



aX5

automationX® Version 5

Distributed Control System

Modular | Scalable | Universal



automationX® is a scalable and modular designed DCS with a common platform for engineering, visualization, control and for the management of small plants up to distributed control systems.

Engineering | Visualization

PLC

Alarm Management | Trend

Journal | Event Records

Data Representation | Reports

Helpdesk | Maintenance Management

Batch System | APC | Network & Telecontrol

- ▶ Automation Classes: Complete, Comprehensive and Reusable Software Modules for Application Configuration
- ▶ Easy-to-use Classes Neatly Bundle the Knowledge of Experts
- ▶ Clear User Interface

automationX takes the concept of totally object orientation. Although somewhat related, the implementation of object orientation in automationX should not to be confused with the techniques applied in high level programming languages. automationX uses object orientation for application development or configuration of automation projects. It is this technique that allows total applications to be constructed out of self-sufficient software modules known as the "automation classes". The result – it allows experts to neatly bundle their knowledge, hide confusing details and provide easy-to-understand interfaces into modules from which others can create their own applications.

Automation classes (also referred to as objects) are powerful software modules that integrate all functionality associated with devices operated with a modern automation system. A single class or object includes features such as regulatory and logic control, process visualization, automated alarm and interlock assistance, data history and trending, automatic simulation mode for testing and training and much more.

Applications are easily constructed by combining automation classes to create the final system. Application engineers just use class catalogues with the advantage of inherited functionality in the used objects.

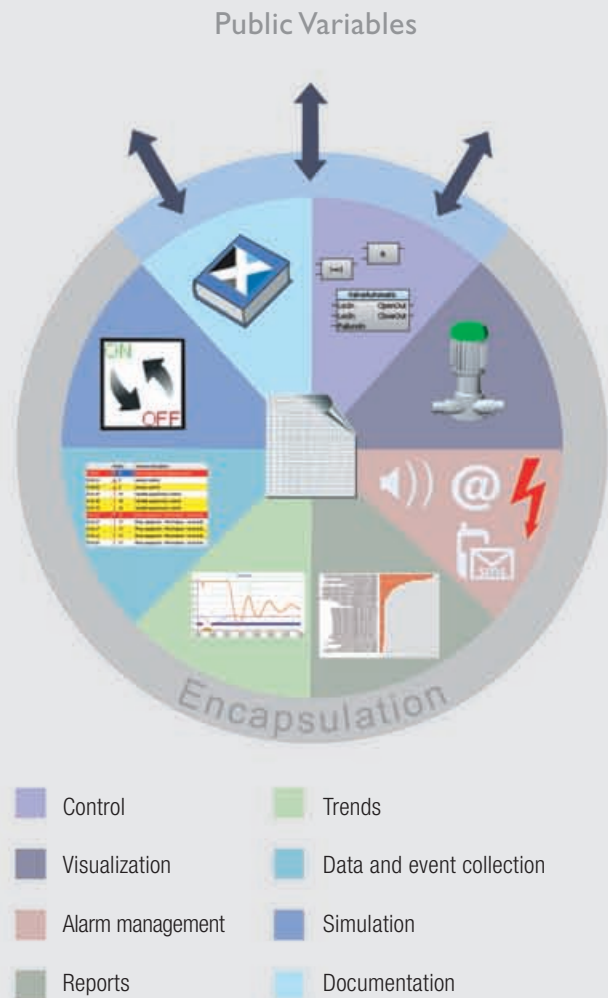
There is no additional effort for the integration of the different automation parts and there is no effort for the deployment to different hardware platforms.

The object orientation feature automatically creates shorter and more intelligible programs. The result is a much higher transparency. For the automation engineering this means a more understandable (intuitive) programming interface for application designers, process engineers, quality managers and the operator of the plant.

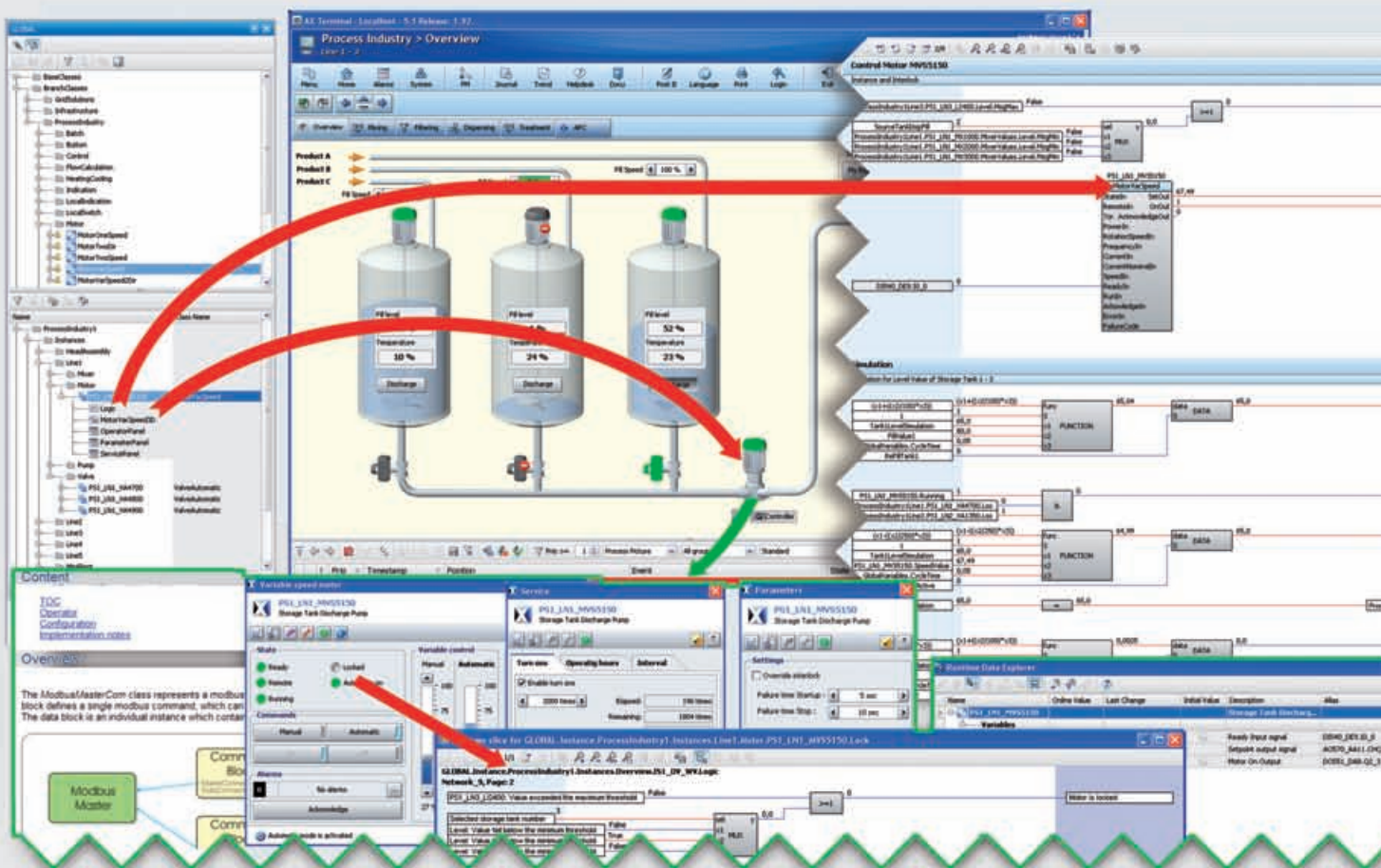
Automation classes are re-usable software "objects" within automationX that contain everything that's necessary to establish a function, whether it be a device operated by the system, a communication task, an interface, or whatever. All of this functionality is neatly wrap-

