Analysers and
Sampling System

C CONTROL MANUFACTURING
OEA5P

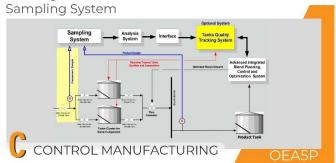| Topic ID	OEA5T
Title	**Analyzers and Sampling System**
Category	**C-Control Manufacturing**
eLearning Level	**Basic**

Introduction

Physical and chemical processes add to refinery complexity. The profitability of a refinery depends on the efficiency of individual processes. Hence, there should be effective process monitoring. For the quantification of chemical and physical properties, NIR spectrometry is very efficient. Optical spectrometry is the basis for NIR process analyzers.

This topic will discuss quality models, analysis methods, multiplexing, multi-analysis analyzer, sampling systems, online analyzer configuration, etc.

Distillation process: In a refinery, the distillation process separates heavier and lighter components.

Octane numbers: In the refining sector, it is important to measure octane numbers from the alkylation, isomerization, and reforming processes.

Nuclear Magnetic Resonance (NMR): Nuclear magnetic resonance (NMR) provides detailed chemical information concerning petroleum products is provided by nuclear magnetic resonance (NMR). Information consists of carbon and proton chemistry. It has helped refiners to address the issues concerning quality control of petroleum products and online process control. Implementation of this technology is easy, inexpensive, and robust.

The final spectrum of NMR produces variation in frequency, helping to understand molecular structure. Differences in the molecular structure are associated with process properties. Due to recent advancements in spectrometer design and permanent magnet fields, compact NMR analyzers are now available. In addition, there are other energy applications of NMR technology like biomass conversion, biofuels, coal to liquids, etc.

NIR (Near Infrared) Analyzer: The NIR analyzer is a multi-channel and in-line process analyzer. It offers closed-loop control of the chemical composition and physical properties of petroleum products. In addition, it supports real-time monitoring.

This analyzer uses an advanced algorithm and integrates with the control system. Further, It ensures information about process excursions and effective control of processes. The NIR analyzer is better than a distillation analyzer or gas analyzer. The NIR spectrum ranges from 700 to 2500 nm and Its spectral response intensity is directly proportional to wavelength. Therefore, a calibrated model is needed to implement the NIR analyzer.

Sampling System for Analyzer: Its purpose is to have a representative sample for all quality analyzers in the context of parameters to be measured. The sample has to be obtained from the process line, then sent to the analyzer within the prescribed time. The process sample has to be prepared within the analyzer's requirements. Stream switching may be there if needed. The analyzer may be calibrated online. Once analysis is over, the sample is disposed of.

The model-based tank quality tracking system facilitates near real-time availability of tank qualities using the samplings at the tank inlet by any of the methods discussed earlier.

Summary

Various process streams are measured with the help of multiplexing. Variation in the chemical composition of petroleum products influences spectral results. NIR analyzers are sophisticated tools for refinery optimization and process control.

Mode of eLearning	Available?
Free Course	No
Refresher Course	No
Pick N Choose (Custom Curriculum)	Yes
Advanced Level Course	Yes
Structured MCOR Curriculum	Yes