technology I'd like to discuss is our tracer technologies where we can deploy tracers to measure different parameters to help with process optimisation. The first is for residence time and distribution as well. For these measurements we place rings of detectors at strategic points on the vessel, as well as on the inlet and outlet. We use a tracer that is compatible with the process media so we can use separate tracers to go into vapour, liquid and solid phases. These studies are of value in showing you how your material is flowing in the process to ensure optimal distribution for reaction efficiency.

Tracer technologies



- Our tracer technologies can be applied to measure:
 - Residence time and distribution



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Lastly, tracers can also be used to revealed carryover and carryunder. As this animation shows, on each major inlet and outlet a detector is placed, and we inject separate tracers upstream that will go into the water and oil phases, monitoring as they pass by each of the detector. From this we can determine the residence time, carryover, carry under as well as the oil and water velocities.

Tracer technologies

□ Our tracer technologies can be applied to measure:

- Residence time and distribution
- Carryover/Carryunder

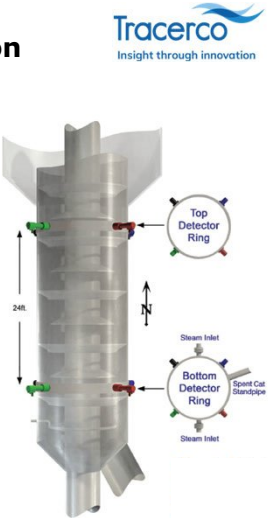


I'd just like to go over this case study to show the value of our distribution studies. This particular one is for a refinery experiencing issues on their FCC stripper. Uniform distribution of catalyst and steam in the stripper is critical to achieve high stripping efficiency. We positioned rings of detectors as shown in illustration and made separate injections of a gas tracer into the stripping steam and a catalyst tracer into the riser so we could measure the distribution of both the steam and catalyst.

Why use Tracerco's Distribution Studies?

Case study: troubleshooting

- Refiner experiencing issues on FCC stripper
- Tracerco distribution study carried out:



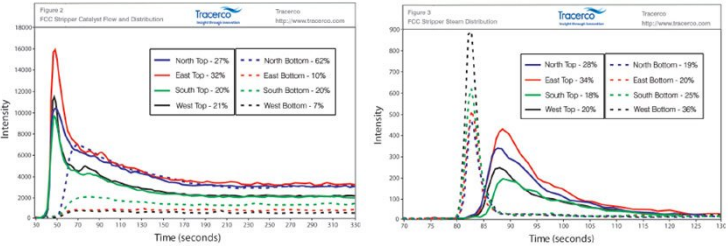
Results from the stripper distribution study pinpointed the root cause of the inadequate stripping of the hydrocarbons from the catalyst, showing 62% of the catalyst to be passing through the North quadrant at the bottom of the stripper while only 19% of the steam passing through the same area. This data revealed to the customer that they had to replace their steam distributor in order to increase the efficiency of the FCC stripper.

Why use Tracerco’s Distribution Studies?



Case Study: troubleshooting

Results:



Scan data enabled root cause of inadequate stripping of hydrocarbons from catalyst to be identified- imbalance of steam:catalyst in north quadrant.

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The final case study I would like to discuss demonstrates the value of our carryover measurements. In this example, one of our major customers was having problems with the plant not reaching design capacity. After further investigation they found and narrowed the problem down to 2 separators. We carried out a tracer study to determine which separator was causing the issue.

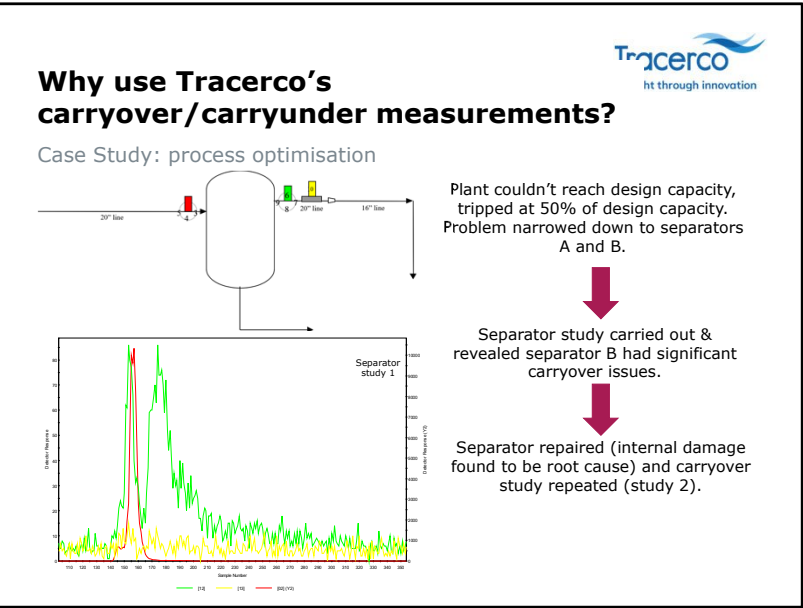
Why use Tracerco's carryover/carryunder measurements?