ped up into a single graphical icon that can be used as many times as desired, even within new more powerful classes.

AUTOMATION CLASSES



- ▶ Intuitive Application Development
- ▶ Process Transparency
- ▶ Minimum Configuration Effort



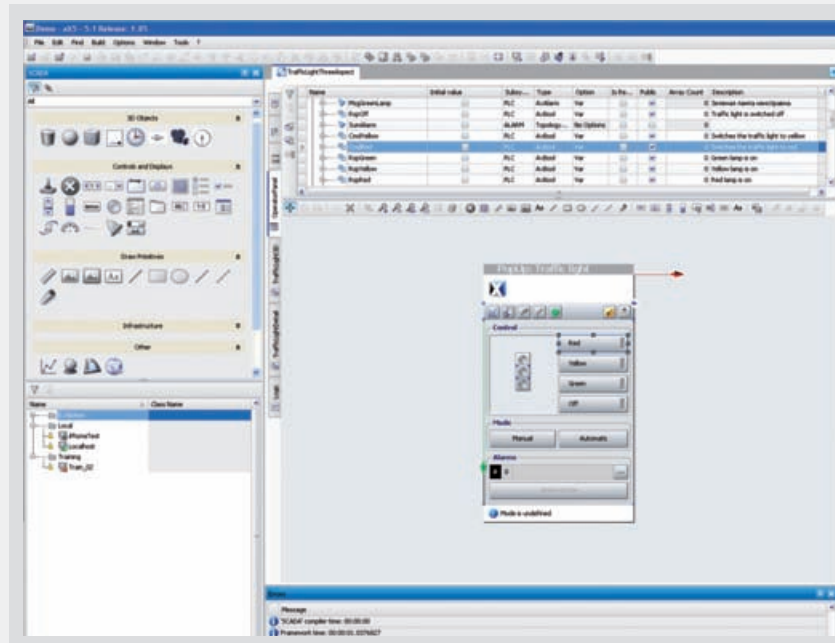
A state-of-the-art development studio, the automationX IDE, enables a transparent engineering. Based on system libraries the requested function of a class will be arranged and stored in libraries for later re-use. Pre-defined and branch related libraries provide a collection of proven automation classes. Use drag & drop to place objects from your resource pool to the HMI screens or assign them to a logic controller for execution. The basic function with several graphical representations, the operator interface, the logic program and for example the maintenance

information and simulation are already defined implicitly. They only need to be integrated to the process work flow by the application designer.

ENGINEERING - IDE

Use one smart and unified engineering tool for your entire plant – start with the configuration of I/O cards, with communications and PLC programs and design your HMI screens and operator guidance's.

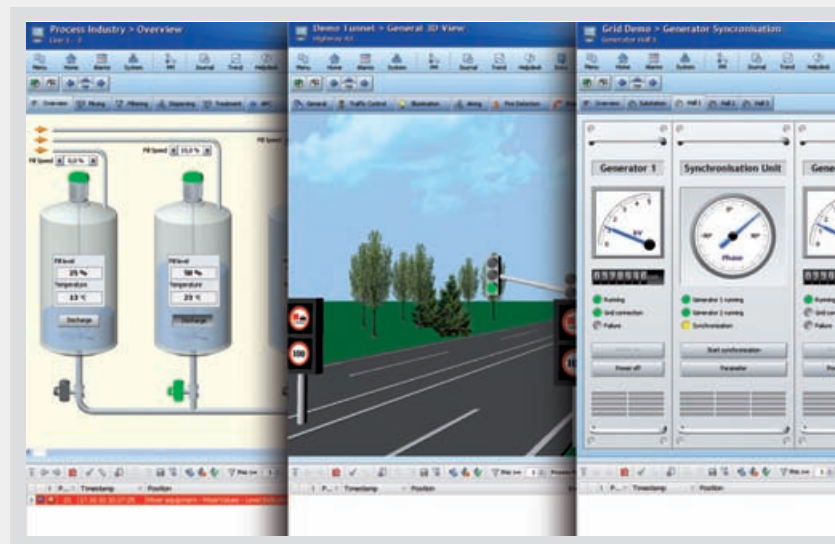
- ▶ Host based data management and shared libraries
- ▶ Online engineering and multi-user management
- ▶ Predefined branch libraries and user defined libraries
- ▶ Version management and version compare functions
- ▶ Automation objects with integrated logic, HMI, simulation, data collection, maintenance information etc.
- ▶ Multiple graphical representations of one single automation object (also depending on zoom levels)
- ▶ Object references and compositions (sub-classes)
- ▶ Documentation management with references to classes and instances
- ▶ Mass data handling
- ▶ Import function (equipment lists, I/O assignment, speech text)
- ▶ Access control based on rules and object protection
- ▶ Integration of .NET libraries and C# / VB code



VISUALIZATION - HMI

Visualize your plant in 2D or 3D graphics and user layer- and zooming techniques as well as the linking of external objects for a user-friendly information representation.

