



Diagnose mechanical damage issues and obtain a quantitative analysis of packing maldistribution.

A Tru-Grid™ Scan. What does it do?

A Tru-Grid™ Scan of a packed distillation tower provides a density profile of the process inside the tower. The power of the technology is that the scan is done while the tower is operating so real-time information about how the tower is performing at that instant is obtained. The scan “sees through” the vessel wall allowing determination of what is happening inside without the need to shut down. The scan produces a density profile of the internal process, giving detailed information about the liquid distribution. This helps diagnosing conditions such as fouled or crushed packing, liquid maldistribution as well as overflowing distributors and collector trays.

Also offered is PackView™ technology. This provides a quantitative measure of the liquid retention through the beds of packing and is an excellent tool to evaluate the quality of liquid phase distribution.

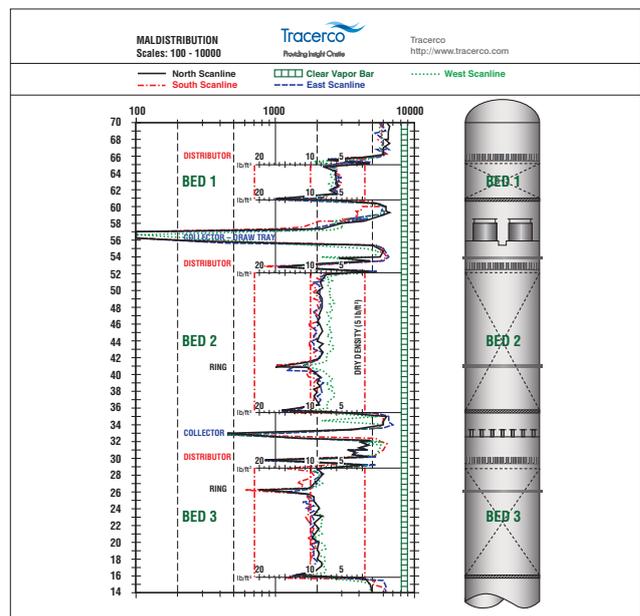
What information will the Tru-Grid™ Scan results provide?

After a Tru-Grid™ Scan has been completed, the lead crew member will prepare a preliminary report before leaving the plant site. A formal report will be provided soon afterwards. Tru-Grid™ Scan technology is used to evaluate the quality of liquid phase distribution and verify the placement of packed beds and distributors. It can help diagnose problems such as fouled or crushed packing, overflowing distributors and collector trays, flooding and foaming.

Benefits of a Tru-Grid™ Scan include:

- Determine process issues that might be easily remedied by a change in operating procedures,
- Detect the presence of flooding and determine the exact location and its probable cause, allowing the best course of action to be chosen to alleviate the problem,

- Confirm position and operating condition of packed beds and other major internals allowing preparation of equipment and field services for any necessary repairs in advance, minimising downtime, emergency expenditures and lost production.



PackView™? What is that?

PackView™ technology provides a quantitative measure of the liquid distribution through packed beds on a liquid retention scale, expressed in density units. The density scale represents the density of the liquid retained in the packing. The fraction of liquid hold up or liquid volume fraction through the packed bed can be calculated by dividing the retained liquid density by the actual (at operating conditions) liquid density in the packed bed.

The measured hold up can be directly compared with the calculated hold up based on packing types and process parameters.

The ability to quantify liquid hold up improves diagnostics to:

- Better quantify liquid mal-distribution
- Better determine the extent of liquid flooding
- Better determine the packing capacity relative to hydraulic flood

What preparation to the tower is needed before a Tru-Grid™ Scan is performed?

A Tru-Grid™ Scan is generally performed without any preparation to the tower, e.g. no insulation needs to be removed. The scanning equipment used is very portable and the crew can carry it to the top of the tower in back packs. They will need access to the top platform or above the vertical section to be scanned either by ladders, scaffolding or a crane basket.

Good drawings, especially showing the orientation of internals is needed prior to performing the scan so the appropriate scanline orientation can be used. Also knowledge of the position of any possible nucleonic gauges on the tower is important to ensure that the scanning activities do not interfere with level measurement.

How is a Tru-Grid™ Scan of a packed tower performed?

A Tru-Grid™ Scan measurement is typically performed using a very small (activity) sealed radiation source and a sensitive radiation detector. While the column is online and operating at normal, test or upset conditions four scans are performed using a grid consisting of pairs of parallel scanlines orientated ninety degrees to each other. Any external obstructions are noted to make sure they do not affect the scan interpretation.



How safe is this procedure?

We offer the safest, highest quality and most accurate Process Diagnostics™ service available. The features of our system include:

- Low-voltage scanning detectors and electronics minimise risk,
- Wireless detector system means no danger from co-axial cables getting burned or stuck on tower structures,
- Our customised detection equipment provides a more focused diagnosis, detecting subtle but important problems that might be missed using other technology.

What about radiation protection?

Compared to industrial radiography (X-rays of welds and piping) we use much weaker radiation sources - typically a thousand times smaller in terms of source activity. We strictly abide by our radiation licence requirements and segregate an area around the equipment we are working on to provide a safe boundary for the public (all the personnel in your plant). Practically speaking this usually means restricting access onto the equipment currently being scanned. Our crew members are always very willing to explain these procedures with everyone potentially affected and to make sure we do not block access to critical areas.

What are your limitations for scanning such as wall thickness and diameter?

Tracerco has successfully planned and executed Tru-Grid™ Scans of large diameter greater than 12 metres (40 feet) and thick-walled vessels up to 8 cm (3 inches) using high energy sources and ultrasensitive detectors built specifically and exclusively by Tracerco for these challenging projects. There are practical limits to the size of equipment that can be successfully scanned due to personnel safety reasons involved with the handling and transporting of radioactive sources. The density of the packing also impacts the tower size limitation.

Tracerco is licensed by multiple regulatory agencies to be able to provide products and services to our customers worldwide. Where we are not currently licensed we will work with local authorities to acquire temporary permissions. A Tracerco representative can discuss any restrictions or limitations that may impact the projects.

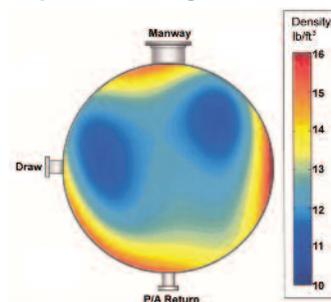
What is the difference in chordal and other forms of maldistribution?

In packed bed towers, liquid maldistribution can be classified as either chordal or "other". Chordal liquid maldistribution occurs when one side (or one chord) of a column has excess liquid and another side (chord) has too little. This type of maldistribution pattern can usually be detected from a Tru-Grid™ Scan. Other types of liquid maldistribution occur when the liquid flows through the tower in a pattern that may appear uniform but is still maldistribution - for example, annular flow against the wall of a column, or down through the center. This kind of maldistribution may appear as uniform liquid and density distribution on a Tru-Grid™ Scan, but can be detected by a ThruVision™ scan.

ThruVision™ - The next step to investigate liquid maldistribution

In some cases, a Tru-Grid™ Scan may appear to show no major problem but symptoms of a problem persist. In these instances, we recommend using advanced techniques, such as a ThruVision™ scan.

A ThruVision™ scan is a 360° scan performed at a single elevation using multiple and overlapping source/detector positions. It produces a detailed contour map of the liquid distribution inside the tower and can help identify a more complicated problem that may be proving difficult to identify using other techniques.



For further details email: process.diagnostics@tracerco.com or visit: www.tracerco.com/processdiagnostics

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

Enabling you to make the right decision