Case study: process optimisation

Diagram illustrating a process flow involving two separators (A and B), two scrubbers, a contactor, and an LTS (Low Temperature Separator). The flow starts at Separator A, goes to Scrubber, then to Contactor, then to another Scrubber, and finally to LTS. Separator B is also shown, connected to the main flow line.

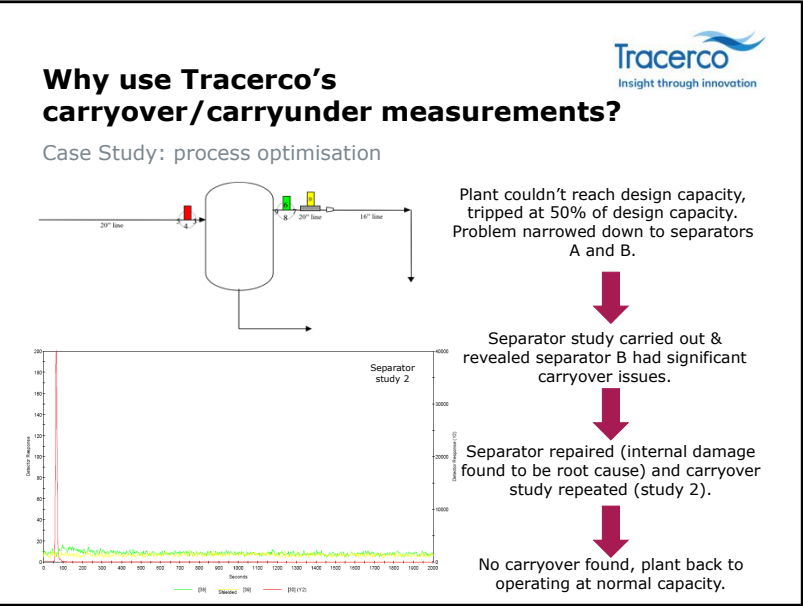
Plant couldn't reach design capacity, tripped at 50% of design capacity. Problem narrowed down to separators A and B.

I'm just going to cover the results for the study on separator B as this was the only one found to have carryover issues. We placed detectors at the inlets and outlets at positions shown on the schematic, and injected a dose of radiation upstream of the separator. From the results we can see response in red, confirming that the radiation has passed through. However, we also see a stronger, wider pulse on the outlet side of the separator from the curve in green. The yellow detector is placed to confirm absence of outside radiation interference and all results are accurate.



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With this data in hand, the customer was able to identify which separator to repair and found internal damage to be causing the carryover in separator B. Following repair of the separator, the customer asked us to repeat the test. The results were that no carryover was present and the plant was back to operating at normal capacity.



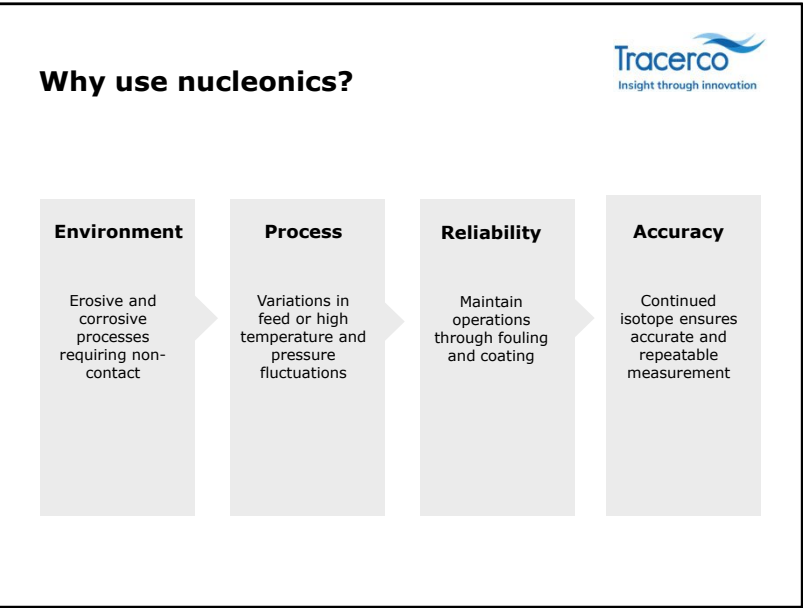
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Usually used in pretty extreme environment/conditions where conventional instruments can't operate effectively or where increased accuracy/reliability is required. Use of gamma isotopes provide continued output; no switching off.