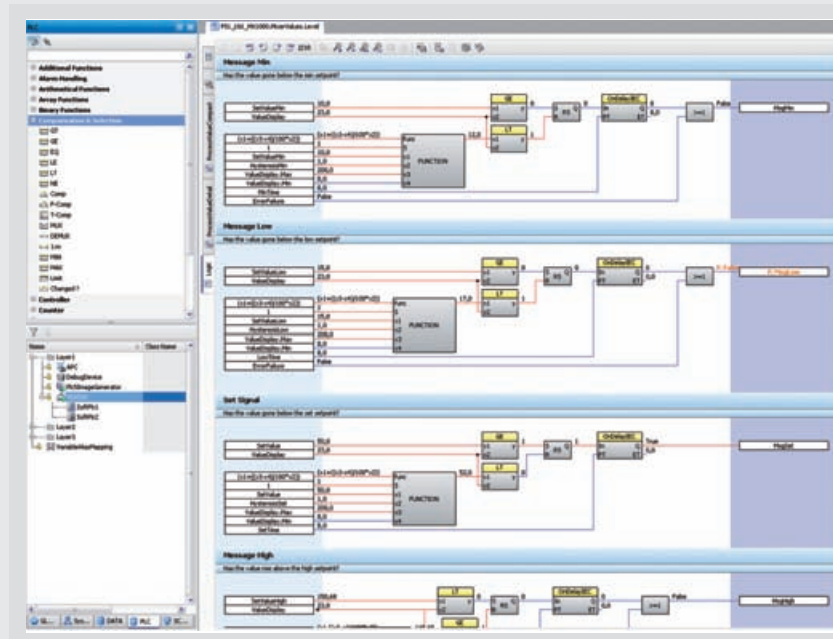
- ▶ Multi-monitor operator stations and video walls
- ▶ Redundant operator stations and tracing of operator actions
- ▶ Multi-lingual (incl. Asiatic, Cyrillic and Persian character sets)
- ▶ Redundant operator stations and tracing of operator actions
- ▶ Profiles and layout design
- ▶ Individual configuration of HMI sets for all work stations
- ▶ Zooming, decluttering, panning, moving of process screens, layer techniques
- ▶ Screen-in-screen views
- ▶ Two-stage control with validation check
- ▶ Playback manager
- ▶ ActiveX objects, video stream and Live-cam involvement
- ▶ Integrated authority control between different control rooms or work stations
- ▶ Online data monitor
- ▶ Cross references to I/O cards and to PLC programs
- ▶ Highlight of object references and display of logic conditions



LOGIC PROGRAMMING - PLC

Create your logic programs for several hardware systems and allow them to communicate with each other!

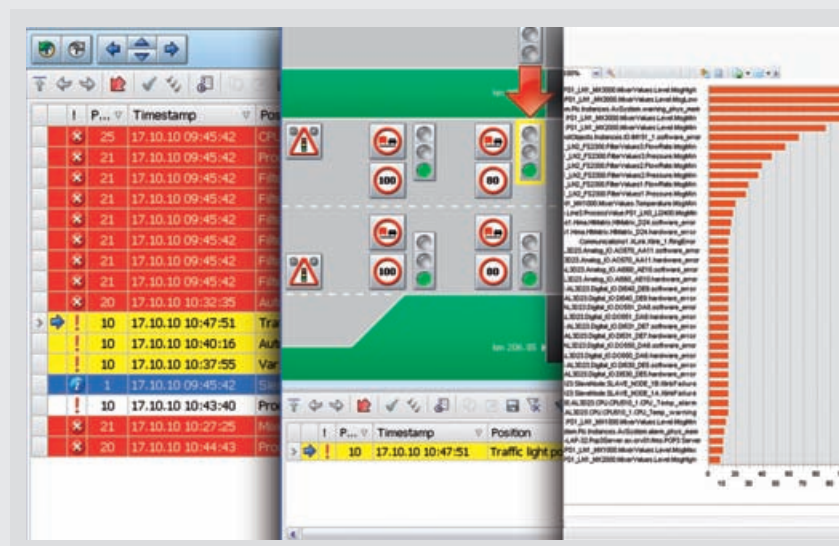
- ▶ IEC 61131-3
- ▶ Redundant architecture with hot-standby
- ▶ Several hardware platforms and operating systems (Windows, real-time Linux)
- ▶ Small resource requirements (ARM9 support)
- ▶ FBD programming
- ▶ C-Code execution
- ▶ Multiple PLC tasks
- ▶ Force of all variables
- ▶ Real-time data collection and time stamps
- ▶ Class-function-blocks based on user defined libraries
- ▶ Execution of mathematical functions and go-to statements
- ▶ Data connectivity between PLC controllers
- ▶ HTTP interface
- ▶ User-defined add-on processes (e.g. APC and Network & Telecontrol)
- ▶ C-API, PHP-API



ALARM MANAGEMENT

Let the system automatically create summarized alarms and have the system highlight the position of alarms on your HMI screens!

