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Title:

Comparison of synthesis gas generation concepts for capacity enlargement of ammonia plants

Abstract:

Capacity enlargements after some time in operation offer plant operators the chance to increase turnover and revenue in moderate steps. In many cases, capacity enlargements of ammonia plants are economical and therefore attractive to plant operators. Also, they involve considerably smaller risks than the erection of a new plant since the overall investments are moderate, project implementation takes less time and the amounts of extra product for which customers have to be found is limited.

Capacity enlargements up to about 15% can usually be realized with moderate modifications to a plant by mobilizing the reserves in the majority of the process units. Only a few equipment items constituting bottlenecks require more significant measures.

Larger capacity increases beyond this tend to require more substantial measures, especially if the plant had been subjected to a revamp before. As this makes the capacity increase considerably more expensive in relative terms, i.e. related to the additional amount of product, it is of prime importance to select the most cost effective solution.

The paper investigates the economics of various syngas generation concepts for a 30% capacity increase. Among the compared alternatives are the enlargement of the existing steam reformer and an autothermal reformer (ATR) in parallel to the existing syngas generation. In order to generate comparable consumption figures, the impacts of the different revamp concepts on the plant's energy balance have been included in the investigation.