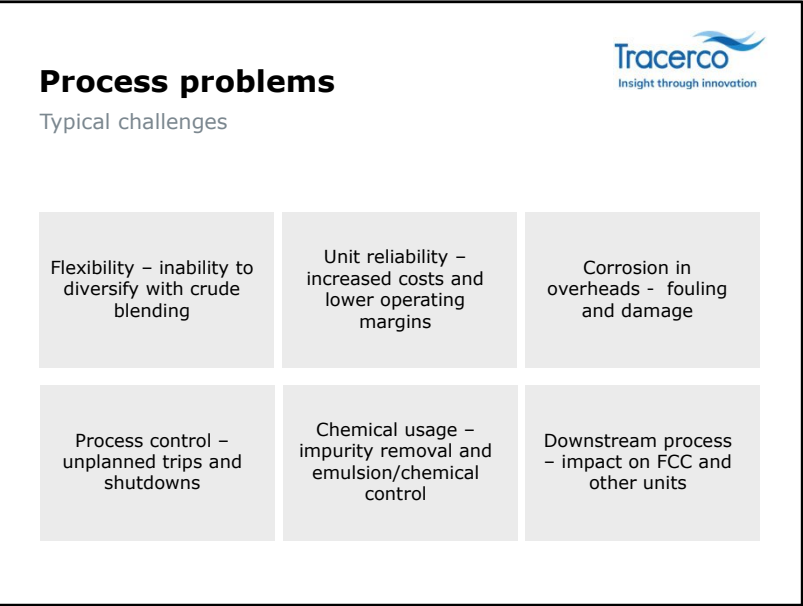
- Fouling, coating, clogging
- Erosive and corrosive processes
- High process temperatures
- High process pressures
- Varying process conditions



Opportunity crudes are becoming a more attractive option for refiners looking to improve flexibility, operating margins, increase distillate yields or convert high sulphur fuel into diesel and gasoline: but they are not without their difficulties. Whether it be oil sands, shale or condensate, higher TAN (Total Acid Number) or increased levels of elemental impurities and contaminants such as waxes, solids, iron and vanadium, all these characteristics can lead to processing issues. The efficient removal of these impurities along with salts and water (BS&W) from crude feedstock is imperative to maintain reliable operations, prevent unplanned shutdowns and outages, and reduce corrosion and fouling.

Foremost of these challenges is to monitor and manage the position and quality of process fluids, including emulsion, downstream of the distillation tower: namely the desalter. Whether the process involves inline or intermediate blending, the use of accurate and reliable level or interface control devices (LIC) in the desalter can reduce and in some cases eliminate process problems resulting from unwanted carryover or carry under.

And it's not just about crude blending; there's a common thread in energy efficiency. Having excess water in your crude stream requires additional furnace demand.



Nucleonic Instruments



Versatile options for process measurement



- ☐ Measures change in attenuation between source and detector
- ☐ No moving parts
- ☐ Easy upgrade conventional level system or retrofit
- ☐ Typically 4-20mA over HART
- ☐ Can be Ex i or Ex d
- ☐ 2, 3 or 4-wire
- ☐ SIL2 options available

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Tracerco's unique Spectrum Scanner technology allows for superior temperature and aging correction while providing a better insight into the conditions of the process being measured and health status of the instrument. The advanced signal processing of the Hyperion™ Spectrum Scanner provides the base for enhanced energy discrimination to offer protection against high ionising radiation fields that may be encountered (e.g. X-ray radiography).

Hyperion™ employs dynamic compensation that accurately compensates for the effect of ambient temperature variations and ageing in the scintillator and PMT. This is achieved by tracking and maintaining the position of the radioisotope photopeak through varying the gain of the system. This allows the density gauge to operate over a wide temperature range from -55°C to +60°C with an output stability of <30ppm/°C. In addition, this method also corrects for any ageing in the PMT that may occur over longer periods reducing the frequency of recalibrations.



