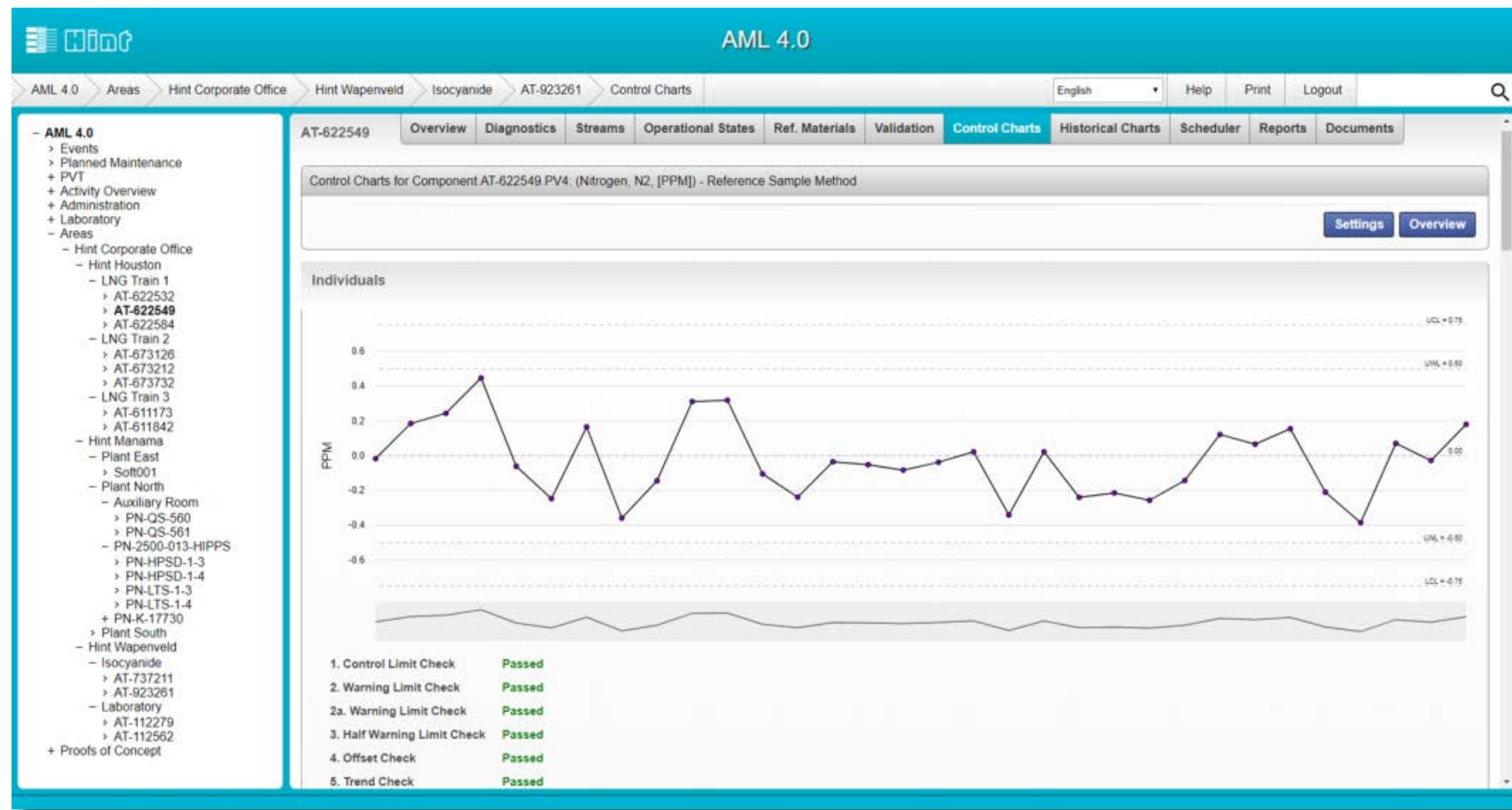


AML Information Management (AMADAS)





Reliable measurements from analyzer systems are the foundation for efficient and effective operation of a plant, regardless whether on-line laboratory or field analyzers are used.

Analyzer systems require frequent validation and maintenance in order to meet performance requirements. AML Analyzer Management provides the infrastructure for managing and maintaining analyzers in the field and/or in the laboratory with a minimum of resources.

AML Analyzer Management is not a replacement for Laboratory Information Management System (LIMS), but serves as a harmonizing platform between analyzers in the field, in the laboratory and if used LIMS. Standard AMADAS functionality is just a part of AML Analyzer Management.

