Software CEM

Advanced Continuous Emissions Monitoring

near 100% monitor uptime

The challenges

Companies are required to meet the continuous emissions monitoring requirements of local, state, national and global regulations and trading programs. These requirements include periodic accuracy verification as well as near **100% monitor uptime.**

As regulations continually become more stringent many industries and processes that were once exempt now find themselves required to account for their impact on the environment. Implementing a monitoring system must meet these regulatory demands while also being cost effective to operate and maintain.

100% compliance

Market and industry leadership

Rockwell Automation was first-to-market with the introduction of the patented Software CEM® in 1992 and is an example of its commitment to innovation.

With well over one thousand successful RATA's, Software CEM has achieved a track record of **100% compliance**. Rockwell Automation maintains a leadership position in mandated emissions monitoring with unparalleled experience and knowledge. Rockwell Automation engineers and technical staff have an industry recognized reputation for meeting objectives on-time and helping companies minimize costs in environmental compliance monitoring, record-keeping and reporting.

**FT FactoryTalk**
by **ROCKWELL AUTOMATION**

Software solution to a hardware challenge

The Rockwell Automation Software CEM is a patented, model-based, Predictive Emissions Monitoring System (PEMS) that provides a certifiable, cost effective solution as an alternative to hardware based Continuous Emissions Monitoring Systems (CEMS). Powered by the FactoryTalk® Analytics™ Pavilion8® software platform, Software CEM provides a highly reliable emissions monitoring solution to meet or surpass regulatory requirements worldwide. Software CEM utilizes powerful analytic models of the emissions source with real-time sensor validation to provide predictive emission values with unparalleled accuracy.

Software CEM: A model-based approach

Software CEM utilizes the FactoryTalk Analytics Pavilion8 Model Analytic engine to provide highly accurate measurements of NOX, CO, CO_2, green house gas and other emissions as an alternative to costly hardware based CEMS. The Software CEM system continuously monitors emissions by means of an online model using historical and real-time source data. The Rockwell Automation hybrid modeling technology incorporates nonlinear empirical models as well as first principles knowledge to provide the most accurate emissions prediction available in the compliance industry. They are executed online to provide real-time predictions of emissions from a wide range of sources and fuels.

These composite models incorporate the effects of operating and ambient conditions on emissions to provide a robust compliance monitoring system for years to come. The Software CEM is a dynamic system that predicts emissions even in the extreme operating ranges of the unit. It can be used for a wide range of different unit operations including boilers, gas turbines, furnaces, reciprocating engines, dryers, heaters, regenerative and conventional thermal oxidizers.
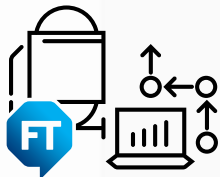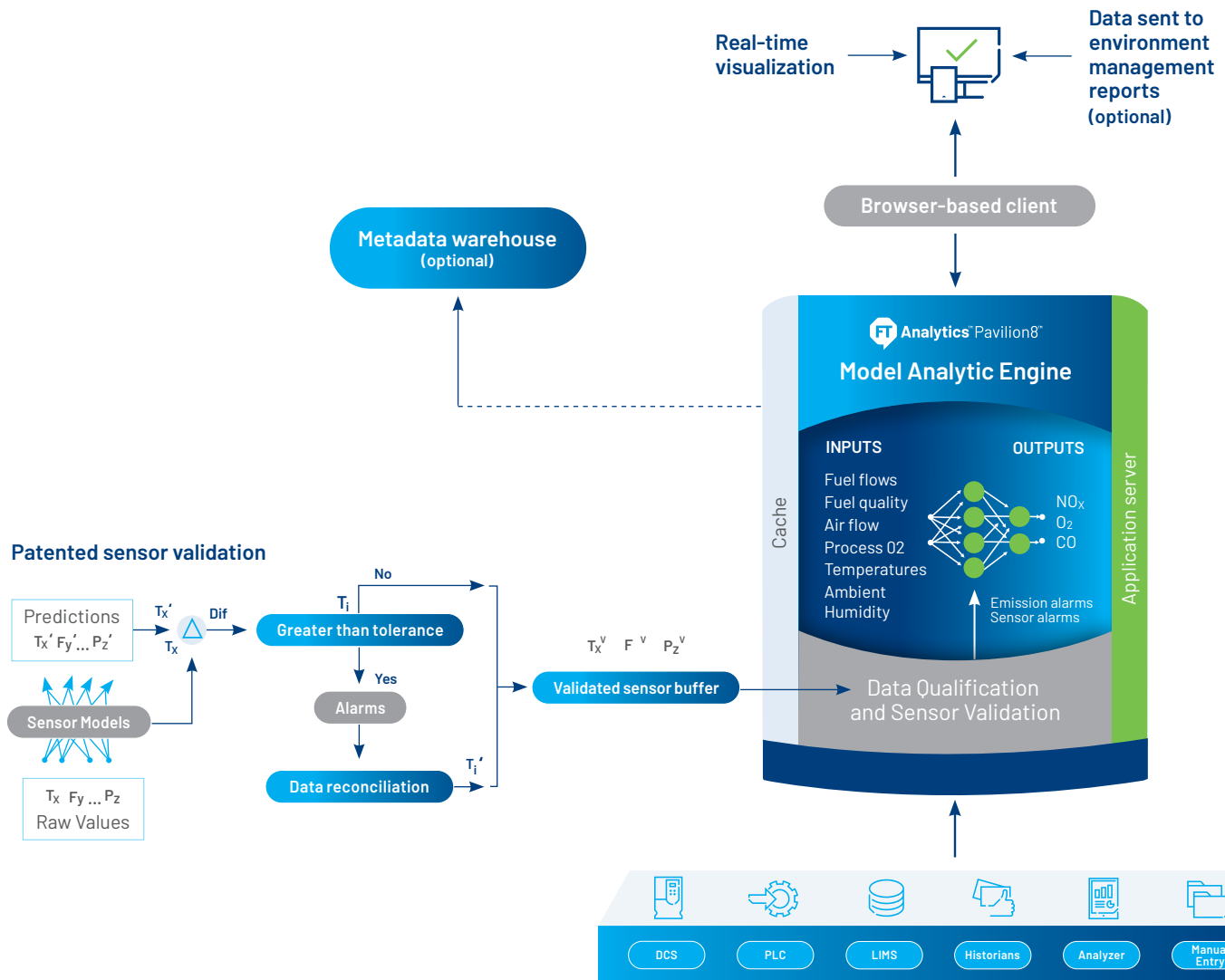
Analytics™ Pavilion8™

