



CASE STUDY:

Hydrogen Recovery From Hydrocracker Purge Gas

Client's Problem

The client, a large Korean refiner, was building a new hydrocracker. In the hydrocracking process, heavy petroleum components are catalytically reacted into more useful components. The process is performed by combining the heavy hydrocarbon liquid with moderate purity hydrogen (95-99 vol% H₂) and passing the mixture over a catalyst in a high-pressure reactor. After exiting the reactor, the hydrogen gas is separated from the product hydrocarbons and recycled to the inlet of the reactor. However, besides useful compounds, the cracking process also produces unwanted light hydrocarbon and other gases (C₁, C₂, H₂S). These gases build up and dilute the hydrogen stream, lowering the hydrogen partial pressure in the reactor, and adversely affect the hydroprocessor performance. To remove these unwanted gases and maintain a high hydrogen partial pressure, a purge stream is taken off and sent to fuel. However, the value of the H₂ contained in this purge stream is substantial, and without recovery of the H₂, the overall economics would be seriously impacted.

MTR's Solution

MTR is constructing a membrane unit that will upgrade the purge gas from < 90 mol% H₂ to > 98 mol% H₂. The membrane system operates at a pressure of more than 2,200 psia, recovers more than 95% of the H₂ in the feed, and has a capacity to recover more than 70 MMscfd of purified H₂. The membrane system is very compact, has no moving parts, is simple to install and operate, and pays for itself in less than 1 month.



Recovering refinery hydrogen boosts clean fuel production.