Joint development with the customer: Double tube design for optimum energy usage

BUTTING is always very interested in using our overall experience to assist customers to develop new processes and products, and to support them in turning these into reality.

This was also true for a customer in the petro-chemicals field who has developed a new and innovative type of reactor. This heat exchange reformer is used in the steam reforming of natural methane gas for the production of synthetic gas, which emerges as a by-product in plants manufacturing hydrogen, ammonia and methanol or synthetic fuels.
BUTTING's contribution to the development of the prototype was a specially designed double tube. The prototype has proved its value in use – and so mass production is now beginning. And part of it is: The double tubes and triangular tubes specially constructed by BUTTING.



Traditionally the hot process gas from steam reforming is cooled in a process gas boiler, thus producing steam – but in terms of energy use, this is a sub-optimal solution, since more steam is produced than is actually necessary for the process.
This problem is solved by the innovative heat exchange reformer of our customer, which guarantees optimum use of the heating surface and has a compact design. This is achieved through the double tube design produced by BUTTING. A catalyst is attached inside and outside the tube.
In this way, a 33 % increase in synthetic gas production can be achieved, along with a saving of around 20 % of the specific oxygen consumption. Admittedly, this does affect steam production, which is reduced by 50 %. But since there is a surplus of steam in any case, this is of no great significance.

Up to now, 8 transformation lines for synthetic fuels in South Africa are being equipped with the heat exchange reformers. In this context, BUTTING is supplying 516 double tubes and 200 triangular tubes.

In each heat exchange reformer (HTER), there are 61 double tubes and 24 triangular tubes. The gas which supplies the heat for the reactor is passed through the annular space between the interior and exterior tube. The triangular tubes are manufactured in sizes 56.7 x 18.5 x 3.56 mm. The interior and exterior tubes in the double tube system are 88.90 x 3.0 mm und 115.3 x 4.5 mm in size, and consist of seamless and welded tubes in high-quality materials, containing nickel. For process-related reasons, the double tubes are each manufactured from two materials (Alloy 693/Alloy 602 CA or Alloy 693/Alloy 601 for the triangular tubes). Their welding also presents a major challenge. In addition, for manufacturing reasons the existing tubes have different form and position tolerances, and must be processed in such a way that perfect circumferential welds between the individual sections can be achieved.

Furthermore, a high degree of precision is already required in manufacturing the tubes, so that an even flow and identical heat exchange conditions can be guaranteed within the reactor.
We are glad to have been able to contribute to bringing this innovative reactor type on to the market, and we look forward to YOUR challenges in the future.