Sensor validation for unsurpassed accuracy and reliability

Achieving the regulatory agency-mandated up-time with a PEMS for demonstration of continuous compliance requires the ability to continue to operate in the event of sensor failure. This requires a methodology for detecting sensor failures and, if possible, compensating for those failures. This function is easily achieved with the Software CEM patented sensor validation modeling capabilities.

This capability includes a very accurate model of all of the sensors as a function of other sensors of the source operations. For example, in a boiler, the fuel flow, air flow and steam flow are highly interdependent. Similarly, modern plants typically have redundant temperature, flow and pressure measurements. Thus it is possible to estimate any one of these readings as a function of the other sensors. In a similar fashion, all sensor values can be validated by comparing raw values to predicted values as a function of the "peer" sensor data.

A raw sensor value that is suspect in relation to its peer readings can be identified. Software CEM uses the sensor validation model as a qualifier to detect sensor failures and to set appropriate alarms. The patented Performance Specifications (PS-16) compliant reconstruction routine facilitates continued accurate prediction of sensor values while the failed sensor is repaired or replaced. This allows for the uninterrupted reporting of emissions data.

Information flow

Real-time visualization

Data sent to environment management reports (optional)

Browser-based client

Metadata warehouse (optional)

FT Analytics™ Pavilion8™

Model Analytic Engine

Cache

Application server

INPUTS

Fuel flows
Fuel quality
Air flow
Process O2
Temperatures
Ambient
Humidity

OUTPUTS

NO_X
O_2
CO

Emission alarms
Sensor alarms

Data Qualification and Sensor Validation

Patented sensor validation

Predictions
T_X' F_Y' ... P_Z'

T_X'

T_X

Dif

T_i

Greater than tolerance

No

Yes

Alarms

T_i'

Sensor Models

Data reconciliation

T_X F_Y ... P_Z
Raw Values

$T_X{}^V$ $F{}^V$ $P_Z{}^V$

Validated sensor buffer

DCS | PLC | LIMS | Historians | Analyzer | Manual Entry

Cost effective monitoring and compliance

FEATURES

- Patented, model-based, software system
- Standardized, software application development and deployment methodology

BENEFITS

- Lowers installation and maintenance costs
- Higher reliability
- Lower safety risks
- Faster deployment, quicker compliance and ROI
- No labor and material costs associated with operations and maintenance

Highly accurate and reliable emissions monitoring and reporting

FEATURES

- Patented Sensor Validation with real-time alerts
- Peer redundancy for reconstructing invalid or missing data
- FactoryTalk Analytics Pavilion8 Model Analytic Engine

BENEFITS

- Quality assurance of input data reduces compliance monitoring and reporting errors
- Fast, accurate fault finding and reduces meantime to repair (MTTR)
- Maximizes monitor uptime which eliminates downtime penalties
- Increases operational confidence with respect to emissions performance

Environmental and industrial expertise

FEATURES

- Proven experience with global project implementation and maintenance methodologies for diverse emission sources and types
- Local, state, national and global regulatory experience
- Send data to environmental reports or use an excel add-in for customized report generation

BENEFITS

- Faster deployment reduces costs and time to achieve and maintain compliance
- Reduces project risk
- Minimizes compliance monitoring, record-keeping and reporting costs

Rockwell Automation

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