

AML Analyser Management

Reliable measurements from analyser systems are the foundation for efficient and effective operation of a plant, regardless whether on-line laboratory or field analysers are used. Analyser systems require frequent validation and maintenance in order to meet performance requirements. AML Analyser Management provides the infrastructure for managing and maintaining analysers in the field and in the laboratory with a minimum of resources. AML Analyser Management is not a replacement for "LIMS", but serves as a harmonizing platform between analysers in the field, in the laboratory and if used the "LIMS".



AML Analyser Management

AML Analyser management is a system to monitor, evaluate and improve the performance of on- and offline analysers in a cost-effective manner. It automatically collects real-time data from analysers by direct readout or via the plant control system, collects manually-entered data, interprets analyser performance and provides guidance for maintenance. Next to this AML Analyser Management can be used in the periodic validation process of critical process measurements, such as fiscal metering points and safety related measurements.

Analytical Performance

Analyser performance is monitored, validated and controlled by statistical process control methods. Validation is the process of confirming actual analyser performance against traceable and accepted standards and is a non-corrective metrological procedure.

AML Analyser Management provides support for six validation methods that can be executed manually or (semi-)automatically:

- Reference Sample Method
- Line Sample Method
- Reference Measurement Method
- Filter Method
- Response Time Method
- Timed Response Method

Validation scripts are configured with Java, Function Blocks or Sequential Function Charts.

Significance Tests

A sufficient level of integrity of the validation data is required for further performance evaluation. Erroneous data (e.g. caused by defective equipment) should be rejected from the data set and not be used for further testing. AML Analyser Management offers a set of most commonly used significance tests:

- Test on Outliers (ASTM-E178, Dixon, Grubbs)
- Test on Non-Randomness

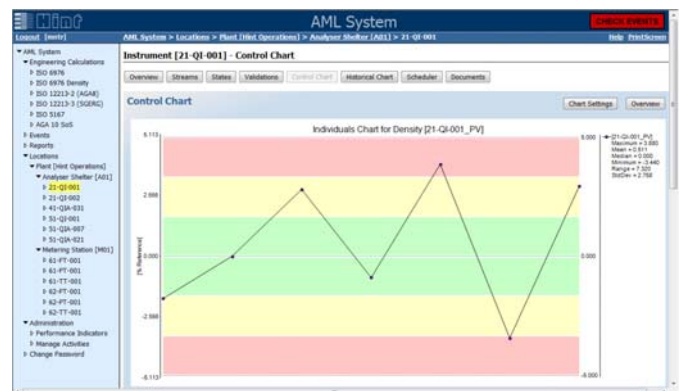
- Test on Systematic Errors (Student's T-test)
- Test on Variance (F-test)
- Test on Reproducibility Rate

Using one of these methods, the person responsible for assuring correct quality measurements, can clean up data before the analyser performance is determined using the control charts.

Control Charts

The control chart is a tool used to determine whether an analyser measurement is in a state of statistical control or not. AML Analyser Management provides five types of control charts for monitoring accuracy and precision:

- Individuals Chart (monitoring accuracy)
- Moving Range Chart (monitoring precision)
- Mean Chart (monitoring accuracy)
- Range Chart (monitoring precision)
- Standard Deviation Chart (monitoring precision)



AML Analyser Management makes use of the VDIsoft Analytics library, a .NET version of QC Charter.

Decision Rules

The performance of an analyser is evaluated by interpreting the control charts. Decision rules are functions that help to detect special cause variation in the validation data of control charts.

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Rule violations are recorded in the central event table:

- Single result plots outside the control limits
- Two out of three consecutive results plot outside the warning limit
- Four out of five consecutive results plot outside half the warning limit
- Eight or more consecutive results on one side of the centre line
- The difference between eight consecutive results have the same sign (trend detection)

Maintainability

AML Analyser Management provides an indispensable set of functions to monitor and control the maintainability of analysers:

- Recording Maintenance Activities
- Scheduler (planning Automatic Validations and Maintenance Activities)
- Online Access to Documents (Procedures, Datasheets, vendor documentation, etc.)

The screenshot shows the 'Plant Instruments' section of the AML System. It includes a search bar and a table with the following columns: Tag, Type, Make, Model, and Validation Method.

Tag	Type	Make	Model	Validation Method
21-Q1-001	Gas Density Meter	Emerson	MicroMotion	Line Sample
21-Q1-002	Liquid Density Meter	Emerson	7926	Line Sample
41-QA-021	RFI Analyser	Process	442006	Line Sample
51-Q1-001	Gas Composition Analyser	Emerson	371	Line Sample
51-QA-007	CO2 Analyser	Siemens	Ultramat 6P	Line Sample
51-QA-021	RSHVCS Analyser	Emerson	706	Line Sample

Events and Reports

Alarms and events are recorded in the central database of AML Analyser Management. Urgent events need acknowledgement from the user who is notified by a flashing indicator in the header of the Graphical User Interface.

AML Analyser Management offers a set of predefined reports that can be exported to various formats, e.g. HTML, PDF, CSV, Excel. These reporting formats are also the basis for integrating AML Analyser Management with a higher level "LIMS" package.



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Availability

The availability of analysers is monitored and controlled by keeping track of the operational state of each analyser and calculating the time rated performance indicators.

Operational States

A set of the most common operational states is supported by AML Analyser Management. This set can be adjusted to customer requirements:

- NORMAL
- MAINTENANCE
- CHECKING
- BREAKDOWN
- OUT OF USE

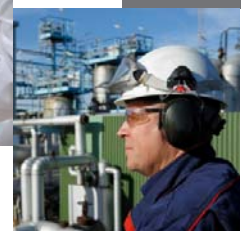
Time Rated Performance Indicators

AML Analyser Management calculates time rated performance indicators for each analyser in real-time. The review period for the performance indicators is user-configurable:

- Availability Rate [%]
- Checking Rate [%]
- Breakdown Rate [%]
- Reproducibility Rate [%]

Benefit

- Allows for single authority/responsibility for field and laboratory analysers
- Reduced cause for arguments on quality readings, increased trust in analyser results
- Manpower savings by preventing unneeded analyser maintenance in laboratory and field
- Possibly reduction of staffing in the quality control laboratory
- Reduced variability of laboratory procedures (by instructions and checkpoints)
- Reduced quality giveaway, resulting from higher confidence limits
- Web based, meaning access anywhere by authorised persons
- Platform independent
- No license costs



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