About Shell Deer Park

Shell Deer Park is located about 20 miles east of downtown Houston, Texas. In 1993, Shell Oil Company and PMI Norteamerica, S.A. de C.V., a subsidiary of Petroleos Mexicanos (Pemex), formed a 50/50 joint venture, resulting in Deer Park Refining Limited Partnership (DPRLP). The assets of the refinery are managed and operated by Shell Oil Company through Shell Deer Park Refining Company, a division of Shell Oil Products Company (a Shell Oil subsidiary).

Today, Shell Deer Park is home to the sixth largest refinery in the United States with a crude oil capacity of 340,000 barrels a day. The Deer Park Refining complex has a variety of processing units, including a distillation unit, a vacuum flasher unit, a delayed coker unit, hydrotreater units, hydro cracker units, a cat cracker unit, and a platformer unit. The APC implementation is carried out in the Gas Oil Hydro Treater unit.

Challenges and Actions Taken

The Advanced Process Control (APC) application is implemented on the reactor/recycle gas heater, six pack exchangers, stripper/main fractionator heater, and main fractionator, with the core objectives of maximizing ULSD production, controlling WABT tightly, and pass balancing of flow and temperature for the main fractionator heater. The APC application is always operated in optimization mode to meet the objectives with the operation parameters controlled within the specified operation limits.

One key product of the Gas Oil Hydro Treater (GOHT) unit is diesel, and sulfur in the refinery diesel pool was very difficult to control since the pool has diesel coming from various units. The GOHT unit acts as a swing unit for controlling ULSD sulfur and, therefore, the sulfur target for the GOHT unit is varied based on ULSD pool. The GOHT SMOC application is designed to minimize giveaway on ULSD pool sulfur.

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The APC application implemented on the GOHT unit helped control the plant with less variation during coker drum switch operation and with less operator interactions during plant operation. This resulted in minimizing the giveaway on the ULSD pool sulfur, thereby maximizing the production.

Conclusion

Yokogawa assisted in the project implementation by providing support for step testing, model identification, pre-commissioning, operator training, and controller commissioning.

A post-implementation study estimated that the overall GOHT Unit APC controller returns a savings of about 198% greater than the originally estimated benefits. The project was implemented 8% less than the originally planned budget with a payback period of three months.

Customer Satisfaction

Shell Deer Park Management was completely satisfied with the way the project was implemented and the results achieved.