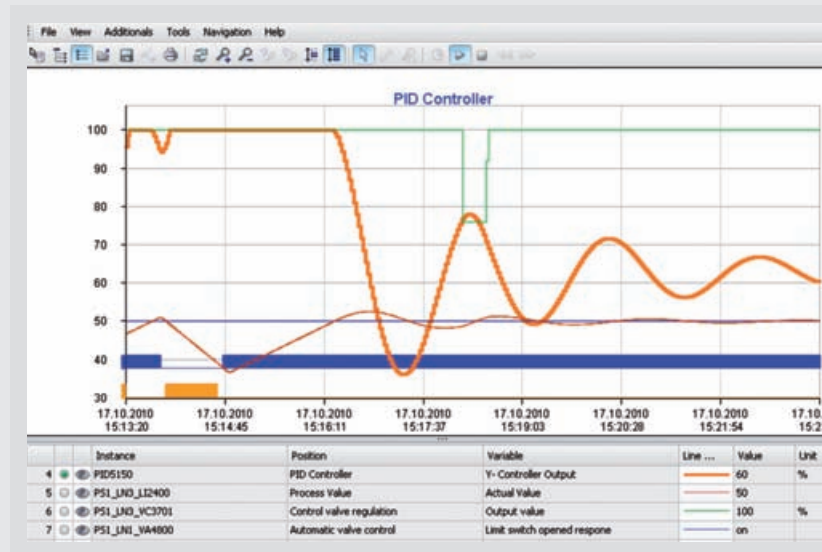
- ▶ User defined alarm attributes (e.g. priority, color, acknowledge behavior, debouncing)
- ▶ Alarm monitor, screen and screen-group alarms, alarm panel
- ▶ Alarm highlight (arrow, border or icon)
- ▶ Automatically blank-in of alarmed objects (because of layer settings)
- ▶ Automatically creation of summarization alarms
- ▶ Cascading of alarms
- ▶ Hide or mute of alarms of a selected process section
- ▶ Messaging (text to speech, SMS, e-mail)
- ▶ Chronological lists
- ▶ Pareto chart and alarm rate evaluation



TREND

Track the chronological sequence of data points and define your own data sets!

- ▶ Online trends and historical trends
- ▶ Multiple time axis
- ▶ Documentation of data points
- ▶ User-defined data-acquisition grid (level, time, event)
- ▶ Realtime data collection in PLC
- ▶ Actual value and statistical evaluations
- ▶ Class-, instance- and user-defined trend sets
- ▶ Documentation of data points with substitute value input
- ▶ Zooming and measurement
- ▶ Measurement tools
- ▶ Adding of trends of different objects with drag & drop
- ▶ Trend archives
- ▶ CSV data export



JOURNAL AND EVENT RECORDS

Track switching operations, parameter changes and operator interventions in the system and document them!

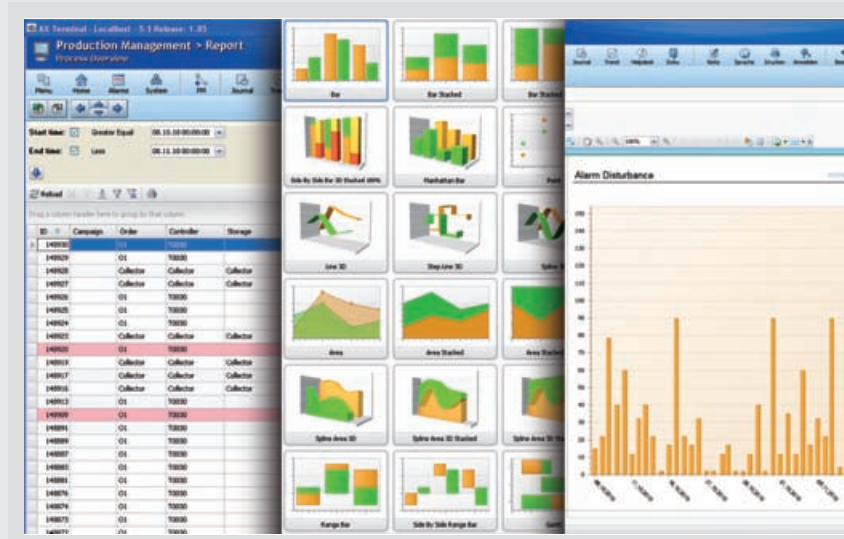
- ▶ Tracking of operator interventions
- ▶ List of system messages
- ▶ Chronological alarm list
- ▶ Summarized event list based on trend and journal data
- ▶ Direct access of object events from the object panel
- ▶ Documentation of events and file attachment
- ▶ Grouping area and column chooser
- ▶ Filtering
- ▶ User defined profiles
- ▶ Documented database structure for all sub-systems

E...	Timestamp	Priority	Instance Description	Event	Message	User Name
34220	17.10.10 15:45:56	20	Four stage entrance lighting control	Fuse 1 triggered	Acknowledged	Alarm Ser
34218	17.10.10 15:45:12	5	Aerator control	Maximum aerator temperature exce...	Inactive	Alarm Ser
34216	17.10.10 15:45:03	5	Aerator control	Maximum aerator temperature exce...	Active	Alarm Ser
34205	17.10.10 15:41:42	10	Variable speed motor control	Service necessary	Inactive	Alarm Ser
34204	17.10.10 15:41:40	10	Variable speed motor control	Service necessary	Acknowledged	demoadn
34202	17.10.10 15:41:33	10	Variable speed motor control	Service necessary	Active	Alarm Ser
34201	17.10.10 15:41:27	21	Mixer equipment - MixerValues - Level Ind...	Value exceeded the maximum thres...	Active	Alarm Ser
34200	17.10.10 15:41:27	17	Mixer equipment - MixerValues - Level Ind...	Value exceeded the maximum thres...	Locked	Alarm Ser
34197	17.10.10 15:41:17	17	Mixer equipment - MixerValues - Level Ind...	Value exceeded the high threshold	Acknowledged	demoadn
34196	17.10.10 15:41:12	17	Mixer equipment - MixerValues - Level Ind...	Value exceeded the high threshold	Active	Alarm Ser
34191	17.10.10 15:41:02	17	Mixer equipment - MixerValues - Level Ind...	Value exceeded the high threshold	Inactive	Alarm Ser
34190	17.10.10 15:41:01	21	Mixer equipment - MixerValues - Level Ind...	Value exceeded the maximum thres...	Inactive	Alarm Ser
34189	17.10.10 15:41:01	17	Mixer equipment - MixerValues - Level Ind...	Value exceeded the high threshold	Unlocked	Alarm Ser

DATA REPRESENTATION AND REPORTS

Design your own data views and charts and embed them into your HMI screens!