Hyperion™ (T251)



Advanced scintillation technology

- ❑ Level, interface or density measurement
- ❑ Sensitive detector
- ❑ Spectrum scanning technology
- ❑ Class leading stability
- ❑ Industry leading reliability (ISO 13628-4:2004)
- ❑ Low power (<1W)
- ❑ Overcount protection (empty pipe)

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Optimus™ is an advanced nucleonic instrument for bulk level measurement. Optimus™ is the first and only nucleonic instrumentation to provide a highly accurate and repeatable nucleonic level measurement in the presence of process deposits and pressure changes. Using Tracerco's patented technology, Optimus™ is a break-through in level measurement. Unique processing algorithms provide unparalleled insight into vessel operating conditions, monitoring what occurs in the vapour space allowing the extent of deposition to be identified.

A vertical, slender industrial instrument with a grey top and bottom section and a green central section, mounted on a small base.

Optimus™ (PRI150)

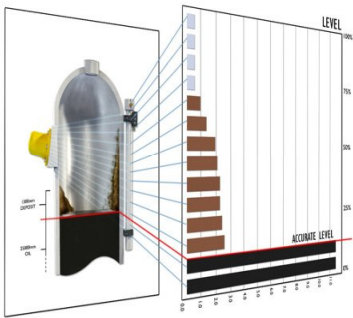
The Tracerco logo, featuring the word "Tracerco" in blue with a stylized wave icon above the "o", and the tagline "Insight through innovation" in smaller blue text below it.

Segmented Geiger-Müller technology

- ❑ More suited to bulk level applications
- ❑ More temperature stable than scintillation technology
- ❑ Multiple measurement stages
- ❑ Advanced signal processing
- ❑ Build-up and pressure compensation
- ❑ Low maintenance

T221 can be used for pressure and temperature compensation. Varying gas pressure or densities in the measurement range can attenuate radiation to reduce signal and result in higher than indicated level (radiation signal reduces – level increases).

Segmental level gauging



Scintillation challenges

- Signal reduction due to deposition or plugging
- Higher indicated level
- Non-repeatable measurement
- Lack of confidence

Segmental solution

- Build-up correction
- Repeatable and accurate
- Operator confidence
- Optimise production/reduce downtime

Tracerco - Optimising efficiency of shutdowns and turnarounds to improve processes

The Tracerco Profiler™ typically comprises of a two or three dip pipe assembly, installed into a vessel through a single nozzle. A narrow dip pipe holds a chain of low energy gamma sources, while the remaining dip pipe(s) hold an array of gamma detectors (Geiger Muller tubes). Typically, each source is directed using a collimating rod onto two detectors above and below the plane of the source. This collimation reduces the number of low energy gamma sources used, stops radiation in all directions except that of the detector. This creates a continuous measurement range by directing each radiation beam up or down.

Measuring density change in this way allows for the most efficient operating conditions to be maintained, as well as monitoring the effectiveness of chemical additive and mud washing regimes.

The image shows the Tracerco Profiler™ instrument, a vertical, cylindrical device with a black finish. It has a top cap, a central section with a mesh-like structure, and a base. The device is mounted on a stand.

Profiler™

High resolution Geiger-Müller

- ❑ Combined bulk level, multi-interface and density instrument
- ❑ Industry leading resolution
- ❑ Real time operator data
- ❑ Wide range of operating temperatures
- ❑ Analogue and digital outputs
- ❑ Low maintenance
- ❑ Bespoke design solution to suit exact need

The Tracerco logo features the company name in a blue, sans-serif font, with a stylized blue wave graphic above the 'o'. Below the name is the tagline 'Insight through innovation' in a smaller, lighter blue font.

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The Profiler design uses a heat pipe array to stabilise the GM dip pipe assembly temperature.

The refrigerant transfers the excess heat from the GM tubes and displaces it through a heat sink mounted between the process seal and the instrument dome.

Instrument footprint is now reduced as no pumping skid is required for cooling.

- ☐ Sealed with zero maintenance cooling system
- ☐ Overall cost is dramatically reduced
- ☐ Accuracy, repeatability and reliability are maintained

Tracerco
Insight through innovation

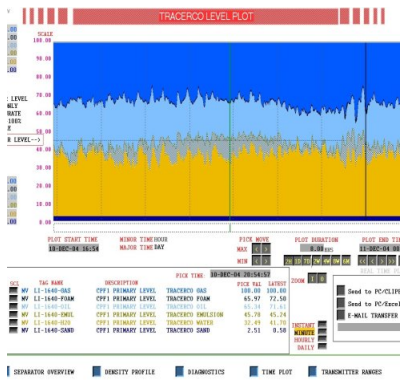


Tracerco - Optimising efficiency of shutdowns and turnarounds to improve processes

Clients can use this information to aid in the vessel clean out. Before installing the Profiler, a client ran the sand mud wash system on a number of occasions before the shutdown and the cleanout would take 3 days. Now they had visualisation of the deposits, they could increase the frequency of the jetting and reduced the cleanout to only a few hours.

