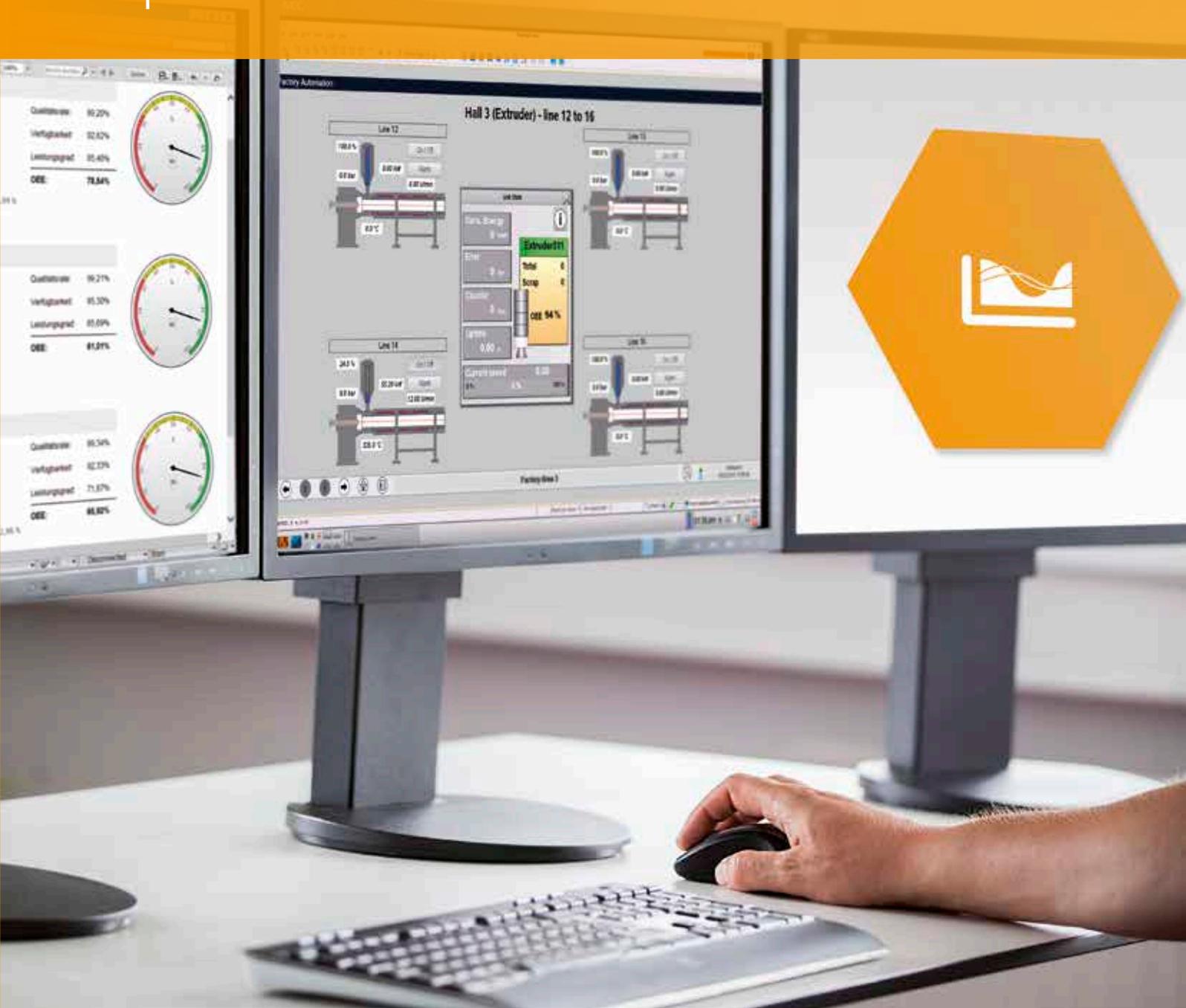


APROL PDA

Monitor and optimize performance online

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP



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APROL PDA – Operate production plants more effectively and efficiently

Operate production plants more effectively and efficiently

In order to continue raising productivity and lowering maintenance costs, machinery and production plants must be connected in increasingly dense networks.



The challenge of big data

Automation technology must address the issue of rapidly growing volumes of data if it hopes to keep pace with the demands of modern production.



Online monitoring of production parameters

Sustained improvements in product quality can only be ensured through online monitoring and statistical analysis. What's needed is full transparency of cause and effect.

Simple real-time data acquisition guaranteed

APROL supports acquisition of raw data directly from the production level in real time. Integrated PDA features make it easy to manage operational and production data for machinery and plants seamlessly in a central location. The solution's scalability makes it possible to implement applications of almost any size with one and the same software – from a small project collecting data from 50 data points to a large-scale PDA implementation with several hundred thousand data points.



BI Suite – a powerful reporting platform

One of the most important components of the BI Suite is the reporting system. A user-friendly report design tool makes it easy to create reports with support for all types of data sources, including MySQL, JDBC, XML and CSV. The APROL SQL server and the optional MySQL database contain all the historic data.



Factory automation made easy

APROL PDA has a number of core components that provide an ideal foundation for factory automation. It can also be expanded flexibly to incorporate additional components.



Line monitoring boosts output

To achieve a competitive level of production efficiency, you need to monitor performance at the production level. Maximum transparency ensures that sources of inefficiency can be pinpointed and eliminated. The increased efficiency in turn boosts production output.



Make well-founded decisions in real time

To navigate the dynamics of hotly contested global markets and respond flexibly to economic forces, companies are in constant pursuit of savings at every stage of the supply chain. APROL's Business Intelligence Suite provides the framework for a manufacturing information system and offers key performance data to help identify potential for optimization.



Produce more effectively and efficiently

Virtually every production plant has some way in which it could be operated more effectively and efficiently. With its ready-to-use APROL PDA solution, B&R offers a powerful platform that allows companies to tap this potential easily and conveniently.

Complete networking of all machines and plants plays an indispensable role. From delivery of raw materials to production, packaging and shipping, APROL PDA seamlessly captures operational and production parameters such as environmental conditions, quantities, power consumption, duration, waste and

more. APROL PDA then helps operators analyze the recorded data and implement appropriate corrective measures.

Efficiency in machine manufacturing

Plant operators aren't the only ones looking to maximize efficiency and effectiveness. The goals of continuous, highly reliable operation with minimal downtime and maintenance are shared by machine manufacturers as well. To achieve these goals, both plant operators and machine manufacturers rely on systems for energy monitoring, condition monitoring and process data acquisition.



Dense networks of sensors, transmitters, machines and plants are indispensable when it comes to boosting efficiency and effectiveness.

Flexible structure and ultimate scalability

Based on the APROL process control system, B&R now offers APROL PDA, a ready-to-use solution that comes preinstalled on an Automation PC 910. The APROL automation platform guarantees maximum flexibility with minimal engineering effort.

Collecting process data is much easier with APROL PDA than with comparable solutions. Not only controllers programmed with B&R Automation Studio, but also third-party controllers, can be connected via standard fieldbus protocols.

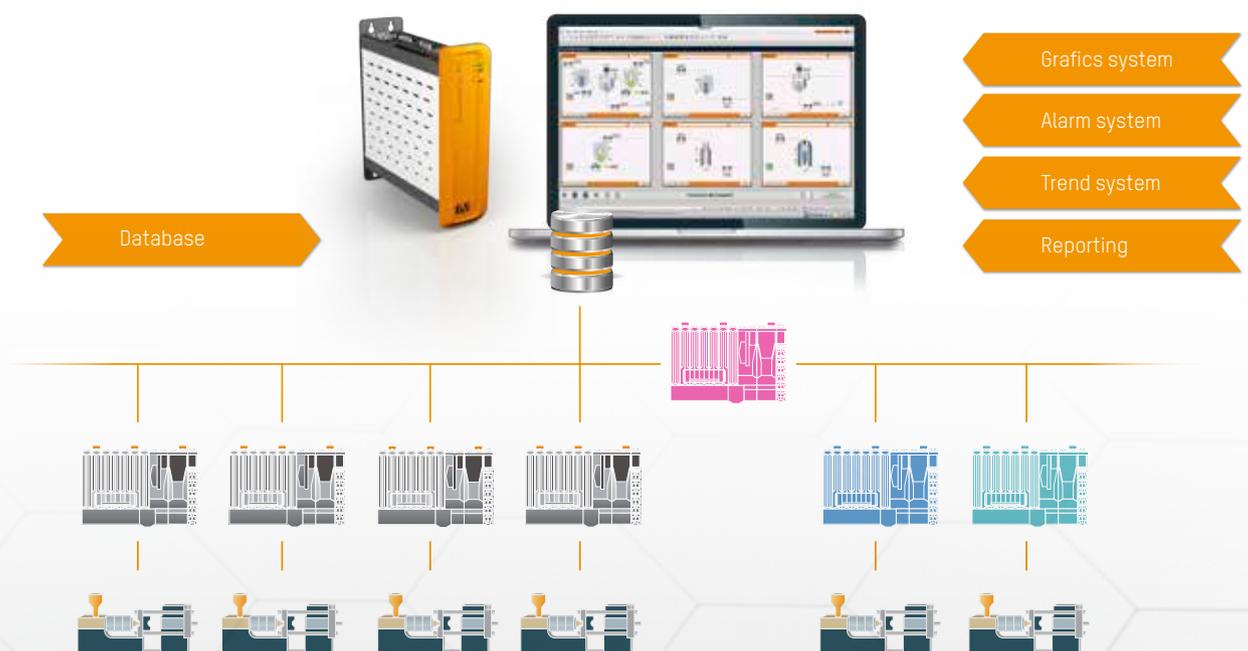
50 to 500,000 data points

With the APROL process control system as its underlying platform, APROL PDA is completely scalable and equally suited for the smallest applica-

tions with 50 data points or large-scale PDA implementations with several hundred thousand data points. This ensures exceptional long-term protection of your investment. Thanks to its flexible scalability, the system can grow to meet new challenges.