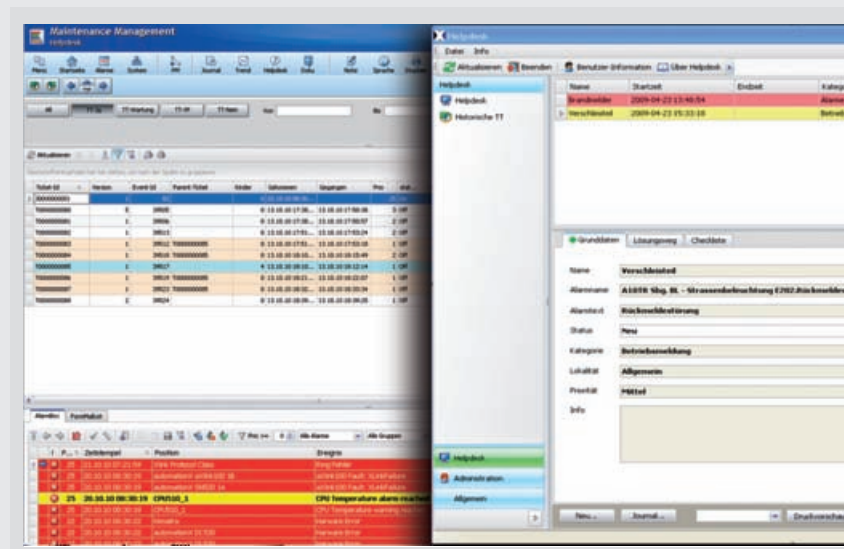
- ▶ Tabular display of database information and file systems
- ▶ Graphical charts with lines, columns, radar plots, segments etc.
- ▶ Report generator
- ▶ Master / detail layout
- ▶ Execution of SQL queries and methods
- ▶ Filter functions
- ▶ Mathematically operations
- ▶ Formatting and grouping
- ▶ Embedded in HMI screens
- ▶ Time and event based reporting and archiving
- ▶ Data exchange to PLC- and HMI-variables



HELPDESK- AND EVENT MANAGEMENT

Let the system guide you through the process and supervise your system events!

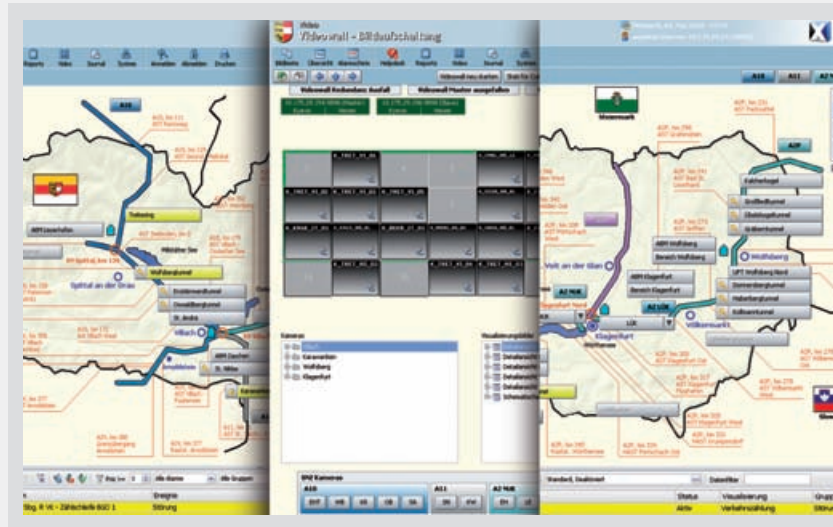
- ▶ Step-by-step operator guidance through critical or complex situations
- ▶ Documentation of finished steps
- ▶ Definition of trouble tickets and templates
- ▶ Automatically record of run-time and switching operations of equipments
- ▶ Definition of trouble tickets and templates
- ▶ Cross references between events and alarms
- ▶ Automatically assignment of e-mail correspondence
- ▶ Reporting system



MEDIA MANAGEMENT

Involve your video walls, large screen displays and audio systems and allow the system to display the relevant HMI screens automatically!

- ▶ Involvement of emergency call, video and telephony
- ▶ Free configuration of cubes in tiles and (alarm) regions
- ▶ Master/Slave redundancy
- ▶ Automatically move-in of alarmed objects
- ▶ Drag & drop move-in and positioning of screens
- ▶ Stretch of objects over tiles
- ▶ Scenario management
- ▶ Display of HMI screens, video streams and life cams
- ▶ Link to video patchboard



BATCH SYSTEM

Define and control a batch oriented production and allow it to be an integrated part of your entire system!

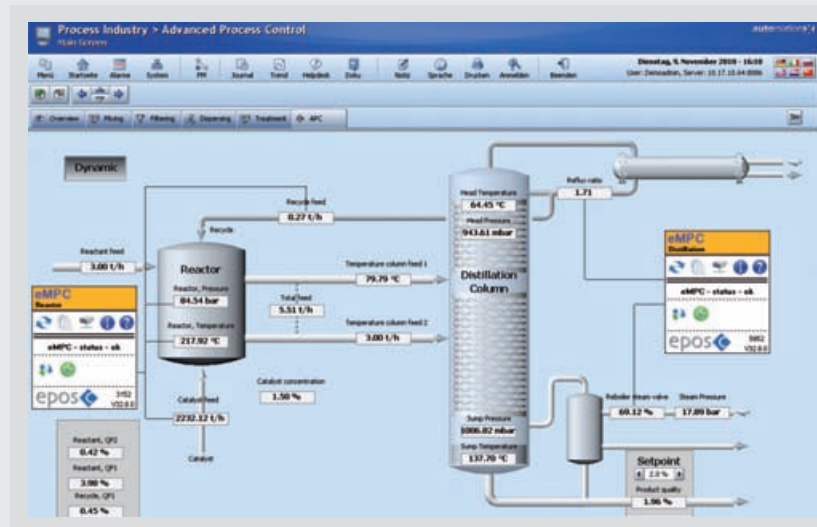
- ▶ Batch oriented process control based on ANSI/ISA 88/S95
- ▶ Equipment modules with phase interface as well as individual parameters, report values and PLC programs
- ▶ Rule- or process definition screen
- ▶ Synchrony and asynchrony steps
- ▶ Go-to commands
- ▶ Scheduler
- ▶ Material administration
- ▶ Runtime monitor with online modification mode
- ▶ Setpoint calculation during run-time
- ▶ Pre-stop calculation
- ▶ Flow control
- ▶ Batch reports
- ▶ Material statistics and balances
- ▶ Consumption measurement

