

TechnipFMC's SFT® Radiant Coil Technology

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Abstract:

TechnipFMC acquired the Swirl Flow Tube® (SFT®) technology for application in radiant coils of steam cracking furnaces. The SFT is a helical pipe, which has a significant technological advantage over other coils with special attributes.

Cracking reactions are endothermic and are driven by the energy supplied to the radiant coils by the combustion of fuel gas in the radiant box. Ethylene yields are favored by low pressures, high temperatures and low residence times in the coil.

Residence time can be reduced by reducing the length of the coils but this implies that the higher heat fluxes through the coils and higher tube metal temperatures. Currently TechnipFMC (and other ethylene licensors) design coils close to the maximum feasible tube skin temperatures. Further increase in heat transfer rates are inhibited by the metallurgy of the radiant coils. Therefore any technology that reduces the tube skin temperatures of radiant coils is interesting.

The SFT technology of TechnipFMC is such a technology. TechnipFMC acquired the SFT technology for application in radiant coils of steam cracking furnaces. The SFT is a helical pipe, which has a significant technological advantage over other coils with special attributes. This swirl flow enhances the heat transfer by a more intense mixing in the circumference compared to the classical straight tubes.

There are other technologies that have a similar effect, among others internally finned tubes. All these technologies yield significant higher heat transfer rates at the expense of a higher pressure drop. The latter decreases the yield of ethylene which reduces the benefit of these heat transfer enhancing technologies.

The alternative technologies have pressure gains of approximately 140 % and more, explaining the huge potential of the SFT which generate higher heat transfer at lower pressure gains.

TechnipFMC has developed bending equipment to fabricate SFT coils from any straight radiant coil tube and from any supplier. The helical shape of the coil is formed by induction bending which is a well-established technology with over 30 years of experience in the field of bending radiant coil material.

This paper will describe the feedback from the first SFT application next to its validation, fabrication process, application possibilities and its benefits for the ethylene producers.