Connectivity via Ethernet TCP/IP – Fieldbus modules – I/O modules

Controllers programmed in Automation Studio can communicate directly with APROL via gigabit Ethernet. Third-party controllers can choose from a broad selection of fieldbus modules. If additional data points are needed, they can easily and inexpensively be incorporated via remote I/O modules.



Machines with B&R controllers can communicate directly. Third-party controllers are integrated via a gateway controller.

The challenge of big data

Studies on the topic of big data forecast up to 40% annual growth in the volume of data generated worldwide. Market trends such as the Internet of Things generate enormous quantities of data – demanding powerful analytical tools to filter useful information from the flood of raw data.

Data is more diverse

In the past, logical states, counters, physical parameters and product IDs were generally provided in IEC data types. Today, a growing share of data is provided in a wide variety of non-IEC data types such as PDF, image and video format.

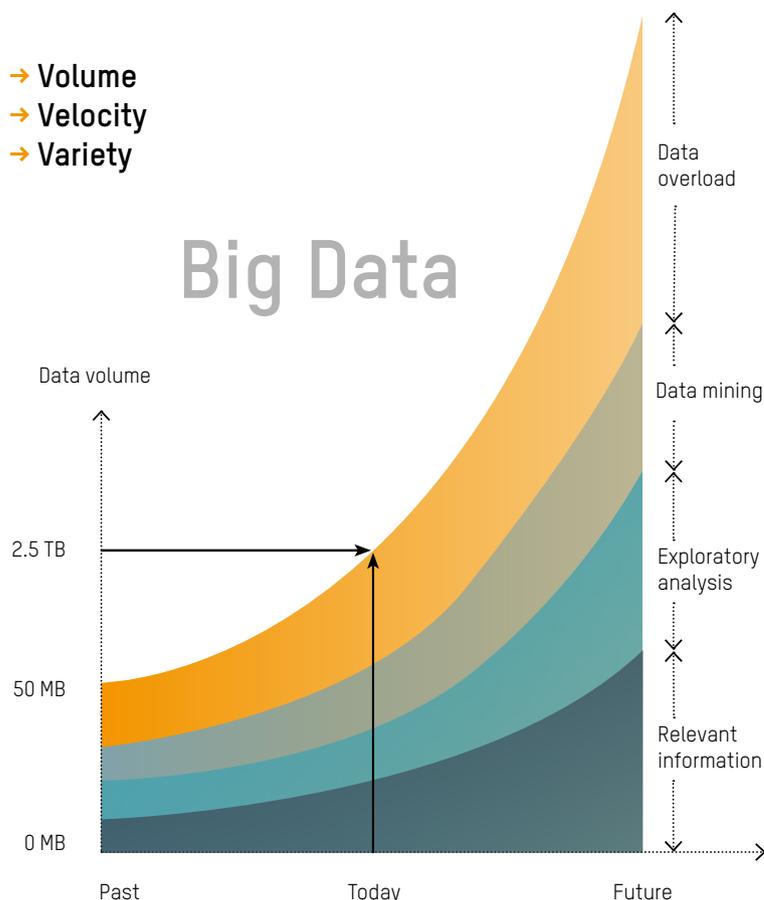
Data is moving faster

Faster transmission rates (Gbps instead of Mbps) should not be underestimated as a factor contributing to increased data volumes (terabytes instead of megabytes). Today's controllers come standard with gigabit interfaces, which allow data to be transferred and archived extremely quickly.

A comparison between today's systems and those of the previous generation shows a massive increase in data volume, with a clear drop in the proportion of relevant data.

All it takes to get an idea of how quickly things are progressing is to compare the volume of data handled by today's process control systems to what the previous generation had to deal with. In the mid-term, managing this sharp increase in data will prove to be one of the greatest challenges for plants of all sizes.

- Volume
- Velocity
- Variety





Data is unstructured

The majority of data generated in a company exists in a completely unstructured form. Before it can be analyzed, it must first be prepared, filtered and structured.

This systematic analysis is crucial to obtaining clear, actionable information from the sea of raw recorded data. And well-informed decisions are the only way to achieve a sustainable increase in productivity.

Ad-hoc reports

Different users with different responsibilities need personalized, interactive reports. That's why ad-hoc reports are becoming increasingly popular as a supplement to standard reports. They give users valuable information and can even be viewed on mobile devices.

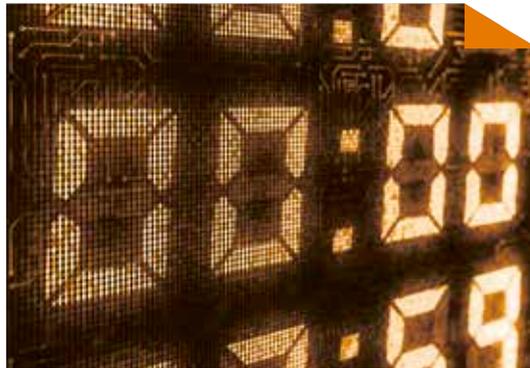
Highlights

- One of the dangers of big data is that relevant data can get lost in the shuffle.
- Raw data must be prepared, filtered and structured in order to be useful.
- Processes must be defined to systematically analyze these huge volumes of data.
- Methods such as Online Analytical Processing (OLAP) and data mining make it possible to filter relevant information out of raw data.
- Personalized ad-hoc reports supplement standard reports and allow for exploratory analysis that can provide additional insight for decision-making.

Real-time acquisition of relevant production data

Modern manufacturing processes demand extremely high levels of precision. Consistent monitoring and statistical analysis are the only way to ensure maximum product quality.

APROL PDA supports acquisition of raw data directly from the production level in real time. Centralized, seamless acquisition of operating and process data from machines and equipment is now much easier. APROL PDA has a PDA browser, PDA function blocks and a PDA visualization element.



Corrective measures are only effective if implemented at the right time. Online monitoring delivers the information you need, when you need it.

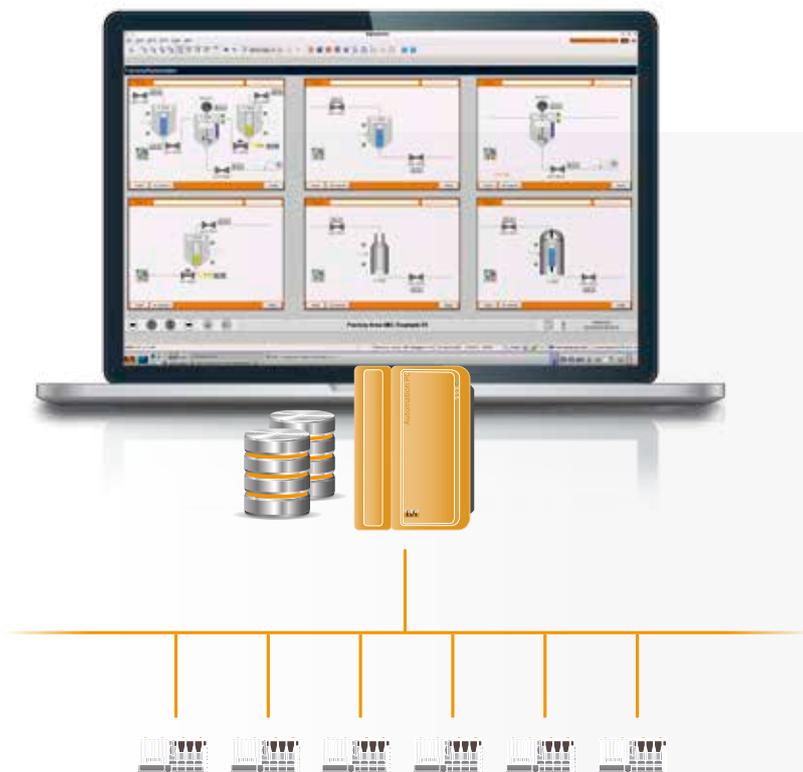
Scalable, flexible, redundant

APROL PDA is easy to configure, fully scalable and perfectly suited for implementation by OEMs. For solutions demanding higher levels of availability, APROL PDA also supports redundancy. APROL PDA can be implemented centrally for

multiple production lines, or as a distributed solution with an autonomous APROL PDA system for each line. APROL PDA can be used on its own as an off-the-shelf solution or as an integrated component of an overall APROL system

