Layer Management for Methanol Process

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Abstract

Air Liquide owns a long history of expertise in methanol production including dedicated pilot plants at the Frankfurt Innovation Campus in Germany, 18 commercial plants licensed with the Lurgi MegaMethanol™ technology and more than 60 methanol licenses for a total capacity of more than 51 million tonnes per year of methanol production [1]. Air Liquide's methanol technology is well-known for its reliable performance and efficiency in the market for world scale capacities but also has the knowledge and capacity to implement small scale units integrated in already existing industrial complexes. Air Liquide applies its experience to further improve the state of the art methanol synthesis technology via process intensification and new technologies for unconventional feed sources such as stranded gas, unused syngas capacities and CO_2 rich gases.

Air Liquide and Clariant – a leading supplier of syngas catalysts and AL's strategic partner – have been collaborating for many years and investigated successfully the possibility of improving the utilization of the catalyst volume in the MeOH reactors, e.g. increasing space time yield, and catalyst lifetime by tailoring the arrangement of different catalyst layers (Layer Management, LM) according to the changing process conditions over the reaction pathway. The LM concept is well-known from other applications such as in Clariant's PhthaliMax® catalysts for production of phthalic anhydride and the FAMAX® product series for the production of formaldehyde [2]. The Air Liquide E&C's reactor systems (Water and Gas Cooled Reactor) are already the benchmark for per pass conversion and heat management. The utilization of those reactors can be further intensified by applying the LM technology while improving the reaction rates over the reaction path by optimizing the temperature profile and selectivity. The potential of the LM approach for methanol production has been confirmed by studies [1,3] as well as by pilot-scale test campaigns. Dedicated process modelling tools have been validated and are now being used for optimization of revamp solutions.

In a first step, this concept is attractive for capacity extension, revamping of an existing methanol plant and for converting off-gases from industries to methanol. This development is another example of successful cross-market technology transfer and joint-development between an engineering company and a catalyst provider working in close collaboration.

References

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