

Application Note – Ethylene Plant

On-Line NIR Analysis in Naphtha Steam Cracker

Site Description

Full Range Naphtha ($C_4 - C_8$) is introduced to Thermal Steam Crackers for cracking into the main fractions of Ethylene and Propylene. A sketch of the application is shown in Figure 1. A Petrometrix Beacon 2000-II Field Unit is connected at the Naphtha discharge pumps (10 bar) and returns the sampled Naphtha to the suction pumps continuously. The Field Unit is connected to the Main Analyzer, which is located in the general purpose equipment room, approximately 250 meters away, via telecommunications fiber optics cable. The Beacon Main Analyzer is connected through a Modbus interface to a Honeywell TDC 3000 in the main control room.

Process Area

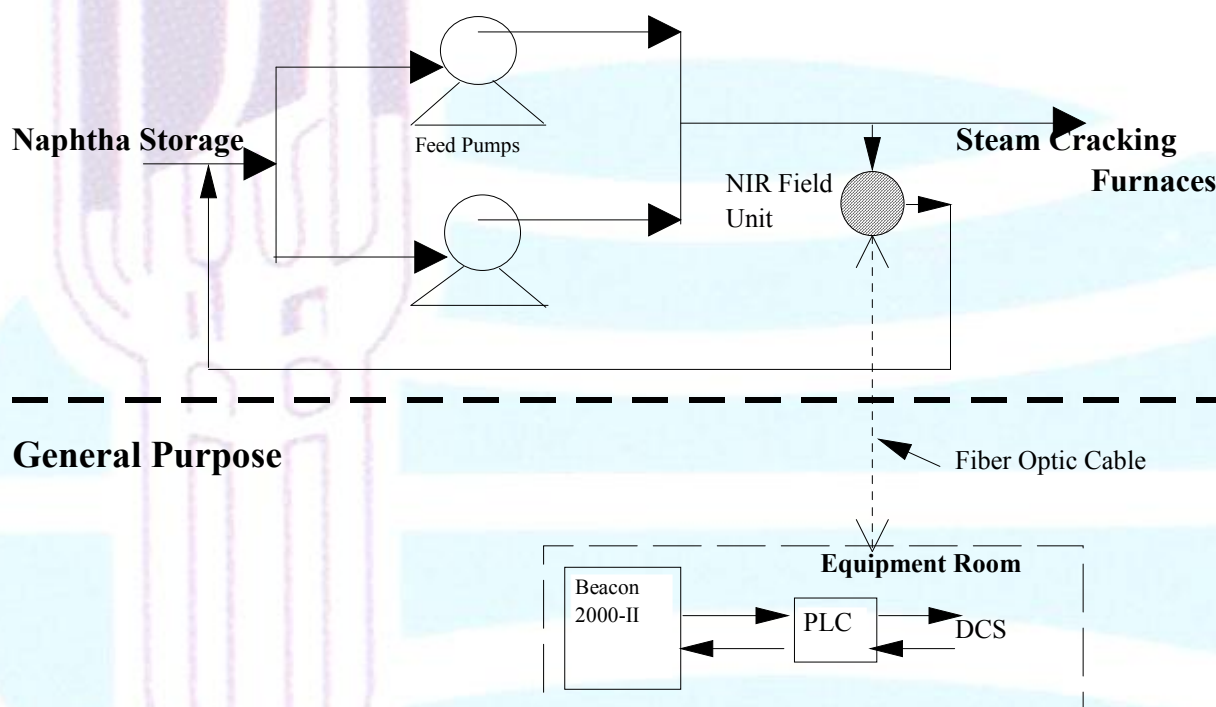


Figure 1: Measurement loop - Beacon 2000-II

Properties Description

The Naphtha calibration models for attaining full PIONA ($C_4 - C_8$) and Distillation points were prepared in cooperation with the petrochemical plant laboratory. The Naphtha contains a light substance which easily evaporates at room temperature. As a result, it was decided to prepare the Calibration Models for the lights only after installation of the On-Line NIR System. This was obtained by saving spectra from the DCS.

Measured Properties

<i>Carbon #</i>	<i>n-Par</i>	<i>i-Par</i>	<i>Olef</i>	<i>Naph</i>	<i>Arom</i>
C₄	+	+	+		
C₅	+	+	+	+	
C₆	+	+	+	+	+
C₇	+	+	+	+	+
C₈	+	+	+	+	+
Total	+	+	+	+	+

<i>Distillation Pt.</i>	<i>IBP</i>	<i>10%</i>	<i>30%</i>	<i>50%</i>	<i>70%</i>	<i>90%</i>	<i>FBP</i>
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<i>Density</i>	+
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Customer Benefits

- The NIR system is connected through a Modbus interface to the DCS (Honeywell TDC 3000). The PIONA and Distillation points data are updated once every 30 seconds in order to give an accurate analysis of the Steam Crackers feed. Before the NIR installation, the Ethylene plant ran a Naphtha sample just once a week.
- The availability of the fresh data enables the implementation of an Optimizer, which maximizes the Steam Cracker's performance.