Highlights

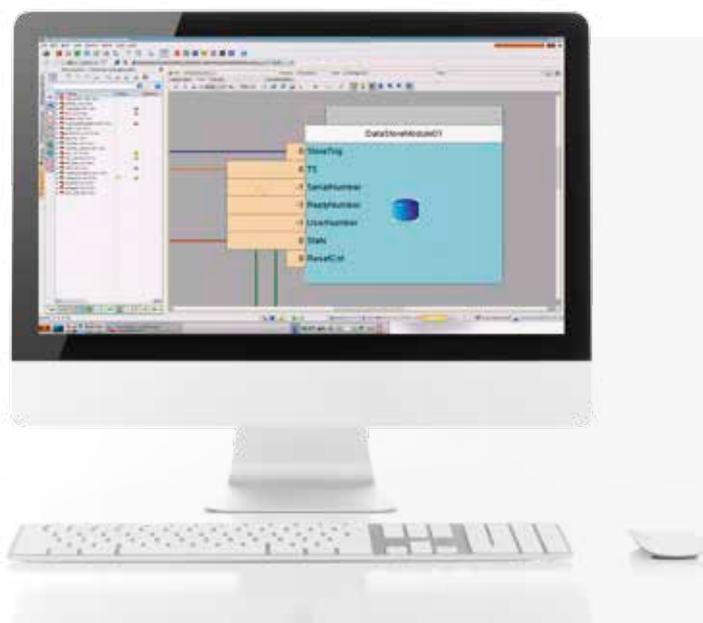
- Acquisition and archiving of all process data
- Systemwide online performance monitoring and visualization
- Correlation analysis with all other data (from any database)
- Powerful and robust long-term archiving
- Quality certification for the entire manufacturing process
- Highly flexible reports with integrated analysis functions
- Production optimization (OEE, downtime analysis, "Down Time Loss", etc.)
- Combined display of data, alarms and events in the TrendViewer to trace cause and effect



PDA browser reads all available data points

The new PDA browser provides read access to all data points on a B&R controller without having to open the Automation Studio project. This allows all machines with B&R controllers to be integrated in the PDA browser.

The PDA browser reads all the data points (structures, variables) that are available on a B&R controller.



Easily defined SQL table structure

The new PDA function blocks make it very easy to define the required data archive on the APROL SQL server in a simple block language. The pin layout of a scalable function block is used to automatically define a table structure on the APROL SQL server.

SQL tables are defined using a logic function block. There's no need for the SQL expertise of an IT specialist.

Monitor sites around the world

APROL PDA allows you to monitor numerous sites spread all around the world. The local projects all communicate with a central master project. The individual projects can even have a different release numbers and software versions.

Each location is equipped with an autonomous APROL PDA solution. All monitoring and management functions run directly on site. Poor network connections or low bandwidth do not affect functionality. Local storage of all collected data helps prevent loss and ensure that data is available for analysis at any time.

Shared database

Each of the local APROL PDA installations continuously forwards data to the central system, where it is maintained in consistent form in a shared database.

Direct access to subsystems

Via Linux remote shell access, the master system has direct access to all the functions of the local systems.



A decentralized distribution of systems across sites ensures absolute independence from the availability of the network.

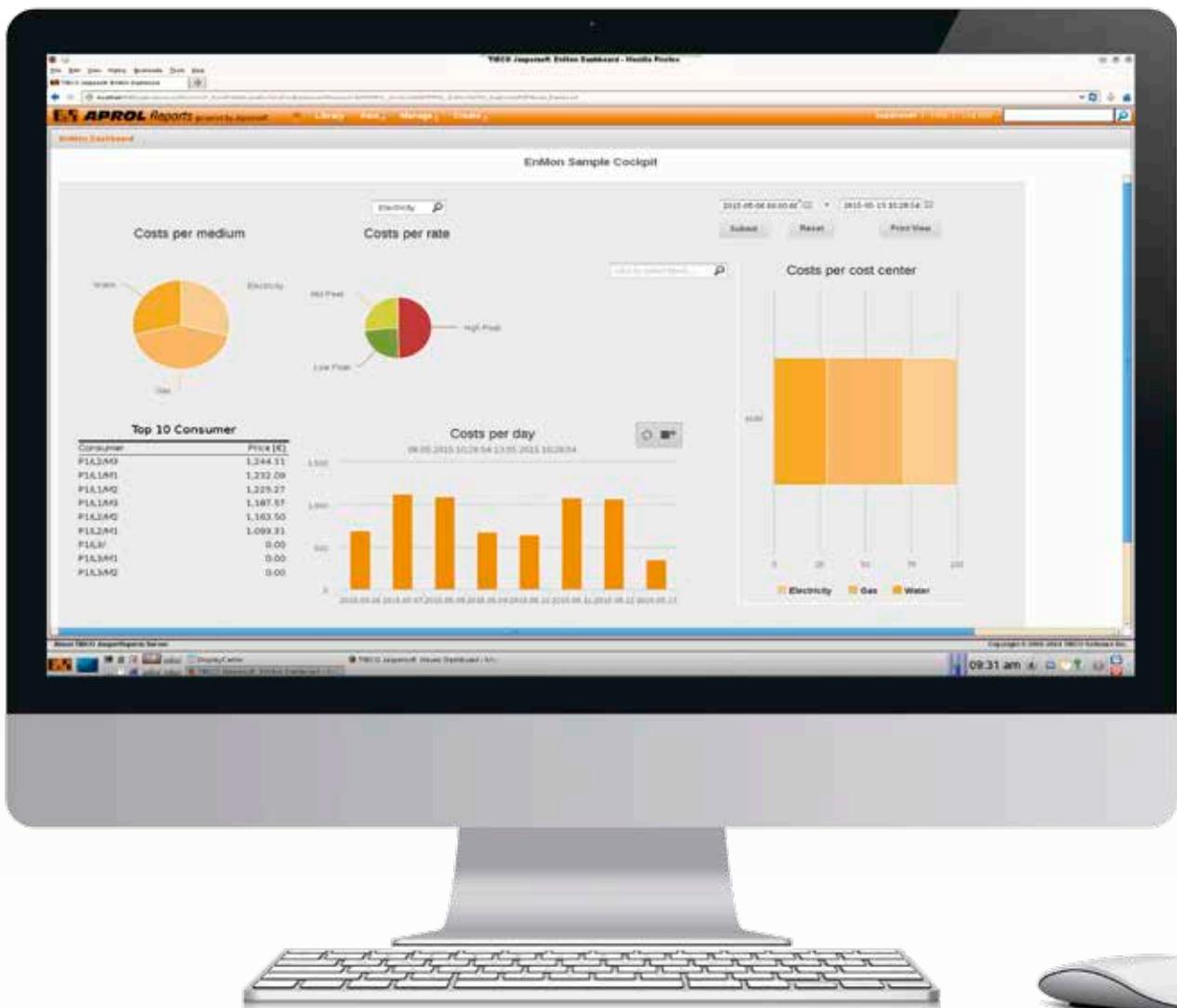
Dashboard

Like a pilot's cockpit, the APROL PDA dashboard provides a quick and intuitive overview of key data in speedometers, line diagrams, traffic lights and maps.

Dashboard software makes it possible for users to combine data and graphic indicators and consolidate important information. Multi-report dashboards can also be created using both internal and external data.

Web-based design tool

Each user can create personalized dashboards by dragging and dropping components in an easy-to-use, web-based design tool. The dashboards can then be modified interactively, giving users the flexibility to quickly optimize the way they view and analyze their data.



Mobile data analysis

With the corresponding app, dashboards and reports can also be viewed on iOS and Android mobile devices. With a touch-capable browser, users can also design custom reports and perform interactive analysis on tablet devices.

With secure and convenient mobile access via smartphone or tablet, you'll never be caught making decisions based on old data.

Security through server-side authentication
 The necessary security for smartphones and tablets is guaranteed through server-side authentication.



Ad-hoc reports allow for exploratory analysis of collected data with flexible selection of data sources, data levels and extensive filter functions.

Process graphics for a perfect overview

APROL PDA allows you to create optimized overviews for machines, lines, systems and subsystems in order to maintain a clear view of all processes.

Simply drag and drop interactive graphic macros into place, and all the right data is available ex-

actly where you need it. Clicking on the macro for a machine, opens up the associated faceplate showing all the available details for that machine. Another click brings you to the associated trend curves and alarms. With an image tree you can build whatever type of hierarchy best represents the system at hand.



Process graphics provide intuitive navigation to both details and aggregate information.

Transparent trends

APROL TrendViewer plots both continuous process data and event data (alarms, notifications, switching operations, comments) in one graph. This helps operators identify correlations between different types of variables, such as increased vibrations due to peaks in power consumption.

APROL's powerful trend system combines an extremely powerful and low-maintenance database with sophisticated web-based query technology.

