



Plant i.T.

Process Control Systems. MES inside.

Works with

EcoPtruxure™



The IT solution for the process industry

proleit.com

ProLeiT

by **Schneider** Electric

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ProLeiT through the years

Developing innovative process control systems

When the engineering company “PROLEIT - Gesellschaft für technologieorientierte Prozeßleit- und Steuerungssoftware” was founded in 1986, the main focus of its attention had already been clearly defined: the production process of our customers – their technology and, therefore, their success!

Just three years after the company's inception, we presented PROLEIT OS 155 – our first in-house developed, PLC-based process control system. Our first chemical industry customer was Henkel in Duesseldorf, Germany, which used our process control system for automating its drying towers.

The system version PROLEIT OS 386 allowed us to realize a process control system that could be operated using conventional PCs. And in 1994, we were commissioned to automate the new entire Müller Milch plant in Leppersdorf, Germany, using PROLEIT OS-NT 1.0.

We used version PROLEIT OS-NT 4.1 back in 1998 to support S7 controllers from Siemens for the first time, and one year later we presented our innovative class concept with version OS-NT 5.0.

New brand names were developed for the PROLEIT systems at the start of the new millennium: Plant iT and brewmaxx, with brewmaxx being the Plant iT industry solution for breweries. In 2002, we automated the then

most modern brewery in Europe for Grolsch in the Netherlands according to the ISA-88 standard.

Two years later in 2004, we showcased numerous innovations with Plant iT V7. One of them is the unique add-on Visu-Recorder.

Plant iT V8 in 2008 signalled a leap in technology: a central process control system that can run on controllers from Siemens and Rockwell Automation. And with the module Plant iT material we realized a process-oriented materials management system that can be combined with all the base systems.

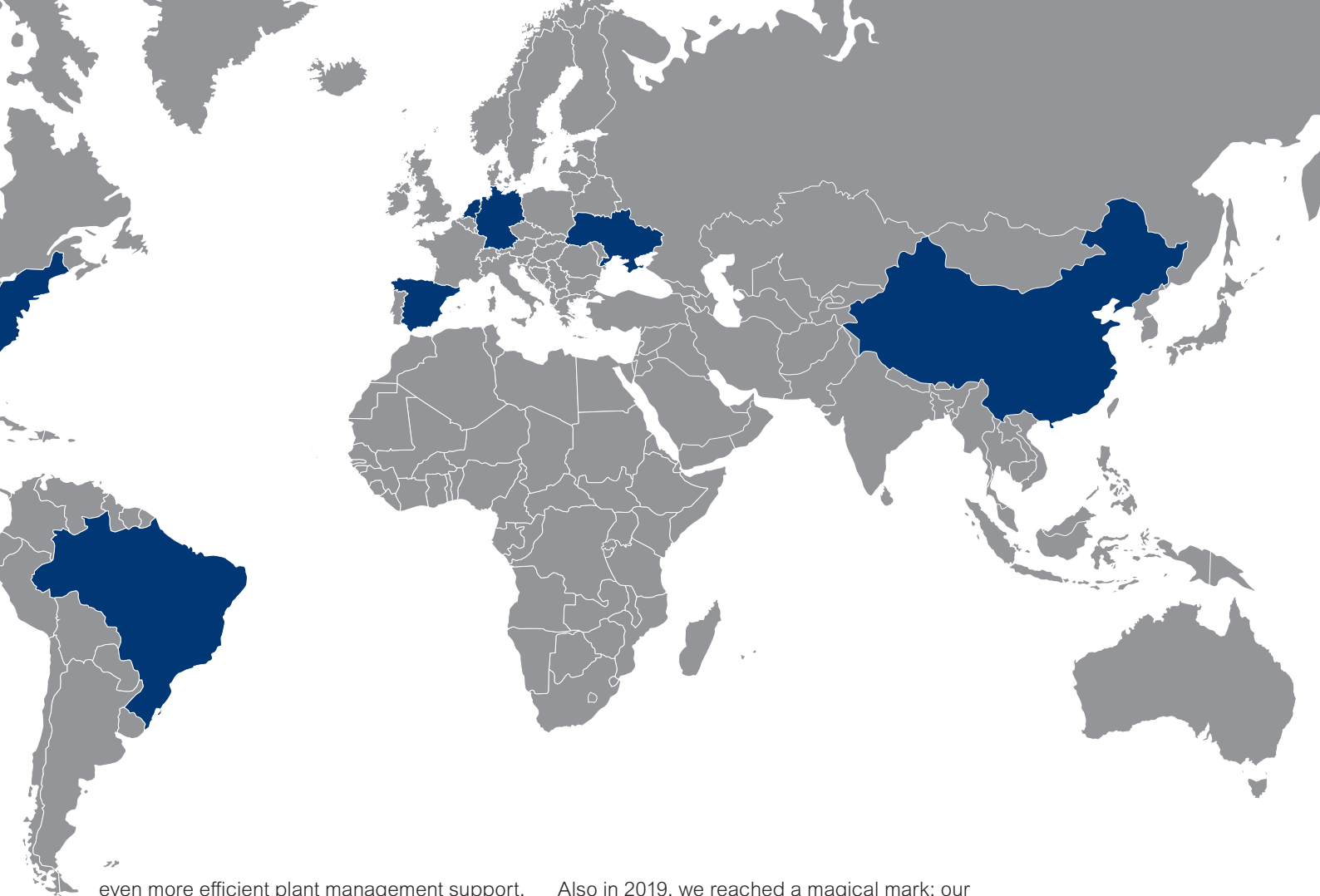
Further large-scale projects followed: for example complete automation of a baby food plant for Almarai in Saudi Arabia, migration to brewmaxx at the Warsteiner brewery in Germany and automation of the entire process for the Carlsberg brewery in Fredericia, Denmark.

