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Polybed™ PSA and Polysep™ Membrane Integration for Debottlenecking: Case Study

Hydrogen

In this plant, as designed, a steam reformer provided the 55 MM SCFD (62,000 Nm_3/h) hydrogen make-up required for a large atmospheric residuum desulfurization unit. The feed gas to the reformer was natural gas supplemented with the high-pressure vent and the low-pressure flash gases from the ARDS unit. A 10-adsorber Polybed PSA system purified the hydrogen stream from the reformer.

Four years after start-up, expansion of the ARDS required an additional 25 MM SCFD of hydrogen. Debottlenecking the steam reformer and the associated PSA unit provided for an increase in hydrogen capacity from 55 to 78 MM SCFD. This increase was achieved through a process redesign, reprogramming of the PSA control software, and a few hardware changes.

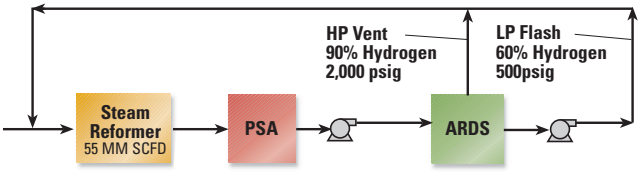
A Polysep membrane system was installed to recover hydrogen from the ARDS high-pressure vent at over 2,000 psig. The hydrogen product was delivered to the suction of the hydrogen make-up compressor. This change added another 5 MM SCFD of hydrogen to the refinery balance.

The revamp made meeting and exceeding the hydrogen balance requirements possible.

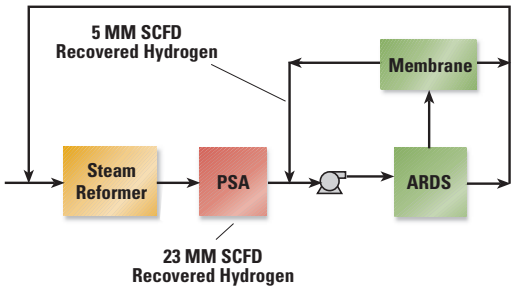
Factors for success:

- Cost-effective solution meeting plant needs
- Optimized integration of complementary technologies (Polybed PSA and Polysep membrane)
- Experienced revamp engineering and technical services

Original Hydration Balance



Revamped Hydrogen Flow



For more information

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