Extensive functionality all in one tool

- Integrated analysis functions
 - Convenient use of time offsets for analysis
 - Trend curve as a reference curve
 - Multivariate analysis for determining the "golden batch"
 - Configurable limit values
 - Automatic scaling
 - Combined historical mode and online mode
 - Forecast data
 - Horizontal or vertical time axis
 - Single-zone diagram and multi-zone diagram
 - X/Y diagram
- Optimized display of access labels
 - Interactive scaling with the mouse and keyboard
 - Markers (alarms, interaction, etc.)
 - Entering comments



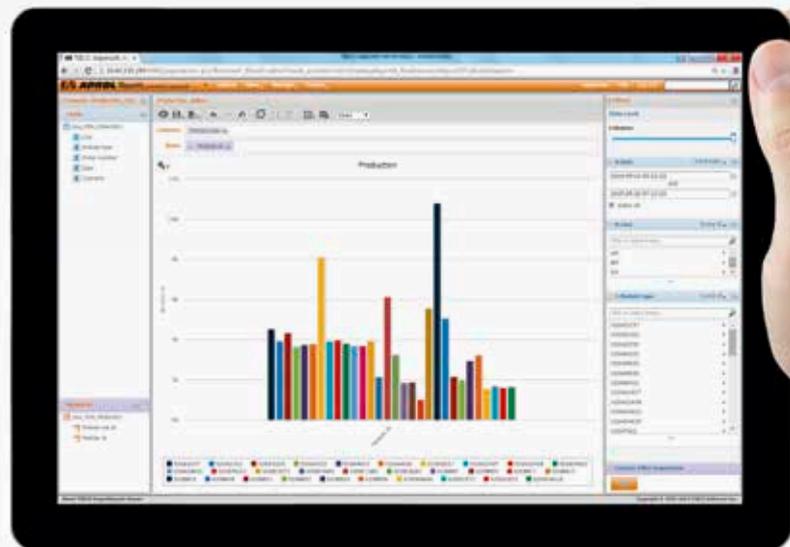
TrendViewer offers a wide range of possibilities for analyzing signal curves down to the finest detail.

APROL SQL server for seamless product tracking

Many industries require that the items produced are tracked seamlessly throughout all stages of the process chain. International standards and regulations (21CFR11, FDA, EU regulation 178, etc.) place strict requirements on producers of

foods, beverages, pharmaceuticals, packaging material and safety-related parts with regard to traceability and documentation of all raw, auxiliary and operating materials used.

Seamless production records are essential to providing full traceability in the event of claims or disputes.



To provide seamless production records, all relevant details are saved to the APROL SQL server throughout every stage of production. This data provides the basis for tracking and tracing. One of the ways that APROL safeguards against tam-

pering is by only allowing read access to this data. Highly flexible reports with integrated analysis functions provide support for production optimization. A comprehensive production record can be generated at the push of a button.

Recorded data

- Machines and tools used
- Quality data (test equipment, measurements, etc.)
- Operating materials, raw materials, auxiliary materials
- Calculated process and machine data
- Personnel involved (machine operator, etc.)
- Descriptive attributes for items (production data, weight, etc.)



Record a full description of every action: time and date of changes, operator login, device, project ID, APROL system, server and operator terminal, controller action, old and new values, alarm and alarm group, event/function, comment/reason for change, image description and display driver function block, web access and modified process variables, parameter set, ParameterCenter mode, reason for change, category and name of changed protocol data.

Additional authentication for interactions

It is possible to configure double authentication (2-man rule) and use advanced electronic signatures for PDF reports to identify and prevent attempted manipulation.

Traceability through comments

The ability to add comments for switching operations that require confirmation in the HMI application satisfies requirements such as those in FDA 21 CFR Part 11.



For advanced traceability, operators can be required to enter explanations or provide double confirmation (2-man rule) for switching operations.

Manufacturing and plant intelligence

The highly advanced and flexible APROL automation platform features a powerful solution for business intelligence (BI). Jaspersoft BI Enterprise Edition is seamlessly integrated.

Business intelligence enables systematic analysis of recorded operating and process data. Users can gain valuable information for the decision-making process with the help of standard reports, personalized interactive reports and ad-hoc reports. Native iOS and Android apps are available for mobile access.

Growing market interest

Demand for business intelligence solutions is growing constantly. One reason for this can be traced to market trends such as the Internet of Things, smart factories and Industry 4.0. Suitable analytical tools are needed to handle the increasing volumes of data being generated. Another source of demand is that the reporting and analysis features of existing ERP and MES solutions are unsuitable for operators who are not IT specialists.

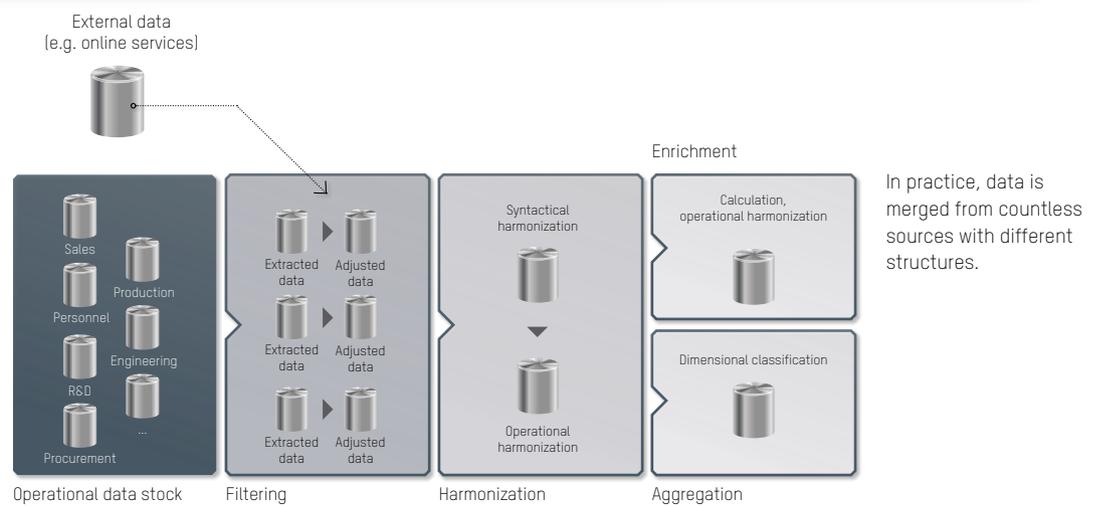
The modular APROL BI platform is comprised of ETL, OLAP and Report servers.



Business intelligence

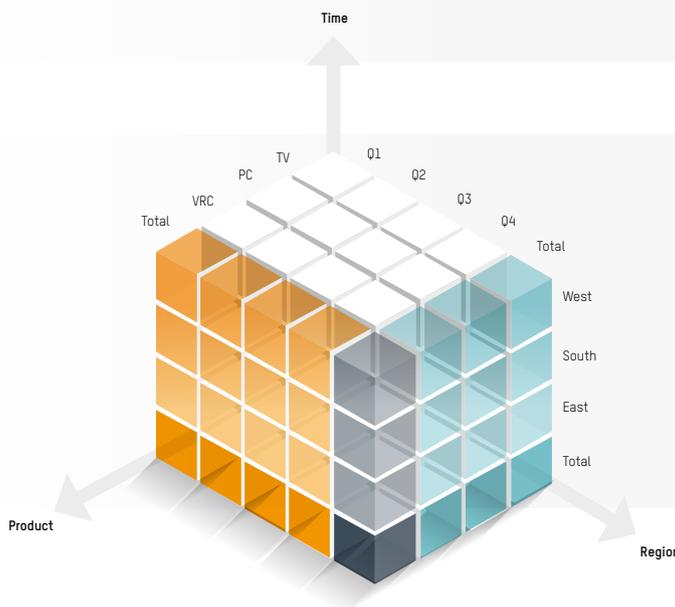
- Originating in the area of business management, the term "business intelligence" has been around since the beginning of the 1990s. Business intelligence refers to the procedures and processes necessary to systematically collect, analyze and present data in electronic form.

The three phases of a business intelligence solution:



1. Collection – ETL (extract, transform and load)
 The first step is to collect the necessary data. Raw data can come from an ERP system, database or file. Before it can be analyzed, raw data must first be filtered, cleaned up and collated.

2. Analysis
 The next phase is analytical processing. Basic analysis can be performed using OLAP cubes (On-line Analytical Processing). Complex statistical analysis is carried out using data mining methods.



3. Presentation
 APROL PDA offers numerous options for organizing and displaying data in graphic form.

Arrays of data known as OLAP cubes are used for analytical processing.

Business intelligence reports

A user-friendly report design tool makes it easy to create, format and distribute reports for a standard browser or mobile devices using drag-and-drop. The data for the reports can come from all types of sources, including MySQL, JDBC, XML and CSV.

All recorded historical data is saved on the APROL SQL server and available to the BI reporting system at any time. Optionally, the data can also be saved in a MySQL database.

Online Analytical Processing (OLAP)

(separate license required)

The optional OLAP server can perform basic

analytical processing. The integrated Mondrian ROLAP engine supports Microsoft SQL Server Analysis Services.

