TDLAS innovations for industrial applications

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Tunable diode laser absorption spectroscopy (TDLAS) provides contactless in-situ concentration measurements with high precision and fast response time. This, along with low maintenance requirements, has made TDLAS the preferred solution for industrial process control applications in harsh environments.

The quest for ever more economical and ecological processes poses a greater challenge to measurement technology. On the one hand, detection limits have to become more and more accurate, on the other hand, additional gases need to be measured for better process control, emission reduction and safety functions.

A good example is the combustion process, which has often been limited to the measurement of pure oxygen (O_2). Recently, there has been an increasing trend to measure carbon monoxide (CO) as well, rather than just the basic combustion measurement, to ensure more accurate and better adherence to the optimal combustion point.

And if that was not enough, nowadays you also want to ensure combustion safety, which means not only measuring even more gases (like methane (CH_4)), but also requiring a high dynamic range of the instrument in addition to a low detection limit. This dynamic range requirement tends to stretch the published accuracies of any combustion analyzer to achieve both proper control and the ability to detect improper operation and shutdown of any combustion process.

In this presentation, we will show how to design opto-mechanical solutions to add more measurements to existing infrastructure on O2-only TDLAS installations, and how to apply modern signal processing methods and challenge physical principles to “squeeze” more information out of a single absorption spectrum.