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simulation
knowledge
profit

Hydrogen Network Management Tool

The optimization of the hydrogen network signifies one of the strategic and operational priorities for refineries around the world to address the challenges of their energy transition, to meet growing demands and, at the same time, to attain clean fuel trends and achieve energy savings while reducing hydrogen generation costs.

Among those, rising hydrogen demand often makes hydrogen supply a critical bottleneck for many modern refineries. Moreover, as the price of energy rises, so does the cost of hydrogen production, which also involves the consumption of a significant amount of energy.

Inprocess Solution for Hydrogen Networks Management

A robust and user-friendly optimization software tool, capable of determining the best hydrogen network configuration, distributing flows and purities from producers and consumers.

A reliable and rigorous simulation model of the current network configuration will be the basis for the optimization step. The model is first calibrated by using real plant data acquired from the Plant Information Database and it is later used in simulation mode by the optimization routine to obtain an improved network flow rates distribution.

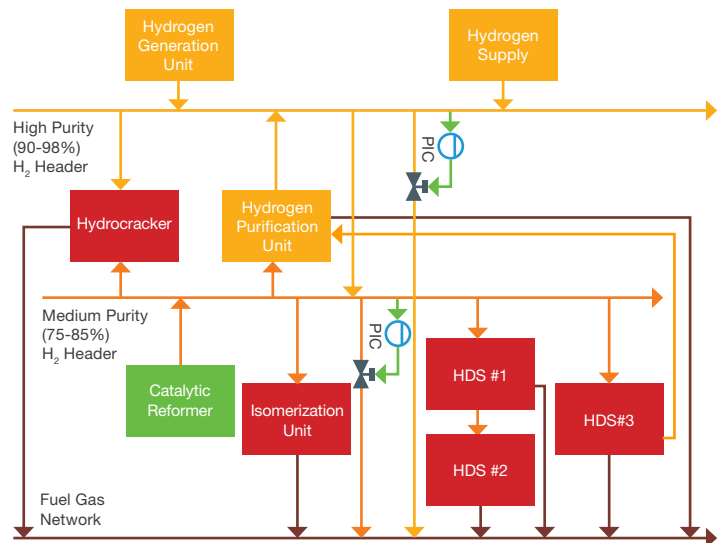
Usually, an **initial feasibility study** is carried out, using existing historical data, to evaluate the savings potentiality. Once confirmed, the management application is then developed and **implemented online** in the control system of the plant. In such way, the optimal set points of flow rates are determined for the best decision making.

A usual optimization outcome would provide suggestions for:

- the minimum quantity of hydrogen to be sent to fuel gas
- an optimized distribution of on-purpose hydrogen inlets
- an optimal quantity of hydrogen streams sent to purifiers
- generated by the reformers
- and always keeping the operation of the hydrotreaters inside processing constraints!

Once decided to go on, the **implementation** of the Inprocess Hydrogen Network Management tool can be approached in two alternative ways:

- **Advisory system**, providing the optimal network configuration to the user, who would ultimately make the decision it considers most efficient
- **Closed-loop optimization tool**, that implements (writes) the calculated optimal solution (into the control system) online.



Benefits

Apart from providing guidelines on optimal operational solutions, the H₂ Network Management Tool brings additional benefits:

- Evaluate H₂ imbalances in order to improve plant instrumentation
- Online monitoring of H₂ purity in the networks and of H₂ makeup
- Rigorous evaluation of operating parameters: Cycle time, Feed flowrate, Feed composition
- Monitoring of chemical hydrogen consumption together with minimum recycle flow rates and associated energy costs
- Minimize cost of external hydrogen
- Minimize purges to fuel gas
- Use lowest cost hydrogen, based on source and operating capacity
- It supports the decision making process, when planning for new operating units or for revamping of existing ones
- It can act as a what-if scenarios evaluation tool

Case studies

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