Line	Seq	Module	Material Name	Property	Value	Actual	Unit	Mode	Time
1 Block A									
1.1	5	Dosing Line T1 to T1 MAT1	Testmaterial 1	Quantity	20,0	20,0	kg		15:59:20
1.2	5	Delay time MD030		Delaytime	0,2	00:12	min		15:59:37
1.3	5	Dosing Line T2 to T1 MAT2	Testmaterial 2	Quantity	17	16,85	kg		15:59:55
1.4	5	Dosing Line PC to T1 MAT3	Testmaterial 3	Quantity	12,000	12,054	kg		
2 Block B									
2.1	A	Dosing Line T1 to T1 MAT1	Testmaterial 1	Quantity	37,0	0,0	kg		
2.2	5	Dosing Line PC to T1 MAT3	Testmaterial 3	Quantity	36,898	0,000	kg		

ADVANCED PROCESS CONTROL - APC

Control your plant predictively and map your processes using a mathematical model!

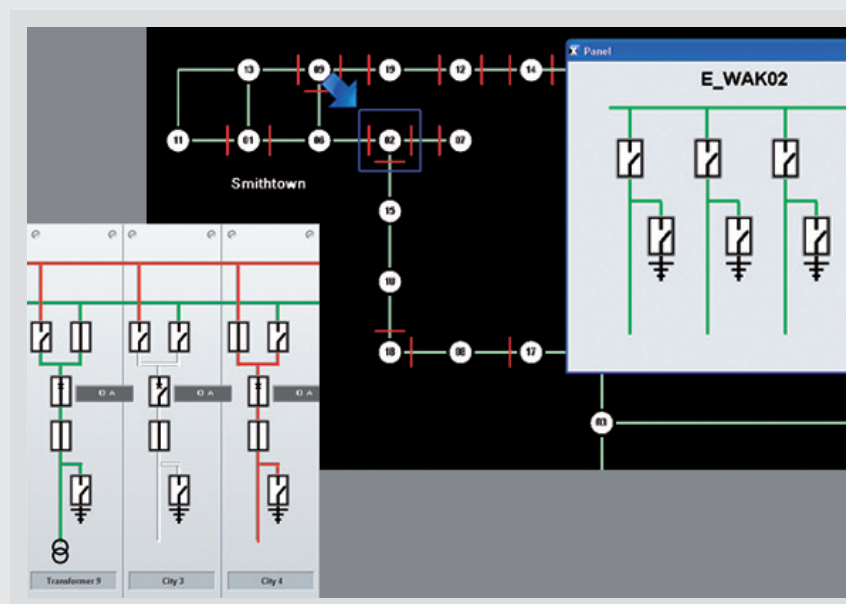
- ▶ Bandwidth control
- ▶ Soft sensors
- ▶ Nonlinear model predictive control
- ▶ Nonlinear optimization
- ▶ Regressive modelling – steady state and dynamic
- ▶ Hard- and soft-constraint handling
- ▶ Consideration of tailor-made cost functions
- ▶ Real time optimization
- ▶ Operator training simulation (OTS)
- ▶ Process condition monitoring



INTEGRATED NETWORK MANAGEMENT & TELECONTROL

Take advantage of a Distributed Control System - design your power line and pipe network and plants with a single tool!

- ▶ Indication-, measurement-, counter value as well as command and set-point value processing
- ▶ Milliseconds accurate time tagging and clock synchronization
- ▶ Communication standards
- ▶ IEC 60870-5-101/104
- ▶ Topological coloring and locking
- ▶ Outage management, fault location as well as earth-fault and short-circuit localization
- ▶ Dynamic training simulator for electrical power grids
- ▶ Load management and consumption optimization for electricity and gas
- ▶ Order management and deployment planning
- ▶ Further higher decision and optimization functions for electricity, gas, district heating and water