Since the launch of V9 in 2013, our control systems are seen as the most state-of-the-art versions available thanks to new navigation concepts and an integrated process graphics designer.

The upgrade 9.50, which was unveiled in 2017, offers, among other things, new operating dialogues developed on the basis of extensive usability tests. ProLeiT therefore guarantees not only greater operating flexibility but also

“ Our process control systems are currently used in more than 100 countries”





even more efficient plant management support. Adhering to our vision of constantly expanding the ProLeiT system platform, further technical innovations such as the modules Plant iT web portal and Plant iT archive manager as well as the new add-ons Plant Batch iT MWS, Plant Integrate iT Batch Cockpit and Plant Acquis iT LMS were added in 2017.

In 2019, the upgrade 9.70 expanded the product portfolio to include a maintenance management solution that offers comprehensive analysis options and supports predictive maintenance.

Also in 2019, we reached a magical mark: our process control systems are currently used in over 2,100 plants, in more than 100 countries. This is why we are a leading provider within our core industries. Our job, to ensure it stays that way, will be to continue expanding our international presence. We are currently represented in the following countries:

- America: Brazil, Mexico and USA
- Asia and the Middle East: China
- Europe: Bulgaria, Germany, The Netherlands, Spain and the Ukraine.





Certified by experience

Vision and motivation

Our automation solutions offer our customers certain peace of mind: in terms of the financial investment in their systems and their availability, their production processes and the actual quality of their products.

To meet this high demand, we specialize in meeting our customers' requirements by focussing on core industries and establishing competence centres, consisting of highly skilled technical and experienced technology engineers.

We see ourselves as a learning organisation that exploits knowledge and innovation in open and effective cooperation with our customers.

We have been embedding this knowledge into our modular process control systems Plant iT and brewmaxx for more than 30 years. By focussing on a small number of core industries and continuously transferring knowledge to customers, partners and universities, we have been able to equip our process control systems with the appropriate scope and depth of unique functions and integration. Therefore, ProLeiT solutions are the automation standard in a

number of internationally renowned corporate groups in the food and beverage industry.

However, for the majority of our customers we are more than just a provider of industry-based process control technology: we are an adviser, developer, technology expert, MES consultant, commissioner, trainer and supporter.

We take responsibility for our actions, since our services and products influence our customers' success. We therefore adapt our daily activities to take the requirements of our customers into account, creating the basis for successful cooperation and trust.