ETL server

Data integration software

(separate license required)

The ETL server data integration software extracts, transforms and loads (ETL) data from various relational and non-relational databases into a data warehouse, where it can be accessed for reports and analyses. This ETL functionality currently offers over 450 data connectors and native integration with ERP and CRM applications like SAP and SugarCRM.



The report server is fully integrated in the APROL runtime system. Optional additional servers and the data warehouse run on separate hardware.

Data preparation

Following analysis, the data is prepared for presentation in the form of reports, PDF files or dashboards. The user can specify exactly which data should be prepared at any given time. Compiling individual reports is as easy as using drag-and-drop. A manager may want boiled down, summarized performance data, while a process engineer can call up detailed information about an individual process.

Standard reporting

Standard reports adhere to predefined format and content, though the type of diagrams used can easily be changed.

Ad-hoc reporting

The user determines how the layout should look when the report is generated. Self-service analytical solutions allow data to be queried easily and interactively to provide the valuable information necessary to make the right decisions.

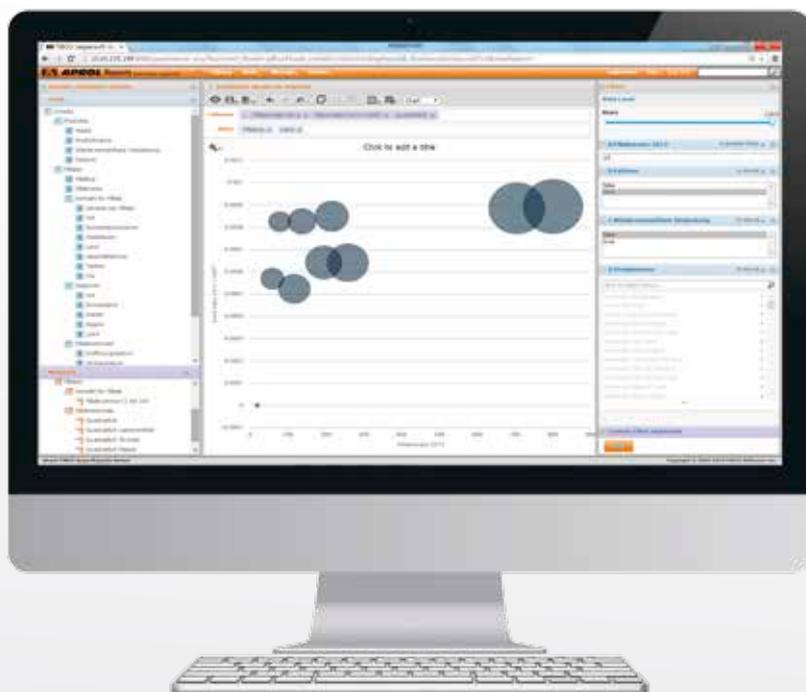
Interactive reports

Interactive reports with perfectly reproduced diagrams and tables can be created for print or online display in no time flat. A browser-based, interactive display tool can be used for filtering and sorting as well as changing column formats and saving data to the report repository.

Many export formats

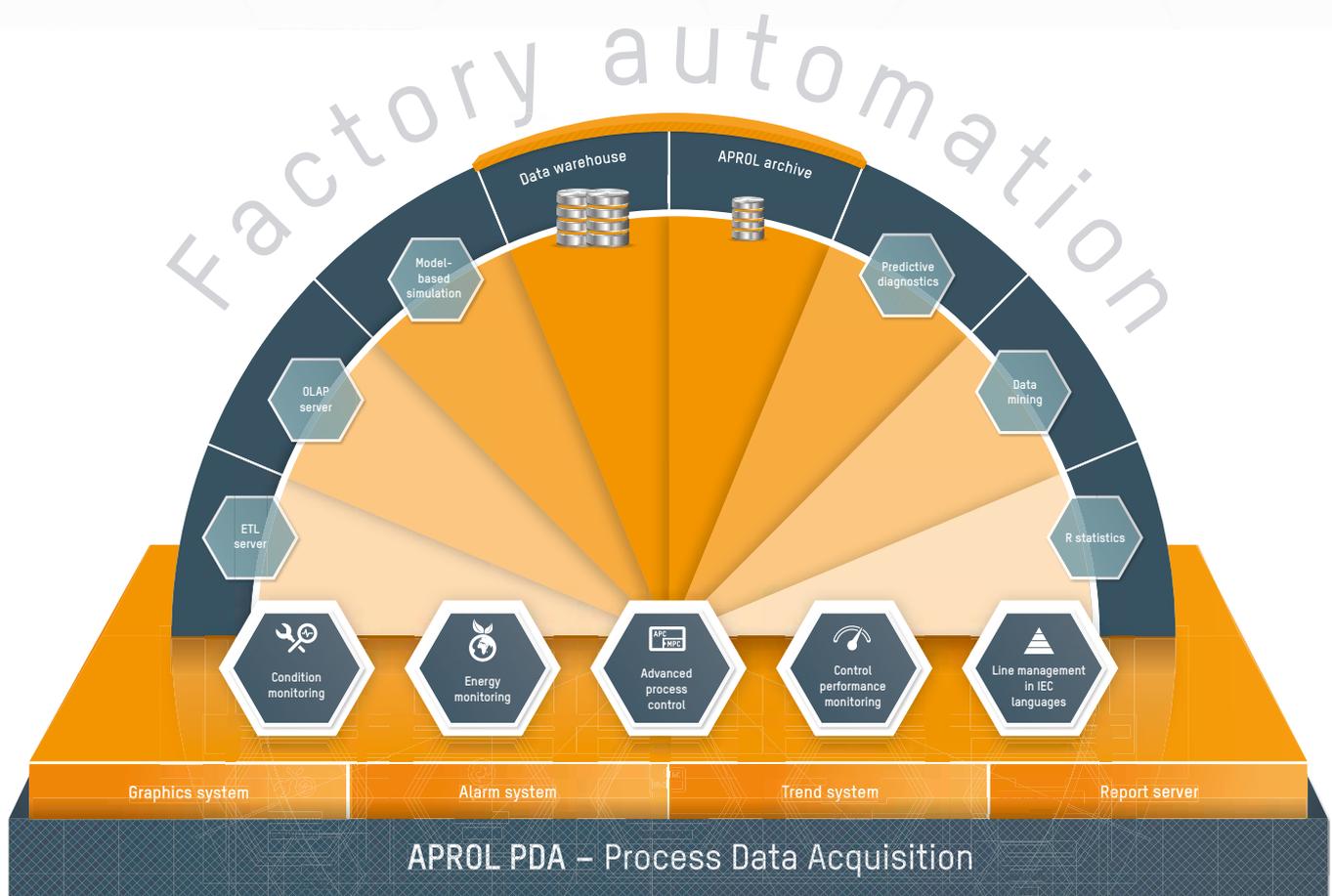
Reports can be published (exported) in many formats, including: PDF, XLS, XLSX, XML, HTML, XHTML, CSV, DOC and ODT. This gives users maximum freedom in choosing how to use the data provided.

Ad-hoc reports allow for exploratory analysis of collected data with flexible selection of data sources, data levels and extensive filter functions.



Factory automation

APROL PDA provides an ideal foundation for solutions in the area of factory automation. Plug-ins in the form of APROL solutions or 3rd-party applications can be added to customize the functionality to each user's unique requirements.



The APROL PDA platform provides core components for system engineering, trend analysis, alarm management, graphic display and reporting. Additional plug-ins can be integrated at any time.



Condition monitoring

APROL ConMon is a perfect solution for optimizing your maintenance costs. In addition to significantly reducing costs, it also helps improve product quality and equipment availability.

Condition-based maintenance utilizes information about the condition of your production equipment to optimize maintenance scheduling - ultimately boosting production quality while minimizing maintenance costs. Intelligent maintenance that begins long before a machine or system malfunctions is known as predictive maintenance. Large volumes of heterogeneous data are aggregated and mined to predict the ideal time to schedule maintenance work.



Energy monitoring

APROL EnMon is an energy management system in accordance with ISO 50001. In addition to reducing energy costs and helping to identify correlations between energy and production costs, APROL EnMon can also help prevent unplanned downtime and switch consumers on and off based on the availability of electrical power.



Advanced process control

APROL APC provides simple, efficient and safe automation for complex production processes. Advanced Process Control (APC) makes it possible to control systems more precisely and make better use of processing resources. When faults are corrected faster, the setpoint can be reached again more quickly and can be moved closer to the operating limits. Actuators are also subject to less wear since the manipulated variable has a lower variability.



Control performance monitoring

APROL APC also offers a tool for monitoring the performance of closed control loops. This can help identify creeping degradation of control quality so that control parameters can be optimized or maintenance performed. Studies have shown that two thirds of control loops are either set poorly or require periodic manual adjustment to maintain stability. In these cases, control performance monitoring offers significant potential for savings.



Line management (IEC language based)

Commercially available discrete-event simulation tools can be used to generate digital models of production systems and their processes. These models make it possible to study the properties of the system in order to optimize its performance. Optimization measures can be implemented in IEC languages, with the higher-level logic (Continuous Function Chart, ANSI C) that handles coordination runs directly on the APROL PDA control computer.