Visualisation

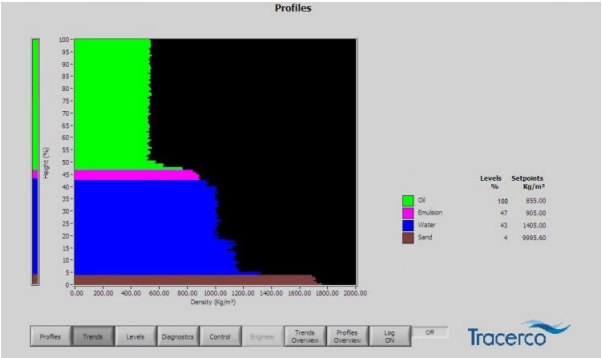
- View from one central location with accurate overview of plant
- Real time alarms enable quicker reaction in the event of anomalies
- Real time and historical density and level data is recorded to offer enhanced diagnostics
- Effective management and operation of instrument and plant



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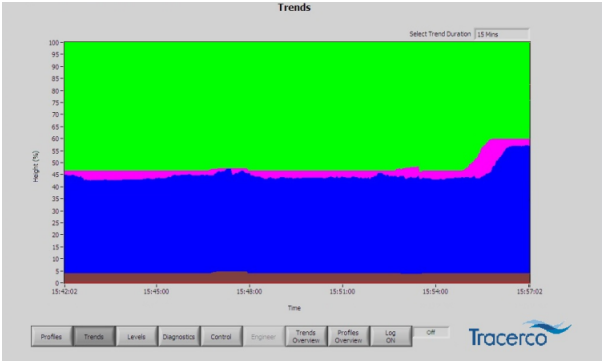
Tracerco provided proprietary software with their measurement and control solution that is a ready-made graphical user interface providing a clear insight into separation quality whilst enabling efficient operation and control of the instrument. The display options available from the HMI provided the client with a window into the vessel, allowing the operators to visualise the process density distribution and utilise the diagnostic data. The HMI offered easy access to the process and instrument status in real-time, as well as trend data (next slide), allowing adjustments to the process to be monitored and changed on the run, enabling decisions to be made faster, analysis easier to understand and greater depth of optimisation. The instrument has now been fully integrated into the client's DCS.

Real time monitoring and control



Trend data is available up to 12 months and can be used to diagnose process problems or optimise by providing data insights.

Historical trending



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Benefits



Characterise and control real time process conditions

No moving parts, low maintenance

Reduce operating costs by optimising the use and effect of chemicals

High resolution measurement – improved control

Improve environmental compliance

Extremely robust and reliable measurement

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In the months subsequent to the installation of the Profiler™ on the first stage desalter, a number of key and measurable benefits were realised that enhanced the unit’s performance and reliability. Due to the industry leading vertical resolution of 30mm, the client’s confidence in the interface level was increased which led to optimising the interface for maximum wash water contact, reducing emulsion breaker chemical dosing by 50%.

In relation to their crude quality, the refiner noted a 44% reduction in BS&W and an improvement in the SRE (Salt Removal Efficiency) of the unit with a reduction in chlorides by 50%.

The demand on the atmospheric distillation tower pre-heat furnace was reduced due to eliminating excess water on the dehydrated crude to provide a more favourable approach temperature. This also had an impact on reducing the corrosion of condensing overheads and towers form hydrochloric acid due to excess chlorides in the heated stream being removed more effectively. Coupled with the enhanced instrument accuracy, the unit had no process trips resulting from lack of control or upsets due to interface incursions to the lower grid, which equated to an increase of 2.5 operational days per month.

Benefits



Enhanced understanding of process	Reduced corrosion	Improved energy efficiency
Improved SRE	Reduction in BS&W	Reduction in chemical dosing

Typical applications



Profiler™ is suitable for use where high accuracy control is required

- ☐ Separators
- ☐ Production traps
- ☐ Slug catchers
- ☐ Desalters
- ☐ Dehydrators
- ☐ Coalescers
- ☐ Settling tanks
- ☐ Wash tanks
- ☐ Primary separation cells
- ☐ Subsea storage tanks



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