Our products and solutions allow our end customers to control, monitor and optimize their increasingly complex production processes. Our OEM customers are provided with the tools that enable them to offer systems with tailored automation concepts. Our system integrators use our products to develop reliable customer solutions with the highest level of productivity. We contribute to the success of all our customers. Our utmost priority is to achieve strong results which always meet our



customers' expectations. Therefore we have formulated the following objectives:

Absolute customer satisfaction

Excellent and professional service must generate loyal regular customers. This is achieved through personal dedication, commitment and motivation, as well as successful projects.

Maximum independence

As an independent company we work together with all well-known plant and machine builders of our core industries. Our solutions ensure that customers remain independent when selecting their preferred equipment manufacturers. The Plant iT and brewmaxx process control systems offer customers the freedom to choose their preferred vendor (e.g. Schneider Electric, Siemens, Rockwell Automation). The performance of Plant iT or brewmaxx is still achieved even if a decision is taken to change the provider at a later date.

Maximum customer benefit

As a mid-sized company we offer our customers a remarkable service portfolio full of technical expertise and practical engineering skills, years of experience in turnkey automation projects and the in-house control system range Plant iT and brewmaxx. This mixture in combination with the flexibility and short decision paths is one of the biggest advantages for our customers.

Maximum local presence

Customers can rely on our service and our strong local presence. Our international locations and our worldwide partner network ensure we are close to our customers and along with our technical skills, quality of service and reliability, we contribute greatly to building the required trust for long-term cooperation with our customers.

Extensive training offers

To guarantee our customers are perfectly trained to work with our control systems and thus well prepared for the full range of responsibilities they will have to undertake, they can participate in courses at our in-house training centre, the ProLeiT Academy. Our certified coaches have extensive experience working with our solutions and offer a vast range of training courses in various areas of application.

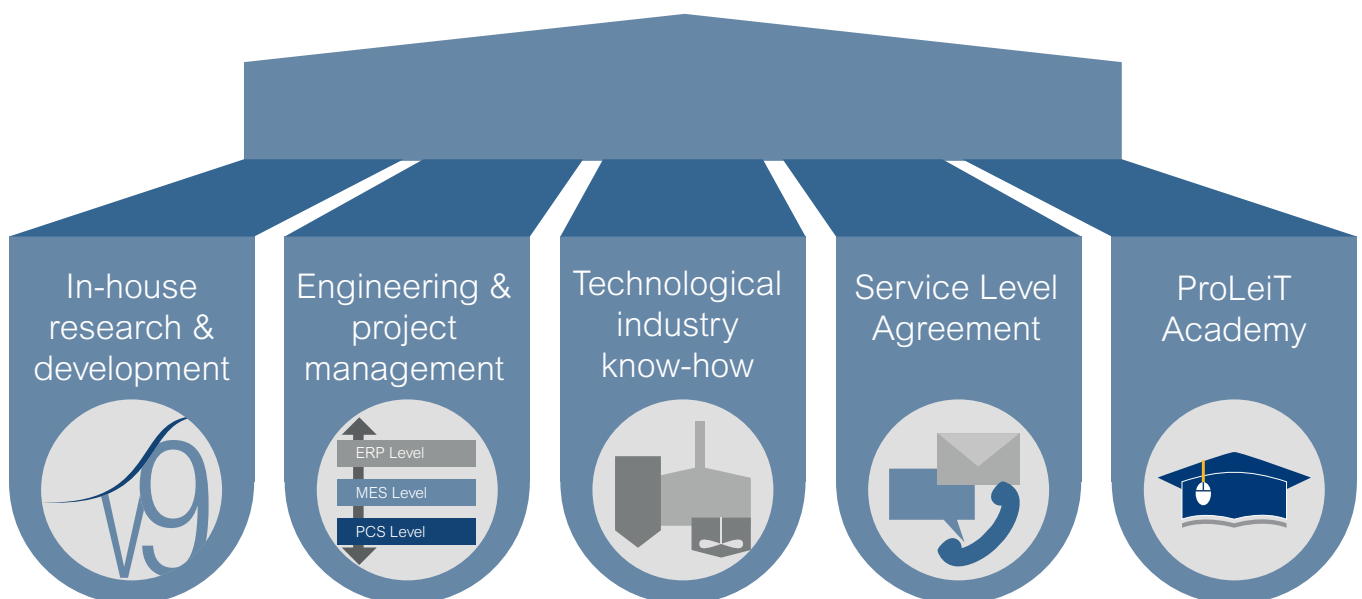
Optimum project management

On the basis of our experience and the internationally recognized IPMA standards, we implement projects systematically, professionally and reliably. The industry-based corporate structure at ProLeiT ensures our dedicated team of experts helps our customers get to grips with planning, implementing and monitoring project-specific activities.