ETL server

ETL server

The ETL server extracts, transforms and loads raw data in preparation for analysis. Before it can be analyzed, raw data must first be filtered, cleaned up and collated. Raw data can come from an ERP system, database or file. APROL supports connections to virtually any data source.

Among the many applications supported are sources of big data such as NoSQL. ETL also provides native connectivity to databases, application packages (ERP, CRM, etc.), SaaS and cloud applications, mainframes, files, web services data warehouses, data marts and OLAP applications.

OLAP server

OLAP server

Online Analytical Processing (OLAP) is a hypothesis-based approach to business intelligence analysis. The results of the analysis either verify or reject the hypothesis. The OLAP server generates an OLAP cube based on the data it draws from a data warehouse.

Model-based simulation

Model-based simulation

Industrial production systems involve large numbers of different components with complex interactions. The better that these interactions are understood, the better a company is able to automate them in a way that maximizes its competitive edge. Modeling and simulation can help identify and utilize potential for optimization in both planned and existing production sites.

Predictive diagnostics

Predictive diagnostics

APROL ConMon provides a broad range of condition-based maintenance features. If specialized predictive diagnostics methods are required, they can be added as a separate plugin.

Data mining

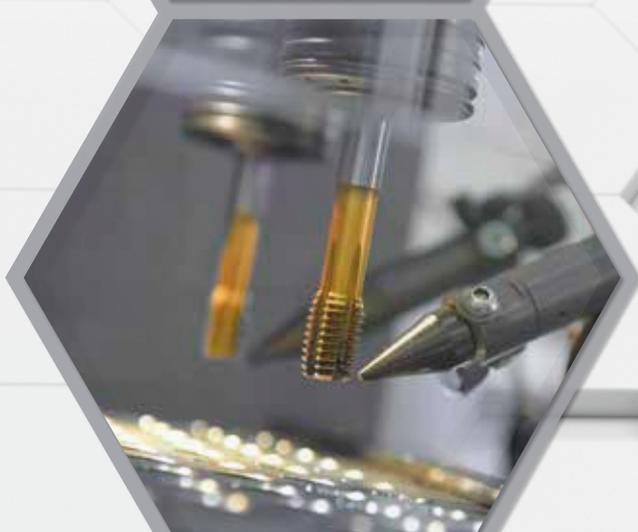
Data mining

Data mining is used to identify patterns and correlations in large data sets. The goal is to extract information that could not be detected through conventional analysis. Data mining allows users to discover patterns and trends without searching for them explicitly.

Statistics

Statistics

Statistical data analysis frequently relies on the R programming language. R offers a large library of functions that can be used for statistical analysis and graphical representation. The library is constantly being expanded with new functions.



Line monitoring increases production output

To achieve a competitive level of production efficiency, you need to monitor performance at the production level. Maximum transparency ensures that sources of inefficiency can be pinpointed and eliminated. The increased efficiency in turn boosts production output.

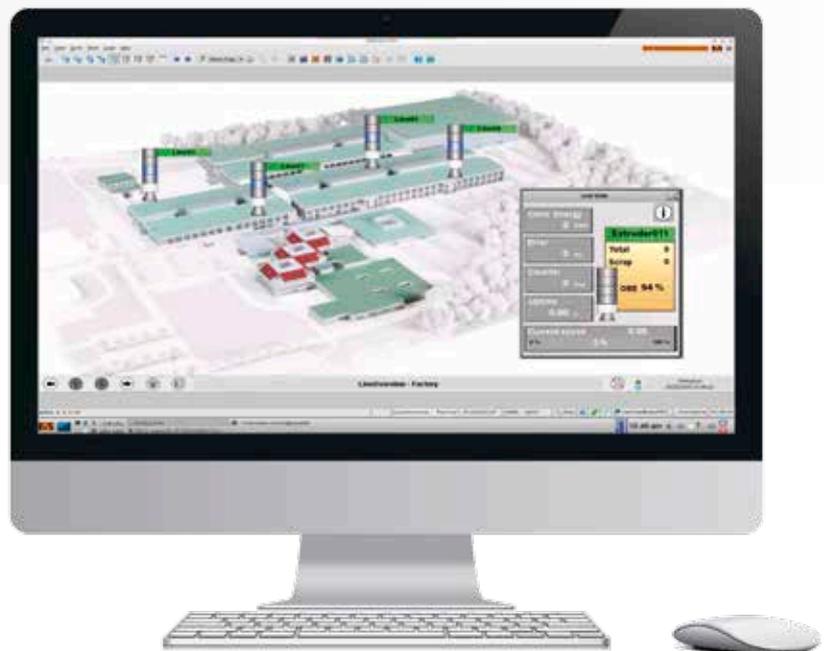
APROL PDA structures machines, lines and plants according to the PackML state model derived from the S88 state model.



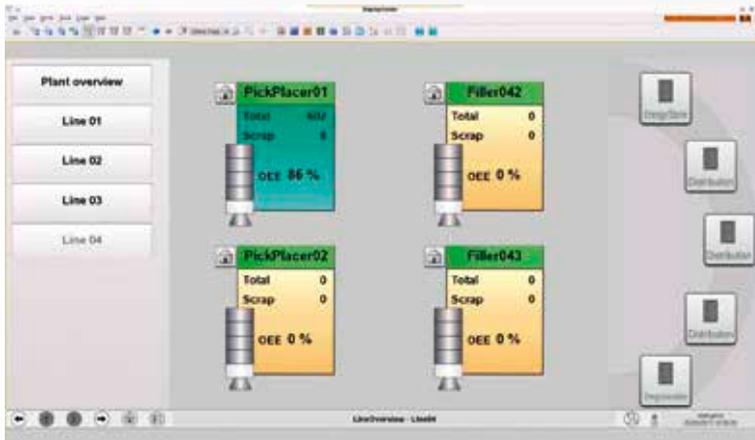
The PackML state model was derived from the S88 state model and divides the structure into clearly defined levels.

Plant level

APROL PDA can be used to monitor one or more lines of integrated machines. A clear overview of the entire plant, including aggregated status signals, makes it possible to assess the state of individual production lines or an entire plant at a glance. By optionally displaying the overall equipment effectiveness (OEE), operators can easily identify deviations and call up detailed information at the click of a mouse.



The overview graphic shows the entire plant and the key aggregated status information.



Line level

The individual lines are shown in line control modules. The OEE, total production output and total scrap are shown for each line.

For each line, the display indicates the OEE level, total output and scrap.



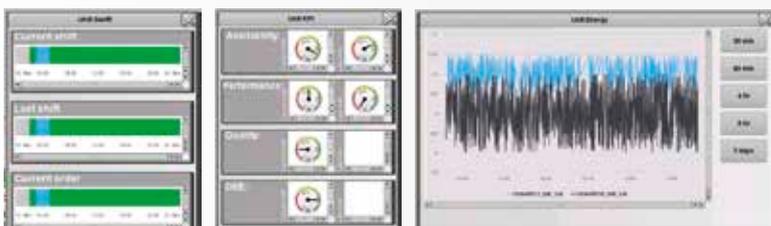
The faceplate shows the key data for each machine and can be used in virtually any industry.

Machine level

Each machine has its own faceplate that displays the following data:

- Energy consumption
- Most recent error
- Quantity counters (total and scrap)
- Uptime

The machine's speed is shown both numerically and graphically. If the permitted range is violated, the color of the graphic changes.



Sub-faceplates show detailed and aggregated data in clearly organized graphics.

Detailed information

Any relevant details can also be displayed, including energy consumption, OEE, machine mode/status, product names, parameters, etc. over time.

In addition to absolute and relative values, it is also possible to display various illustrations, such as a Gantt chart.

Simple integration of machine visualizations

The APROL VNC viewer allows you to display multiple HMI applications simultaneously in a single process graphic.

The individual applications can be scaled as needed, independently of the respective platform. A web widget is also available that allows web pa-

ges to be embedded, for example for HMI applications based on HTML 5, IP cameras and business intelligence reports.



APROL PDA provides a wide range of options for displaying and presenting data. Multiple machine HMI applications can even be displayed on a single dashboard.

Easy integration with PackML

The PackML machine data interface makes it easy to implement a convenient monitoring and management system for line operators with minimal engineering. The machine data interface is frequently taken into account when designing plants and awarding contracts to machine manufacturers.

The standard PackML machine data interface contains control modules for machines and lines that provide convenient access to relevant details. Faceplates and sub-faceplates display key data and important details.



The control module offers a transparent view of individual machines and the overall line.

Based on the history archive

Archiving of continuous process, operating and production parameters can be tailored to the needs of any machine manufacturer or plant operator. The foundation is provided by the integrated APROL trend system. PDA function blocks make it very easy to define the required data archive. Discrete data (batch data, operator data, etc.) can be archived in any of the APROL SQL server's table structures using PDA blocks.

Highlights

- Higher-level system for line integration
- Transparency across all plant levels through detailed and aggregated information
- Universal support for OMAC's PackML standard
- PackML machine data interface control modules for simple and fast line integration
- Drag-and-drop analysis using the integrated report server
- Maximum availability through optimal perspective
- Reduced downtime

Make well-founded decisions in real time

To navigate the dynamics of hotly contested global markets and respond flexibly to economic forces, companies are in constant pursuit of savings at every stage of the supply chain.

