

Process analytical challenges In the SNG production process, there are several streams that are typically analyzed in real time which form the basis for controlling and optimizing the main process units. However, although most of the streams are relatively easy to analyze using traditional on-line analyzer techniques (such as GC, MS, photometry etc.), in several cases the process conditions are severe enough to present significant challenges to the standard sampling and conditioning systems, thus impacting the possibility of obtaining a reliable analysis. For an IGCC, examples of these extreme stream conditions are gasifier raw syngas effluents and the syngas stream after the water scrubber.

The solution: Optograf™ Analyzer and OptoDRS™ or OptoAST™ System The Optograf Analyzer is a unique spectroscopic instrument capable of analyzing the diatomics H₂ and N₂, as well as CO, CO₂, and CH₄, which allows measurement of all the streams shown in the typical “Stream Service” list below. Speciation is achieved without any columns, valves, stream switching or the need for carrier gas as in the case of GCs. In addition, the OptoDRS and OptoAST modules are based on the pipe-centric concept of performing the process sampling and sample conditioning as well as incorporating the sensor measurement in an integrated sampling and measurement interface located preferentially at the sample tap. Below is a list of the typical process conditions and the process sampling interfaces recommended by Kaiser for each of the streams analyzed on-line. The OptoDRS module is uniquely capable of dealing with hot, dirty (particulates) and moisture saturated syngas streams, whereas the OptoAST can interface to relatively dry and clean process samples at line pressure and temperature (up to 150°C/1000 psig). As such, only minimal sample conditioning is required while avoiding any need for sample transport to the analyzer in a shelter (the optical probe sensor transmits spectral information via an optical fiber to the analyzer).

| | Stream Service | Key Measurement Parameter | Pressure* (barg) | Temp* (°C) | Recommended Sampling Interface |
|---|--------------------------------------|--|------------------|------------|--------------------------------|
| 1 | Raw Syngas from Gasifier Effluent | Composition/CH ₄ | 49 | 337 | OptoDRS |
| 2 | Syngas after Scrubber | Composition/H ₂ /CO/CO ₂ | 49 | 199 | OptoDRS |
| 3 | Raw Syngas from Other Trains | Composition/H ₂ /CO/CO ₂ | 49 | 199 | OptoDRS |
| 4 | Common Syngas Header after Scrubbers | Composition/H ₂ /CO/CO ₂ | 49 | 199 | OptoDRS |
| 5 | Shift Converter Outlet | Composition/CO ₂ | 41 | 250 | OptoDRS |
| 6 | CO ₂ Absorber Outlet | Composition/CO/CO ₂ | 41 | 42 | OptoDRS |
| 7 | SNG at Methanator Outlet | Composition/CH ₄ /H ₂ /CO ₂ | 30 | 35 | OptoAST |
| 8 | SNG to Pipeline | Composition/CH ₄ /CO/CO ₂ /H ₂ | 74 | 40 | OptoAST |
| 9 | CO ₂ Recovery Stream | Composition/CH ₄ /CO ₂ /N ₂ /H ₂ | 74 | 40 | OptoAST |

Table 1: Summary of the Typical Streams analyzed on-line in an IGCC SNG plant (see also Figure 1)

* Pressure and Temperature values listed are for typical process unit outlet streams.

www.spectrasensors.com/contact

 For more information please go to www.optograf.com

SpectraSensors®
An Endress+Hauser Company