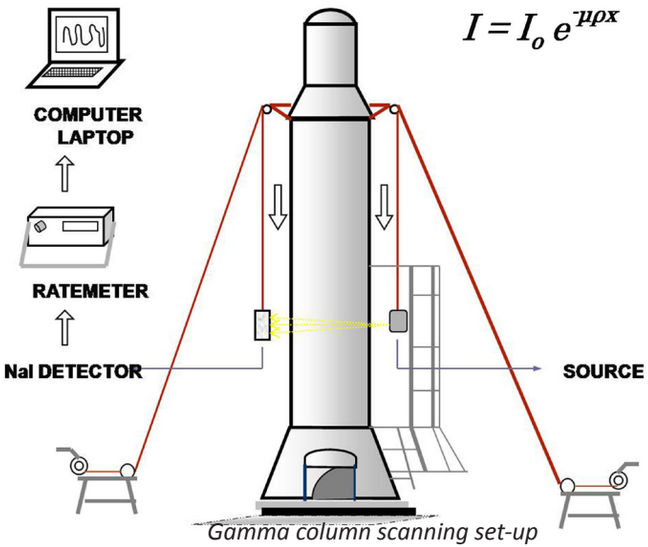
How is Gamma Colum scanning done?



Gamma column scanning set-up

When scanning a distillation column or a similar vessel, a suitable radiation source and detector are lowered concurrently in small increments on opposite sides, down the exterior length of the unit. A relative density profile of the contents of the column is thus obtained. Areas containing relatively high density material (such as liquid and/or metal) would result in a relatively low intensity of transmitted radiation. Areas of relatively low density (vapor spaces between trays) would result in a high intensity level. By comparing the scan profile obtained with a mechanical drawing of the unit, deductions can be made with regard to possible mechanical damage to trays in the unit, as well as with regard to certain operations/conditions in the unit, such as flooding, blockages, weeping and other process anomalies.

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Gamma-Ray Column Scanning Technology

Introduction

This technology, which uses gamma rays from controlled radioactive sources, shows the conditions inside process columns and vessels for a more physical inspection without interrupting production.

Keeping up with global standards, PNRI scientists adapted the gamma-ray column scanning technology to improve the maintenance capabilities of local industries, particularly for oil refineries and petrochemical plants.

Outcome

- Established national capability on gamma column scanning technology for industrial applications.
- Localized gamma column scanning technique service offered to industries in the Philippines.

Strategy

- Benchmarking of strategies or techniques available in countries considered leaders in the gamma column scanning technology
- Promotion of gamma column scanning technique to petroleum refineries, gas processing installation, and chemical plants.
- Establishment of a pool of trained personnel on gamma column scanning technique.

Actions

- Establish trained and competent personnel through capacity building for enhanced gamma column scanning of industrial process columns
- Upgrade column scanning materials and equipment
- Conduct ocular inspections of columns or vessels to be scanned
- Conduct gamma column scanning technique field testing

Benefits/Advantages

- Provides real-time information and uses a sealed radioactive material that is not affected by environmental conditions
- Non-destructive and cost efficient; no need for column preparation, removal of insulations and shutdown of operation during investigation, thereby reducing production downtime
- Does not emit or produce any waste to the environment, making it safe to use

What possible defects can be determined using gamma column scan?

By analyzing the density profile of the material inside the vessel, engineers can readily determine:

- Damaged or missing tray
- Aerated liquid loadings on trays and other internals inside column
- Location and extent of flooding
- Location and severity of entertainment
- Location and density characteristics of foaming
- Downcomer liquid levels, base liquid levels
- Integrity of demister beds and catalyst beds
- Draw pan integrity and liquid holdup
- Presence and the formation of coking
- Blockages caused by downcomer obstruction, tray fouling, dirt or high liquid loadings on trays
- Presence of liquid weeping
- Top and bottom positions of packed beds
- Maldistribution of packing material in packed beds
- Uneven liquid distribution from a distributor through structured packed beds by means of grid scanning

Some equipment used for gamma column scanning