More Diesel in Delay Coker Unit by using ANFIS

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Abstract

Detailed operating condition were gathered from a live Delay Coker unit (DCU) (Lab. And DCS) for two years. The most significant parameters were selected by both simulation and experience. Coke, output CCR, light gases, gasoline, gas-oil and $C5^+$ weight percent are the network outputs. The R^2 and MSE of the proposed model were 0.92583 and 0.1424, respectively. It was found in the optimum operation conditions. Then, by considering all operational constraints, the results confirmed that the decision variables generated by the optimization approach can enhance the gross profit of the hydrocracking process to more than $0.51 million annually, which is significant for the economy of the target refinery. Among the Multi Layer Perceptron (MLP) architectures a network with 31 hidden neurons has been found as best MLP predictor 80 .percent of the data have been used for training of ANN. Radial Basis Function (RBF) also has been implemented for identification of the plant .Best RBF network and best MLP network performance in prediction of 25 percent of unseen data were compared. It was found that RBF method has the best generalization capability and was used in DCU modeling.

The delayed coking process is used to convert heavy oils into more lucrative light liquid products while producing less valuable gas and solid coke byproducts. Although the first delayed coking plant was established in 1930, the delayed coking process has been evolving for 78 years. In recent years, changes in feed stock have had a significant impact on the design and operation of delayed coking plants.

Delayed coking is the heat cracking of heavy residue in an empty drum where deposition of carbon occurs.Cocaine is consumed. The type of feedstock processed influences product production and quality.A typical delayed coking plant includes a furnace to pre-heat the feed, a coking drum, and a kiln.Product fractionation takes place.the feed is first preheated in a furnace to the correct cooking temperature before being fed. to the coking drums, which are typically mounted in pairs and where the cracking reaction occurs, and Coke gets deposited at the reactor's bottom. The vapour from the coke drums rushes to the They are divided into overhead streams comprising wet gas LPG in a fractionating column, and naphtha, as well as two side gas oil streams.

A delayed coker is a form of coker in which the residual oil feed is heated to its thermal cracking temperature in a multi parallel pass furnace. This breaks down the residual oil's long chain heavy carbon and hydrogen molecules into coker gas oil and pet coke. Cracking starts in the furnace, moves through the transfer line, and ends in the coke drum.

As the cracking in the drum continues, gas oil and lighter components are produced in the vapour phase and separate from the liquid and solids. Except for any liquid or solid entrainment, the drum effluent is vapour only and is routed to a fractionation column where it is separated into the desirable boiling point fractions. In the drum, solid coke is placed in a porous structure that permits flow through the pores. The particulates and uncracked residual liquid generated by the vapour and liquid feed are supposed to remain in the drum. When the drum is full of hardened coke, the hot furnace mixture is transferred to a second. While the second drum fills, the full drum is steamed to further reduce the hydrocarbon content of the pet coke before being water quenched to cool it. The top and bottom heads of the full coke drum are removed, and the solid pet coke is cut from the coke drum with a high pressure water nozzle, falling into a pit, pad, or sluiceway for reclamation to storage.

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