AML Information Management

AML Information Management (AMADAS) is a system to monitor, evaluate and improve the performance of online and offline analyzers in a cost-effective manner. AML Information Management (AMADAS) provides:

- Automatic collection of real-time process data and diagnostics from analyzers through direct readout or via the plant control system
- Collects manually-entered validations results
- Interprets analyzer performance
- Planning, triggering and registration functionality for maintenance activities
- Sensor data quality labels

Analyzer Performance

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

AML Information Management (AMADAS) provides support for any type of validation method. Typical validation methods that are executed manually or (semi-)automatically:

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

Control Chart

The control chart is a tool used to determine whether an analyzer measurement is in a state of statistical control. AML Information Management (AMADAS) 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)

Decision Rules

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

AML Information Management (AMADAS) contains the following set of decision rules that can be switched on or off:

- 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 center line
- The difference between eight consecutive results have the same sign (trend detection)

AML Information Management (AMADAS) provides the functionality to add your own decision rules.

Significance Tests

A sufficient level of integrity of validation data is required for further long-term 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 Information Management (AMADAS) offers a set of statistical significance tests:

- Test on Outliers (ASTM-E178, T-Statistics, Dixon's, Q-Statistics)
- Test on Normality (Shapiro-Wilk)
- Test on Non-Randomness (Bennet and Franklin)
- Test on Systematic Errors (Student's T-test)
- Test on Variance (Chi square test)
- Test on Reproducibility Rate

Diagnostic Information

Smart devices (like analyzers and sampling systems) are capable of sharing diagnostic information. Diagnostic information provides an indication about the health status of the device. Via the maintenance network AML Information Management (AMADAS) grabs the diagnostic information directly from the device itself and can execute on- and offline validation based on the health status of the analyzer.

Historical Diagnostic data can be viewed in the application.

Sensor Data Quality

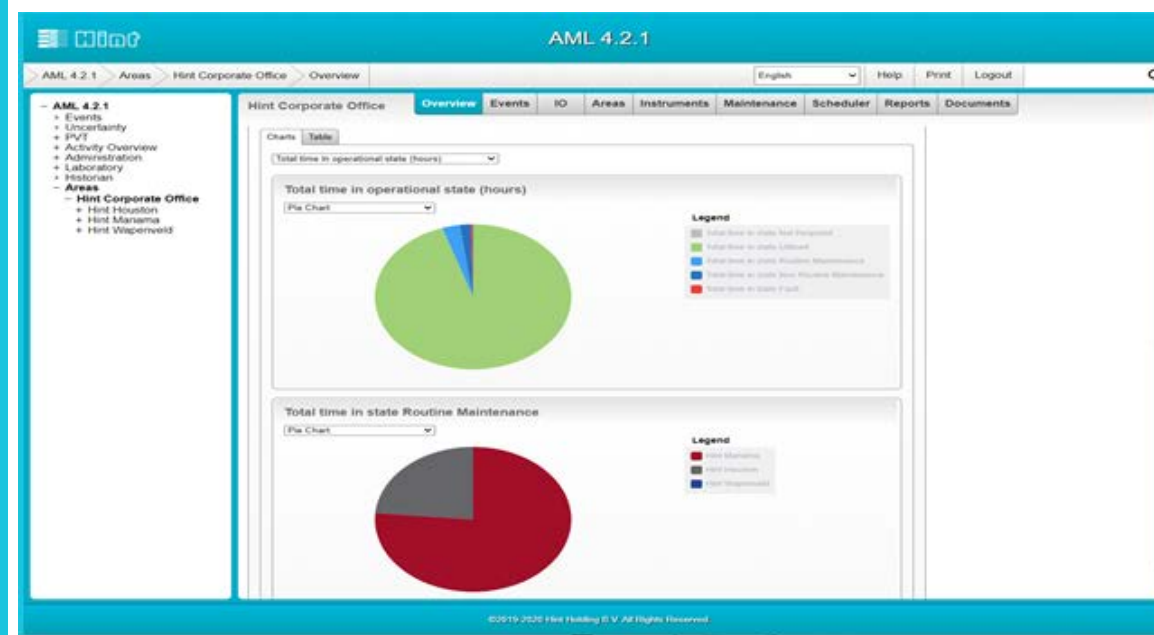
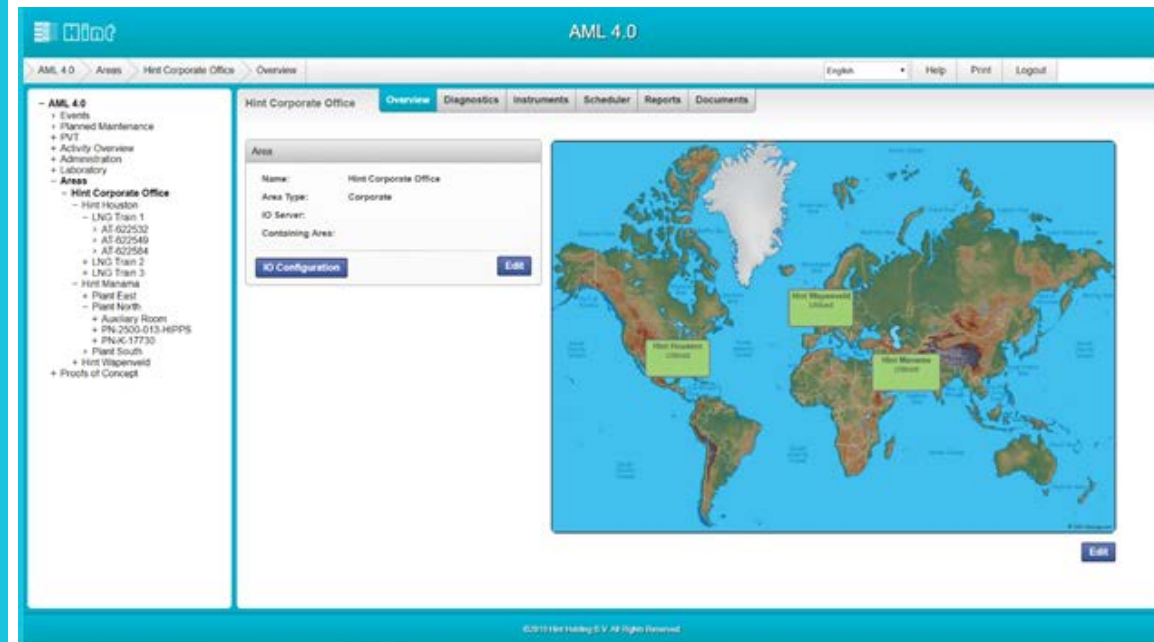
A quality label is created based on statistical process control results and diagnostic information to ensure the reliability of the analyzer data. Historical data becomes more reliable when cross checked with the quality label.