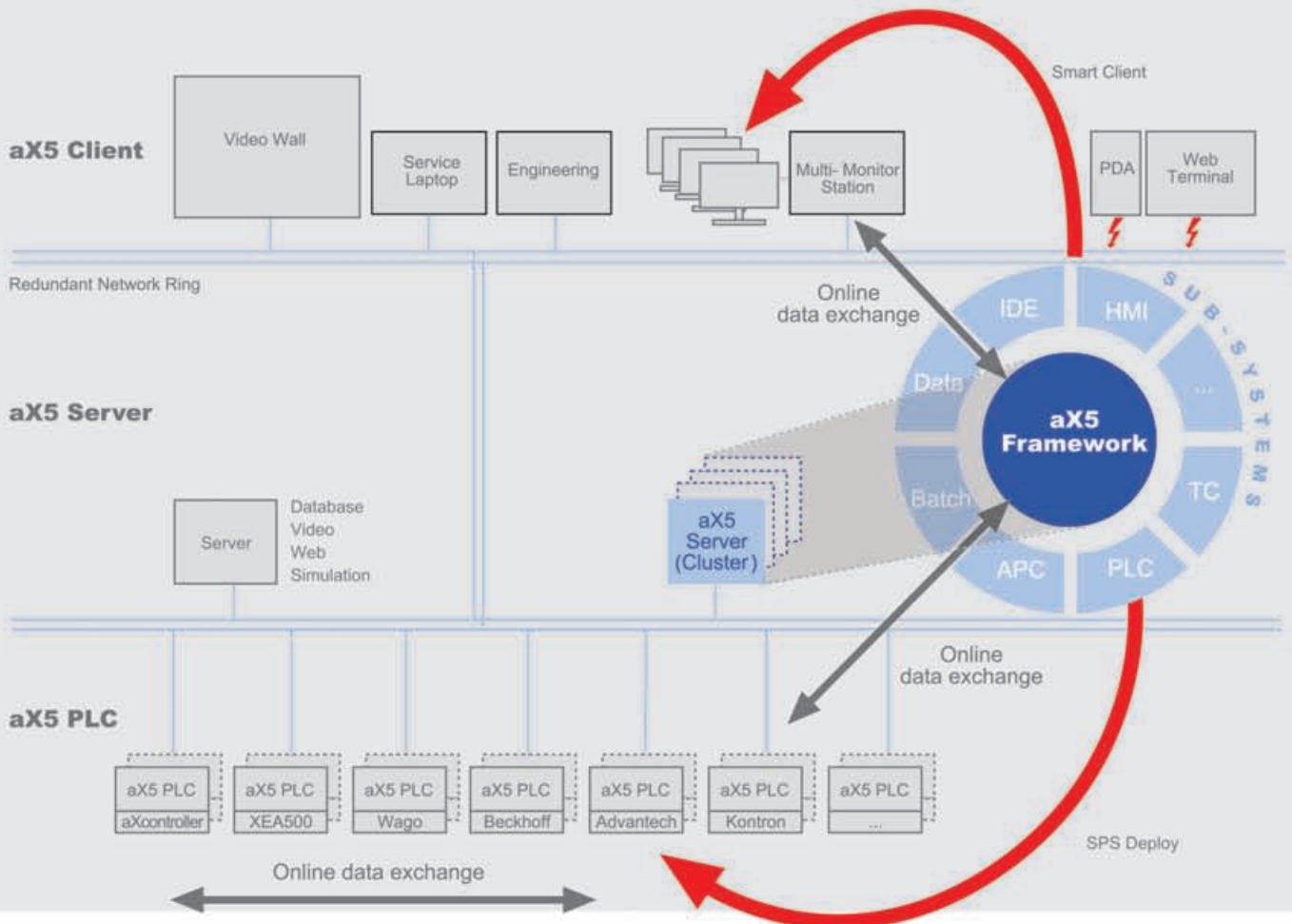
SYSTEM ARCHITECTURE

- ▶ Utilization of Distributed Hardware Resources
- ▶ Centralized System Monitoring
- ▶ High Availability and Data Integrity through Clusters, Redundancy and Field-Bus Concepts

AutomationX is a distributed control system for miscellaneous applications. With the framework a central communication node is established that provides a comprehensive platform for sub-systems deployed to different hardware components. AutomationX is scaleable, that means that for a simple plant all functions are handled by one single server station. This station contains the framework and all required applications for the sub-systems. Large and distributed plants are equipped with an automationX load-balancing procedure for the framework on one hand that shares the load to several server stations (clustering). On the other hand the sub-systems will be deployed to an external and autarkic hardware. Especially for the IEC 61131-3 control the hardware resources and I/O cards of different manufacturers are integrated to form a unique overall system. Only one engineering tool is required, the automationX IDE. Whether the logic controller or, for example, the Profibus system shall be designed redundantly (hot-standby), it is only a effort of a few mouse

clicks – automationX has already implemented these features in the core system. This guarantees a high availability of the system. The data exchange between logic control units is handled by a direct TCP/IP link while HMI applications and other sub-systems request the framework service for data exchange.

The Smart Client stations use their own resources and automatically upload the required application programs. The hierarchical architecture starting with the automation classes and their clear interfaces is continued in single plants represented as a standalone site embedded in a multi-site environment. Each site provides data for other sites in the same way as classes provides data for the process sequence.

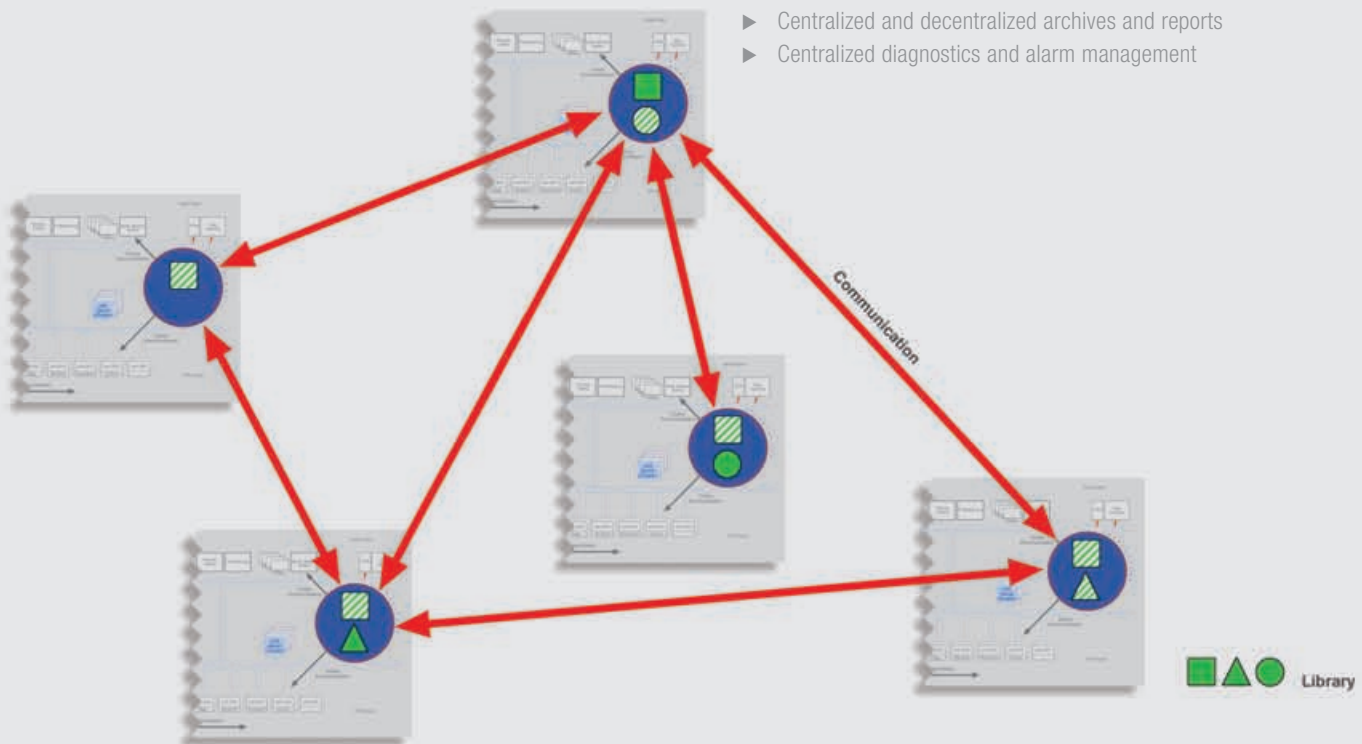


DISTRIBUTED SYSTEMS (MULTI-SITE ARCHITECTURE)