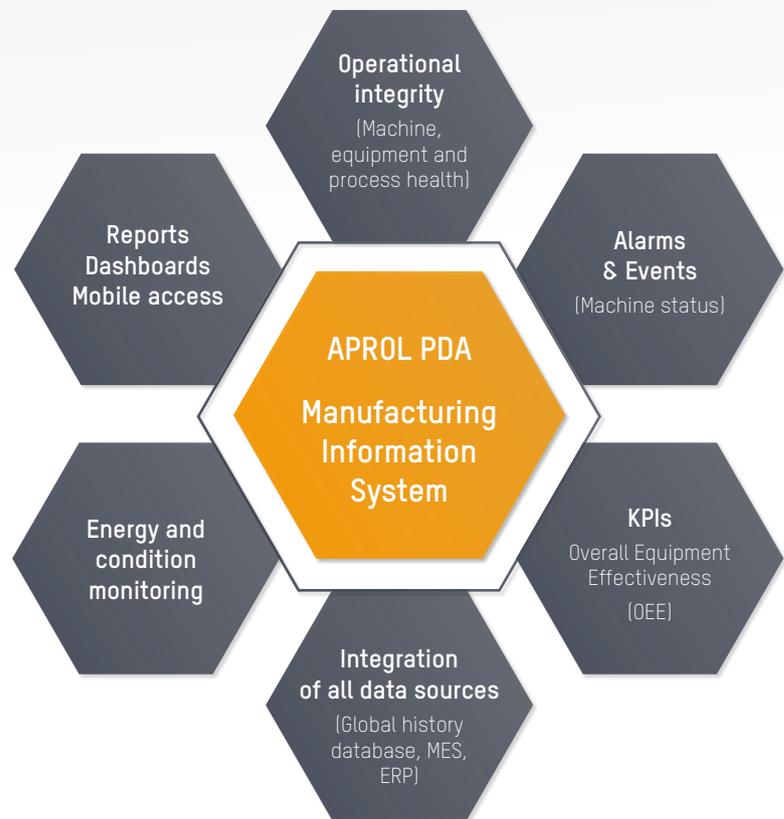
History archive provides basis for real-time decisions

Along with operational improvements, one of the keys to savings and optimization is the ability to make well-founded decisions in real time. The APROL PDA history archive holds all recorded production data and serves as a solid foundation for these real-time decisions.

APROL BI Suite provides the framework for a manufacturing information system

The report server has unrestricted access to all data in the APROL PDA history archive.

In addition to evaluating production data collected in real time, it is also possible to integrate external enterprise data (MES, ERP) into the reporting system. Since real-time production data and data from enterprise systems can often have considerable differences, this data can optionally also be extracted, transformed and loaded to the APROL PDA database cyclically.



Real-time decisions rely on operational and process data merged from a multitude of different systems.



Automatically generated OEE reports play a key role in well-founded decisions.

Correlation analysis helps get to the root of the problem

- When key operational and production parameters are monitored online and stored in the APROL history archive, correlation analysis can be performed for any time period in order to optimize processes.



The real root of a problem only becomes visible when the process data from machines, lines, equipment and subsystems is viewed in the right context. For this to be effective, it is essential that not only continuous process data, but also event-based data (alarms, messages, operator actions, etc.) are included in the analysis.

Correlation analysis of archived process data, using both continuous and event-based data, can be a quick way to shed light on the root of a problem.

Reports deliver key performance indicators

- The report scheduler can be used to generate all types of reports automatically, such as overall equipment effectiveness (OEE) reports.

Correlation analysis helps get to the root of the problem

- The ability to differentiate between production data and work order data, scrap data, or operator data through contextualization makes production teams more flexible and allows them to respond more quickly.

Customized training for APROL PDA

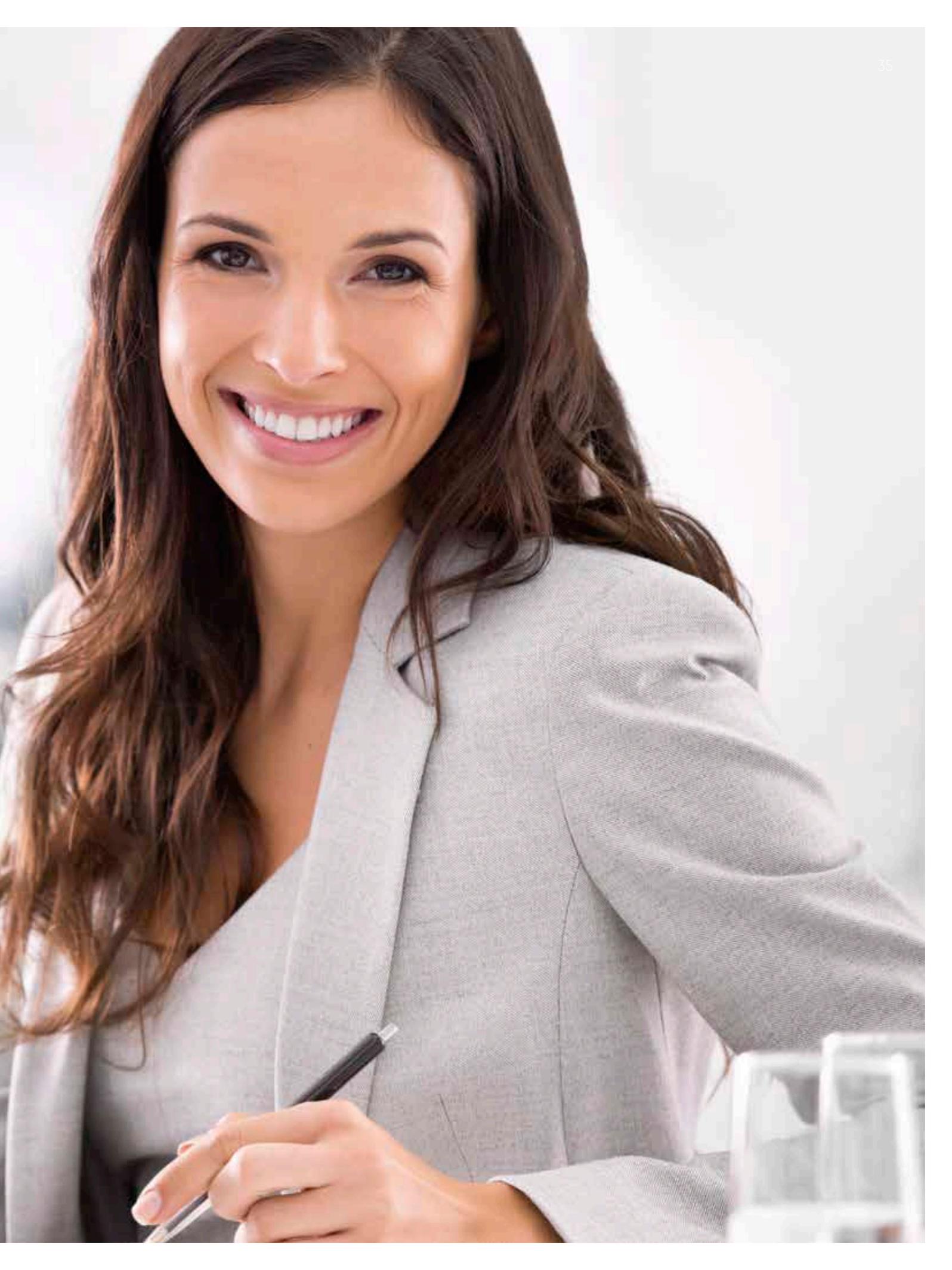
Training for APROL solutions (ConMon, EnMon, PDA, etc.) is provided in two seminars:
Basic 1 and Basic 2.

SEM841.5 APROL Training: Basic 1

- Structure of the APROL process control system
- APROL systems (Operator, Runtime, Engineering) and controllers
- Organization and content of the standard APROL libraries
- User management for organized project engineering
- Using operator management for operator stations
- Creating a new project (hardware, application software, HMI application)
- Features of the APROL web portal (system diagnostics, reporting, etc.)
- Functions that support validation (version management, Audit Trail, change control, etc.)
- Configuring APROL systems and using the standard libraries, PAL (Process Automation Library) in particular
- Introduction to APROL solutions (configurator)

SEM842.5 APROL Training: Basic 2

- Creating, operating and expanding parameter sets and recipes
- Implementing a controller from start to finish
- Using controller-to-controller communication
- Configuring and using the event driver and the PDA coupling
- Creating customer-specific library function blocks
- Examples of how existing block types are used
- Developing and implementing custom blocks
- Language switching with TranslationManger tool
- Backup, system installation, setup and recovery
- Creating templates for APROL solutions (configurator)





Usage examples

Food and beverage

Application: Ice cream production

Ultra-modern hygienic powder processing systems for feeding powder into ice cream mixers ensure optimal product quality and reduce production costs. To guarantee that consumers enjoy great-tasting ice cream, it is important to cool the ingredients as rapidly as possible in order to create the tiny crystals needed for the perfect ice cream texture and also to effectively control the entire production process.

