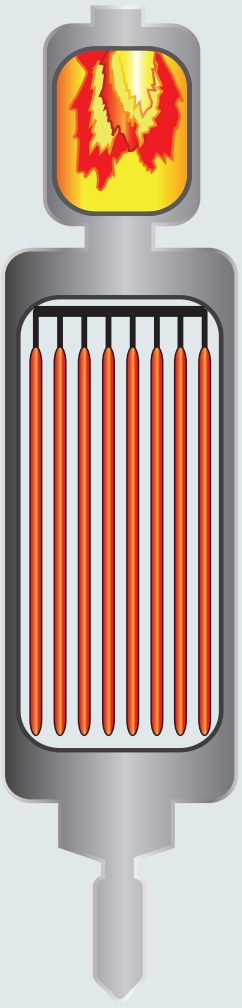
Optograf™ analyzer enables optimal syngas production



Gasifier installation showing installed Optograf Analyzer.

Frontside view of OptoDRS installation at access plattform.

Syngas is produced via the reforming of natural gas and the gasification of carbon-based solid fuels. Gasification of high- or low-grade coal, biomass, and even waste is an environmentally friendly alternative to the direct combustion of these fuels. Syngas can be used directly to generate energy or to produce value-added products such as fuels and chemicals.

The composition of the syngas varies greatly depending on the method by which it is produced. It is essential to know the composition in order to optimize the processes for which the syngas is used. Sampling and measuring the raw syngas stream is a major challenge, as this stream is often at high temperature, particle-laden, and steam-saturated, so an optical analyzer is often the ideal solution.

CVR Partners (CVRP) produces ammonia at their Coffeyville plant in Kansas via gasification of petroleum coke. They are the only nitrogen fertilizer plant in North America that uses a petroleum coke gasification process to make hydrogen, a key ingredient in its Urea Ammonium Nitrate (UAN) manufacturing process. Production at this plant satisfies nearly 5 percent of the annual demand of UAN in the United States.

Their plant originally installed a mass spectrometer to analyze the syngas (and downstream Shift Converter) streams around the gasifier. Unfortunately, liquid carryover and other sampling system problems forced CVRP to abandon the analysis of the syngas stream using mass spectrometry. In 2013, they installed an Optograf along with an OptoDRS™ process and sampling interface from Kaiser Optical Systems for the raw syngas stream and have not experienced any liquid carryover events since. The on-line window on the unit shows the process and a view of the behavior of their gasification process which was not possible before.

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Backside view of the OptoDRS installation on an isolation valve at the sample tap of the gasifier effluent process pipe.

Recently, CVRP upgraded the Optograf system to measure all the syngas streams around the gasifier and the downstream Shift Converters. The process control system is now being upgraded to fully implement advanced control procedures based on the real-time composition information being provided. The plant has experienced several major benefits from the installation of the Optograf solution, from process optimization (yield and quality), improved robustness and reliability of the on-line composition analysis, and a significant reduction in maintenance costs (fewer man-hours, reduced requirements on technician skill level).

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