Metrology of fiber coupled optical sensors: feedback on industrial needs and instrument comparison

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Abstract

On the industrial analysis Axel'one platform, we evaluate online analysers and sensors to answer industrial needs. Controlling lab analysers is compulsory and generally based on well established procedures in certified laboratories. For online application these controls are not always so well implemented or even possible. However to install analytical systems in the industry it is essential to give guarantees of stability and robustness of the systems to convince industrials. That is why further than just the feasibility of an analysis we need to evaluate the sensors metrology in terms of: effect of temperature fluctuation (sample and environment), pressure, flow, matrix, interferences, vibrations, ageing ...
For an industrial, the choice of an analyser is often based on the seriousness with which this knowledge of the instrument behaviour has been obtained. In practice, several years are often required for an analysers to gain all this feedback. Nowadays with artificial Intelligence being the new thing, everything has to be smart. Sensors are no exception and a Smart Sensors should tell you when they are not fully operational.

In this sense, we will discuss the work done on the platform to comfort industrials in the choice of their instrumentation. How control charts implemented on equipment allow us to control the systems, compare them and use them most efficiently. We will show the protocol we establish and need to adapt to each system depending on the technology used for excitation, transducer, detector and probe. Illustrating this on the specificities of the equipment presented here on spectrometers and fiber coupled probes which are particularly adapted for industrial applications.

Focus will be made on characterising and/or guaranteeing the long term stability of an analyser. This aspect being essential when online monitoring of a process is at stake and especially now that this data are used in multi-statistical process control (MSPC) loops.
Finally, to try and accelerate this work of sensor characterisation we will discuss the future prospect of developing on the platform a 'intelligent test bench' dedicated to the calibration and evaluation of sensors in partnership with technology providers and laboratories.

Keywords: Control chart, Online analyser, spectrometer, process probes

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