Development of new hardware system for gamma scanning

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Abstract

A new data acquisition system with associated treatment software for gamma-ray scanning were developed to scan and to plot density profiles inside a distillation column in the form of graph illustrating the activity of the radiations able to cross the contents of the column.

This system makes it possible to acquire the signal coming from the preamplifier and to count the event per second CPM corresponding to each point of control over the length of the column before transmitting them via the connection series RS232 to the computer. These measurements can be properly stored and, then immediately represented in graphs (distance versus counts per second).

The electronic card of this data acquisition system was designed based on a microcontroller and its program is developed in machine language assembler.

Connected to a battery or on sector, this portable system presents a convivial characteristic for the user, it offers five functionalities corresponding to various conditions of scan according to the site of work, and moreover its intelligent card is equipped with a battery of backup to safeguard the data on memory in the event of a possible power cut.

As for the interface of command and visualization, we designed it with the graphic LabView software of National Instrument by adopting its serial communication protocol with the acquisition card.

The developed software can be installed on a portable computer. It allows the scan to be performed on-line without disrupting the normal operation of the column.

This software treats the data and plots the results of scan in the form of counting and graph.

The evaluation of the column’s performance (trays, packed beds, areas with liquid, areas with vapour etc...) is consequently deduced from the graph.

This software allows a systematic and complete record of the column operating conditions to be kept. Data collected by the computer can be used immediately and also stored for future comparisons.

By analysing the scanning results, a number of frequent failures in columns can promptly be determined.

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