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Online Quality model-based Control of FCC Dry Off Gas Stream

Controlling stream quality online, is one of the challenges refiners face today. Assuring online quality is, sometimes, a complex issue due to the need for controlling and manipulating more than one variable, besides the complexity of measuring quality online.

Controlling more than one process variable is the motivation for Advanced Process Control. To control quality stream, it is useful to base the control on measurement of the quality property. Since online analyzers sometimes are not reliable enough for continuos control, an inferential model is used to predict the quality property. Robustness and fidelity of inferential model are key for performance of the control strategy.

In this application, an APC strategy was developed, designed, implemented and commissioned to control the C3 plus content on the top of the sponge tower by adjusting the flow of lean absorber oil to absorber tower, while maintaining the tower far from flooding condition, and in anticipation to changes in feed flow to the Unit. The strategy was implemented at the FCC Unit of the Cartagena ECOPETROL Refinery.

Control is based on an inferential model running online, on DCS, with one-minute frequency. Model is updated every 7 minutes using the measurement of an online analyzer.

After commissioning of the strategy the performance of the strategy was monitored and tested during a 30 days period, given a variability C3 content reduction of 80%; and a benefit estimated on 100 KUS$ per year. Fidelity was tested comparing the predicted value with online measurement. Online measurement was assured following a more strict calibration and validation procedure using lab samples analysis. Robustness was tested monitoring model deviation when upset condition of the process arrived. After a severe upset, model deviate from analyzer and returned to track in about 3 minutes. To achieve this level of robustness several algorithm was used to calculated the dynamic bias.

Up today the strategy has been in continuos operation and all the operators have become well trained on the use of such strategy.

A recent long period performance evaluation, has showed a calculate benefits of 400 KUS$/year from de recovery of 163 bpsd of C3 plus as LPG, due to the reduction of 2 % on the C3 plus content on dry off gas.

Experiencias similares en inferencia de propiedades serán presentadas adicionalmente:

Experiencia en Inferencia Dinámica De H2S En La Cima De La Torre Debutanizadora De La Unidad De Cracking Catalítico De La Refinería De Cartagena

Experiencia en Inferencia En Estado Estacionario De RVP De La Nafta Debutanizada De La Unidad De Cracking Catalítico De La Refinería De Cartagena

Estudio, Análisis, Diseño E Implementación De Un Prototipo Para La Identificación De Sistemas Dinámicos Usando FPGA y DSP.

Estas tres presentaciones, así como la presentación principal, incluirían el uso del Toolbox de identificación de sistemas para el desarrollo de la inferencia, así como de otros toolboxes de MATLAB.