

# Making perfect sense

Lumasense Technologies' Pulsar 4 offers simultaneous refractory and gas flame measurements, providing even more accurate results in real-time

**T**HE optimal operation of Sulfur Recovery Units (SRUs), Sulfur Burners, and Thermal Oxidiser furnaces requires the measurement and control of a complex sequence of processes. Accurate process gas (flame) measurements are needed for control, while accurate refractory measurements are needed for operational safety, such as in high temperature alarms.

Flame temperatures are used by operators to monitor process thermal events before it affects the refractory temperatures. Of particular importance is control of the furnace process temperatures, in order to prevent damage to the furnace refractory and to assure that reaction or destruction temperatures are reached and maintained. as E2T-Product Manager, David Ducharme explains below.

## The problem

Although gas temperature change will always

lead to refractory temperature change, using just refractory measurements to control your furnace means the loss of a possible early warning signal provided by the additional gas measurement. The use of both gas and refractory temperature measurements, via a single, infrared thermometer, provides faster response times for the operator.

Infrared thermometers are non-contact solutions that can measure gas or refractory temperatures simultaneously without being exposed to the high temperatures and corrosive acids of the process they are monitoring. However, they do require an input for compensation of process emissivity, as well as the lesser-known issue of changes of flame transparency. Gas flame transparency, to a given wavelength, varies with changing process feeds to the furnace – this variation not only affects the measurements of the flame, but in turn affects the refractory measurement.

Alternatively, refractory measurements

are not affected by clean burning flames – the infrared thermometer will see through the flame and provide an accurate measurement. However, if the gas is not balanced and is burning dirty, then this dirty flame is not completely transparent to the refractory measurement wavelength of the device. The taken measurements will therefore be higher than the actual refractory temperature.

Gas flame measurements are affected by changes in transparency too. In unbalanced (dirty) gas flames, infrared measurement will provide an accurate measurement. However, if a flame is clean burning, it becomes partially transparent, taking components from the refractory, and again resulting in the inaccuracy of lower than actual flame temperature. This variable affects all infrared furnace measurements

## Pulsar 4

The LumaSense E<sup>2</sup>T Pulsar family of detection systems are designed for continuous and instantaneous measurement of refractory temperature, gas temperature or integrated temperature in a given vessel, away from heat, vibration and corrosive gases. In response to the above issue, Lumasense Technologies' Pulsar 4 offers both simultaneous gas and refractory temperature measurement, using a single thermometer installation and separate 4-20mA or digital outputs.

The use of these two wavelengths makes it possible to apply a compensation calculation – the Flame Measurement Algorithm (FMA) – to remove the variable effects of flame transparency on the separate measurements. This FMA program takes measurements from both the gas and refractory readings and compensates for changing flame transparency in real-time, removing the inherent measurement errors of typical infrared thermometers.

In addition, the Pulsar 4 requires little-to-no-maintenance and eliminates the need to perform field calibrations when operating in FMA mode. Each system allows visual inspection of combustion processes, refractory cureout and preventative maintenance while the vessel is pressurised and fully operational. ■

**LUMASENSE TECHNOLOGIES**  
**E<sup>2</sup>T PULSAR SERIES**  
 Sulfur Recovery Units benefit from simultaneous gas and refractory temperature measurement

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