

Laser focus

Energy from waste plants are shining a light on the power of laser-based, real-time gas analyser instrumentation. Brian Tingham talks to Bob Lane of Siemens

With environmental regulations and raw materials cost controls both tightening, the pressure on plant operators to find process improvements has rarely been greater. One approach that is rising to the challenge, particularly in the energy from waste industry, concerns tuneable diode laser gas analyser technology.

Bob Lane, business manager, process analytics, with Siemens, points to the fact that these plants are forced to use expensive abatement consumables, such as lime and urea, to clean up emissions. Hence their interest in the laser gas analysers, which, he confirms, have been achieving savings of between 20% and 30% in media consumption for gas scrubbing and NO_x reduction, while also enabling a significant boost to combustion efficiency.

"The secret is in location and timing," says Lane. Power generators, especially those incinerating waste, he explains, are accustomed to monitoring emissions to stay within legal limits. "But this is typically done by continuously extracting a sample of the gas stream for analysis and applying FTIR [Fourier transform infrared spectroscopy] at the stack end, where the exhaust gases are discharged."

Position matters

That, to date, has been the limitation. "While perfectly adequate for emissions monitoring, the position of FTIR leaves it isolated from the sharp end, where abatement media are added and combustion controlled. That limits how much it can be used to fine-tune the process on a real-time, dynamic basis – for example, by indicating that too much abatement media is being added."

Quite simply, the measurement delay is too great. And that's why a growing number of plants are fitting laser gas analysers – and doing so at the control point. "Consider the application of lime for HCl [hydrogen chloride] abatement: whether it's from FTIR on the stack or an in-situ laser analyser, the signal is used in the same way. [The] variable forms the input to a control loop, which varies the amount of lime dosed into the gas scrubber," explains Lane. "But the crucial differences are the laser's speed of response and its position at the point of dosing. We've got the laser right in front of the scrubber, so we're providing a very dynamic, tightly-coupled [control] signal."

Lane says the difference amounts to several minutes less lag. Indeed, in-situ laser gas analysis was proven some time ago at London's SELCHP municipal waste incinerator, which was the first UK

energy recovery plant to meet and exceed European directives. That plant removes HCl from its flue gases by injecting lime milk into the gas stream, which creates deposits on filter bags that, in turn, do the neutralising. However, once the filter material is fully loaded, performance deteriorates and it must be removed and refreshed.

"Changing the filter at the optimum time is key," states Lane. "Using Siemens' LDS 6 diode laser gas analysers immediately before and after the filter, HCl concentration in the raw gas can control the injection of new or recirculated lime. And if the second laser picks up a significant change in gas leaving the filter, that is the signal to change the filter."

The result: process engineers were able to fine-tune the lime injection process to an extent previously impossible. Improvements, such as eliminating unnecessary filter changes, led to a 20% reduction in lime consumption, and meant less material disposal and fewer maintenance interventions. Word is that savings on lime alone were enough to recoup investment in its instruments.

And the improvements are just as impressive, whether it's acid gas scrubbing, as described, or NO_x treatment. What's more, in-situ laser gas analysers can also bring benefits to the combustion process itself, through faster, closed-loop oxygen sensing and control than can be achieved by Zirconia probes. Lane says combustion efficiency improvements are typically up to 10%. **PE**



Bob Lane (above): "Siemens has developed a leasing package that balances the costs of a laser system against the measurable process improvements and expected savings. This leaves plant operators cash-positive from day one of installation."