This includes receiving and storing raw materials, measuring the ingredients, cleaning equipment, packaging and storing finished ice cream products. To comply with government regulations and optimize production, there are often several thousand data points that have to be managed using APROL PDA when validating production line processes at a site so that data acquisition and long-term archiving of the entire production process documentation is handled in a seamless and tamper resistant manner.

Advantages

- Production and energy costs (EN 500001) for the products are calculated in detail
- Food law compliance is ensured (Regulation: (EC) no. 178) with regard to traceability throughout all stages of production, processing and distribution.



Automotive

Application: Tractor production plant

State-of-the-art technologies, such as ultra-modern CNC machines and laser cutters, are used for production and painting equipment. Ergonomic and efficient workstations and work processes ensure that tools and materials are available for operators on the assembly line in a clear and intuitive manner. An automated small parts storage system provides parts extremely quickly with an average speed of 125 part movements in and out of storage per hour.

In order to manage all data related to production of the tractor cab, over 10,000 data points must be recorded and placed in long-term archiving. APROL PDA and several dozen Automation PC 910 units were installed as gateways throughout the system for this purpose.

Advantages

- All production steps are documented seamlessly by the system
- Quality certification for the entire manufacturing process
- OEE (Overall Equipment Effectiveness) reports are generated automatically



Infrastructure

Application: Underground railway stations

The latest forecasts predict that the number of people in urban areas will nearly double by 2050. About 70 percent of the people on the planet will then live in towns and cities. Expanding the urban transport infrastructure in cities is extremely expensive, so the existing infrastructure must be used more efficiently in order to meet increasing demand.

Through modernization of existing underground railway routes, the capacity of an underground railway can often be increased by 35 to 55 percent. The use of railway control and safety systems allows trains to run at shorter intervals, thus increasing efficiency. The use of optimized acceleration, transit and braking processes can reduce energy consumption by up to a third.

To take advantage of this potential to increase efficiency, thousands of data points must be quickly and reliably recorded, usually with redundant and decentralized I/O systems. The data points represent stopping the train at the stations, opening and closing the doors, data about number of passengers, elevators, escalators, emergency stop buttons, smoke detectors, emergency lighting, emergency exits, intruder surveillance, heating, air-conditioning, ventilation, remote surveillance of tracks and platforms, and much more.

Advantages

- Capacity of an underground railway line can be increased by 35 to 55 percent
- Data points are recorded reliably using a fully redundant design



Plastics processing

Application: Pipe systems

The automotive industry, like the machine and system manufacturing industry, requires a wide range of pipe systems that must be produced using the latest methods. Extrudable polymers and high-temperature materials are required here. Complex compositions must be used in order to meet stricter requirements for UV resistance and fireproofing of the materials. The variety of plastics is continuously being expanded so that combinations of properties can be tailored to each application and area of use.

In order to ensure the high product quality required by automobile manufacturers and industrial companies, it is necessary to strictly adhere to prescribed compositions and process steps. It is also necessary to provide complete data for all manufactured items throughout all steps in the process chain. This guarantees traceability of the end products and precise information about the raw materials, operating materials and auxiliary materials used in the event of claims or disputes. Line monitoring encompasses more than 100 data points and also includes all machine states.

Advantages

- Energy costs for items produced are determined in relation to defined recipes
- A complete production record ensures traceability of end products at the push of a button
- Precise information about raw materials, operating materials and auxiliary materials used
- OEE (Overall Equipment Effectiveness) reports are generated automatically

Optimize your system

B&R offers an extensive range of products for delivering integrated automation solutions. For a complete overview of all B&R system components, visit www.br-automation.com.



Energy monitoring

- **APROL EnMon**
- Supports implementation of ISO 50001
- Standalone solution for all industries
- DCS platform guarantees flexibility
- Ultimate scalability for safe investments
- Robust Automation PC 910
- For all energy types and consumers
- Load management protects against peak loads



Condition monitoring

- **APROL ConMon**
- Condition-based predictive maintenance
- Support for plant asset management
- Standalone solution for all industries
- Broad portfolio for measuring condition parameters
- Energy and flow calculation for water and steam
- Control performance monitoring



Advanced process control

- **APROL APC**
- Increased process control efficiency
- Increased throughput
- Significant reduction of manual intervention
- Faster product changeover
- Less wear due to less variability
- Move the setpoint closer to the operating limits
- Standalone solution for all industries



Process automation

- **APROL process automation**
- Flexible system topology: from 50 to 200,000 I/Os
- Concurrent engineering for large teams
- Redundancy at every level for maximum availability
- Integrated safety for SIL3 applications
- Process automation library with more than 80 control modules
- Information management for real-time decision-making
- Audit Trail and change control for validated systems



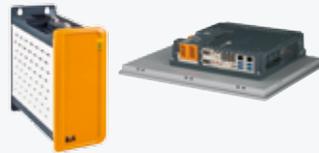
OEM

- **APROL OEM**
- Maximum modularity – only features that are actually needed
- DCS platform guarantees flexibility
- From basic monitoring to FDA-compliant automation
- Reliable redundancy at every level if needed
- Maintenance-free database for historical data, also redundant
- Energy efficiency thanks to well-proven solutions
- Machine data interface for easy line integration and monitoring



Plant automation

- **Plant automation**
- Standardization through object-oriented development
- Simplified commissioning
- Redundancy at all levels for high availability
- Integrated safety technology for SIL3 applications
- Central project management for software maintenance
- Safe, integrated remote access
- Audit Trail for monitoring system operation



Box PCs/Panel PCs

- **Automation PC 910/Panel PC 900**
- Powerful Intel Core i3/i5/i7 processors
- Fanless operation
- Windows 7, Windows 8, Windows Embedded, Linux, real-time
- Uncompromising quality for many years of operation
- Direct fieldbus connection



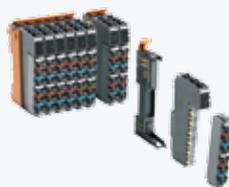
Automation Panels

- **Automation Panel 900**
- Widescreen from 7" to 24" Full HD
- 4:3 from 12.1" XGA to 19" SXGA
- Projected capacitive multi-touch and analog resistive single-touch
- Hygienic design (IP69K)
- Swing arm or cabinet mounting
- Remote operation up to 100 m with SDL3

reACTION TECHNOLOGY

Ultrafast automation

- reACTION TECHNOLOGY
- 1 μ s response time
- Cost-effective due to standard hardware
- IEC 61131 programming
- Significant reduction of CPU load
- Digital and analog signal preprocessing
- Comprehensive diagnostics and simulation
- Extensive function library



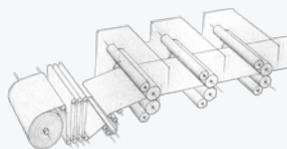
Modular I/O system

- X20-I/O
- Open for all fieldbus systems
- Removable terminal blocks
- Hot-pluggable
- Unequaled component density: 16 channels in just 12.5 mm
- No-risk hardware replacement due to centralized management of firmware/configurations



IP67 I/O system

- X67 I/O
- Open for all fieldbus systems
- Seamless integration
- Excellent EMC properties
- Diagnostics via PLC program and web interface
- Simple cabling



Technology solutions

- Integrated closed-loop control
- Hydraulics, temperature, winders, printing
- Profile generators, controllers, system identification, autotuning
- Virtual sensors
- Simulation models
- Model Predictive Control (MPC), Advanced Process Control (APC)



HMI terminals

- Power Panel T-series
- Portrait and landscape
- 4.3" to 10.1"
- Widescreen and 4:3
- Integrated VNC terminal and web client
- Compact, fanless and maintenance-free
- IP65 protection
- Daisy chain connections



Power Panels

- Power Panel C-series
- Control and HMI in a single device
- Easy programming in IEC 61131-3, CFC, ANSI C, C++, PLCopen
- 5.7" to 10.1"
- Widescreen and 4:3
- Open communication (FTP, VNC, OPC, web server, POWERLINK)



Scalable PLC platform

- X20 controller
- Easy programming in IEC 61131-3, CFC, ANSI C, C++, PLCopen
- Open fieldbus options (POWERLINK, CANopen, DeviceNet, PROFIBUS, PROFINET, etc.)
- Intel Atom performance
- Fanless and maintenance-free
- Integrated CNC and robotics



Safe control platform

- SafeLOGIC
- Safety in accordance with CAT 4 / PL e / SIL 3
- PLCopen-certified function blocks
- Virtual wiring
- Management of machine options
- Easy IEC 61131 programming
- Openness through openSAFETY
- Integrated diagnostics



Safe I/O system

- X20 SafeI/O/X67 SafeI/O
- Digital inputs/outputs
- Relay outputs
- Analog inputs
- Temperature inputs
- Use of I/O data in both standard and safe applications
- Safety in accordance with CAT 4 / PL e / SIL 3

Integrated automation
Global presence
Solid partnership



ETHERNET 
POWERLINK

open 
SAFETY