How can you know better than your measurements?

Measurement quality is a key issue in assessing plant performance. How can you extract useful process information without expensive precision instruments?

Sensor signals are indicators of reality, but nothing more. In addition to inaccuracy due to the measurement principle, degradation, signal noise, or miscalibration, it may simply be the fact that the location of the sensor is not representative for the overall process stream, which creates discrepancies when looking at equipment performance. In order to make condition-based maintenance effective, the equipment KPI must be accurate and reliable, and this is only the case, if the input data for the performance analysis are correctly reflecting the actual process. And it is of course of high value, if faulty sensors are identified, so that the resulting deviations are not mistaken for equipment problems.

Using the redundancy of information from other sensors in combination with process know-how produces the most probable value of the sensor signal.

Placing multiple sensors at a specific stage in the process is an option, but it may be costly and still leave you in the dark, because if every sensor shows a different value, which one is correct? If you apply range checks and create the average value of the valid data, you can improve the result, but it will still be tricky to detect sensor bias. But when you look at the overall picture and consider the information available from the entire process, there is plenty of evidence to judge a measurement, even if it is derived from a different location.

Model-based data reconciliation generates consistent and reliable process information.

Data reconciliation applies statistical methods to find the most probable value for every signal in a closed balance for mass and energy. It considers differences in sensor quality (as certain measurement principles are more accurate than others) and determines a set

of data that is the most representative for the current operating point but at the same time in accordance with the laws of nature. If a specific sensor deviates excessively from the heat balance, it is excluded from the reconciliation procedure and replaced with the most reasonable default that is derived from the current process state.

ENEXSA uses the EBSILON®Professional heat balance software that allows for modelling every type of power generation process under design and off-design conditions and which also includes a comprehensive framework for data reconciliation. With our engineering know-how we can provide you the right tool to monitor both, the quality of your plant sensors and of your process.

If you want to learn more about model-based data reconciliation, please contact ENEXSA!

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