Maintainability

AML Information Management (AMADAS) provides an indispensable set of functions to monitor and control the maintainability of analyzers:

- Graphical overviews of the operational state of analyzers
- Scheduling planned maintenance tasks
- Creating maintenance tasks based on conditions
- Recording maintenance activities
- Scheduling validation activities
- Audit trail of configuration changes
- Online access to documents (procedures, datasheets, vendor documentation, etc.)
- Completely user configurable





Events and Reports

Events are recorded in the central database of AML Information Management (AMADAS). Urgent events need acknowledgement from the user who is notified by a flashing indicator in the header of the Graphical User Interface. AML Information Management (AMADAS) offers a set of predefined reports that can be exported to various formats, e.g. PDF, MS Word, MS Excel and CSV. Next to that AML supports the option to create user designed custom reports. The data and layout can be configured by the user.

Availability

The availability of analyzers is monitored and controlled by keeping track of the operational state of each analyzer and calculating the time rated performance indicators. AML Information Management (AMADAS) supports maintenance interlocking with the control system, which means that a DCS operator has to explicitly give approval for maintenance before the operational state is changed.

Operational States

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

- Utilised (UTL)
- Routine Maintenance (RTN-MNT)
- Non Routine Maintenance (NRT-MNT)
- Faulted (FLT)
- Not Required (NRQ)

Time Rated Performance Indicators

AML Information Management (AMADAS) calculates time rated performance indicators for each analyzer in real-time. The review period for the performance indicators is user-configurable. Examples of time rated performance indicators included in AML Information Management (AMADAS) are:

- Availability Rate [%]
- Checking Rate [%]
- Breakdown Rate [%]
- Mean time between repair (MTBR) [hours]
- Mean time between failure (MTBF) [hours]

Technology

AML Information Management (AMADAS) has a web-based graphical user interface and therefore does not need client installation and can be accessed by authorized users. If it is possible through the infrastructure, the application can be made available for remote access. The application can be used from all standard browsers, independent of the platform.

The solution can be installed on-premises on a physical server or a virtual machine. The solution can also be provided as a SaaS solution in a private or public cloud.

The solution is scalable from 1 analyzer on a plant till thousands of analyzers on the corporate level. User license fees are not applicable.

Benefits

AML Information Management (AMADAS) provides:

- Reduced cause for arguments on quality readings, increased trust in analyzer results
- Savings by preventing unneeded analyzer maintenance on laboratory and field equipment
- Options for planning, scheduling, triggering and registration of maintenance tasks
- Reduced quality giveaway, resulting from higher confidence levels
- Improvement of availability and analytical performance of analyzers
- Uniformity in handling collected data, applying statistical rules and reporting
- Availability of historical process, diagnostics and maintenance data
- Web based graphical user interface, meaning access anywhere by authorized personnel
- No user license fees
- Custom, user defined, reporting
- Ability to add and update analyzers and I/O points by user.