Sites are decentralized and autarkic units to control, visualize and collect data. They are usually part of an entire system managed by a central control room. AutomationX fulfils the integration requirements with the so called "multi-site-architecture". The applications are developed on-site or from a central station and third party systems are linked up through standardized communication protocols. Class- and instance libraries can be shared and will be updated automatically. Superior visualization and management tasks are realized by simple drag&drop

operations without substantial engineering effort. The multi-site-architecture is an integral part of the automationX core system and can also be deployed at existing projects.

- ▶ Autarkic sites (location, craft, production unit)
- ▶ Centralized and decentralized engineering
- ▶ Shared libraries with automatically update
- ▶ Standardized communication protocols between sites
- ▶ Drag&drop engineering of global overview screens
- ▶ Centralized and decentralized archives and reports
- ▶ Centralized diagnostics and alarm management

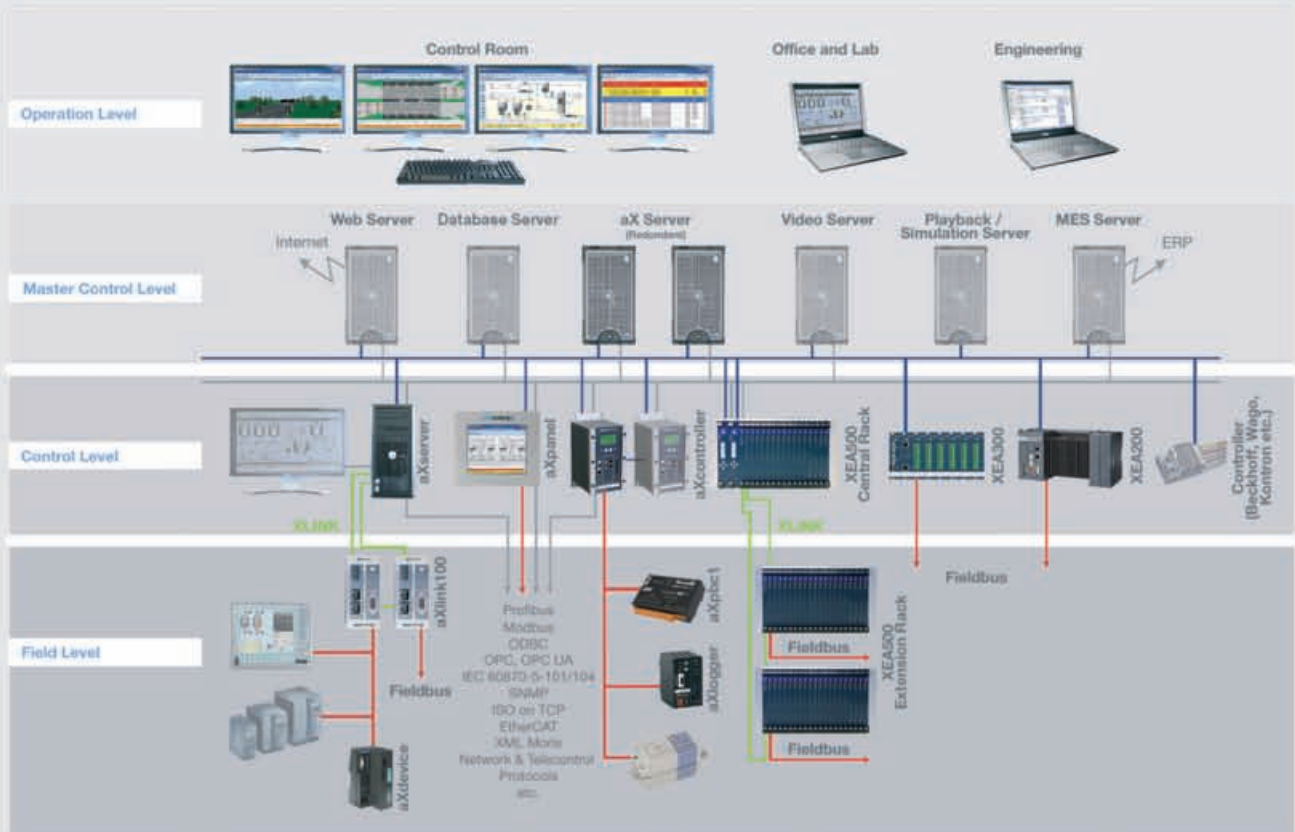


CONNECTIVITY

The open architecture of automationX integrates the DCS into an existing infrastructure. For this purpose standardized interfaces and industrial field-bus-systems are available. Based on license points the automationX system can be online expanded step by step. APIs ensure the integration of customized applications and data processing functions. The continuous development policy of automationX as, for example, for the PROFINET and IEC61850 development and the practical use in our own projects make automationX a state-of-the-art system with a unique integrity and transparency.

- | | |
|-----------------------|-----------------------------------|
| ▶ Profibus | ▶ SNMP |
| ▶ Modbus | ▶ ISO on TCP |
| ▶ ODBC | ▶ EtherCAT |
| ▶ OPC, OPC UA | ▶ XML Moris |
| ▶ IEC 60870-5-101/104 | ▶ Network & Telecontrol Protocols |
| | ▶ etc. |

INTEGRATED COMPLETE SOLUTIONS



automationX
www.automationX.com

AutomationX GmbH
Headquarters:
Teslastrasse 8
A-8074 Grambach / Graz
Austria / Europe
phone +43-316-4000-300
fax +43-316-4000-307
sales@automationX.com