Integrated solution skills

Customers can rely on our tailor-made industrial solutions for all their production processes. Our solutions and products not only cover all production requirements from the raw material stage to the finished product, but also offer full vertical integration from the control level through the process and plant control level (MES) up to the corporate management level (ERP).

Scope of services



The five core competencies of ProLeiT

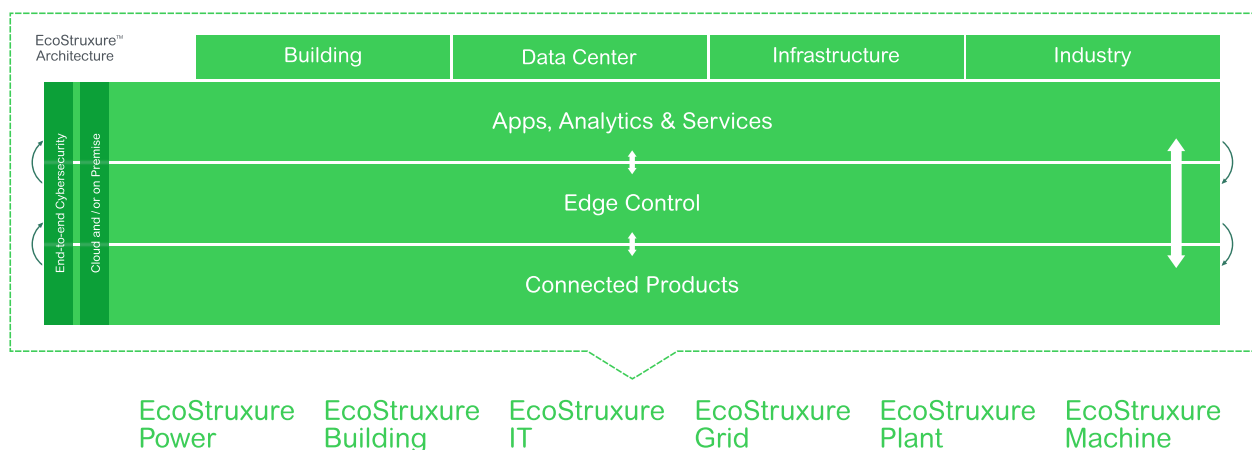
EcoStruxure™

Innovation At Every Level

Since the merger of ProLeiT and Schneider Electric in August 2020, Plant iT has been complementing the Schneider Electric EcoStruxure system architecture. Bringing together the expertise of Schneider Electric SE and ProLeiT offers tremendous value to the customers of both companies to increase their productivity and efficiency. The ProLeiT solutions specifically address the consumer packaged goods (CPG) and food & beverage (F&B) sectors and thus enable broad market penetration. Through its own EcoStruxure system architecture, in which the AVEVA software plays an integral role and which is further strengthened by the ProLeiT portfolio, Schneider Electric, a company active in over 100 countries worldwide, has long been successfully driving forward digital transformation in industrial automation.

EcoStruxure is Schneider Electric's open, interoperable, IoT-enabled system architecture and platform. EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level. This includes Connected Products, Edge Control, and Apps, Analytics & Services, which are supported by Customer Lifecycle Software. EcoStruxure has been deployed in almost 500,000 sites with the support of 20,000+ developers, 650,000 service providers and partners, 3,000 utilities and connects over 2 million assets under management.

EcoStruxure™ Innovation At Every Level



Industrie 4.0 (IIoT)

Integrated solutions for smart factories of tomorrow

Rapid development, including an ever faster and more networked world of production, offers not only new opportunities but also creates new challenges. Within this context, a keyword that can often be heard is “Industrie 4.0” or Industrial Internet of Things (IIoT) – but terms alone do not generate added value. For ProLeiT, however, Industrie 4.0 (IIoT) has not simply become a trend topic but is seen as a decisive step towards the future of the process industry.

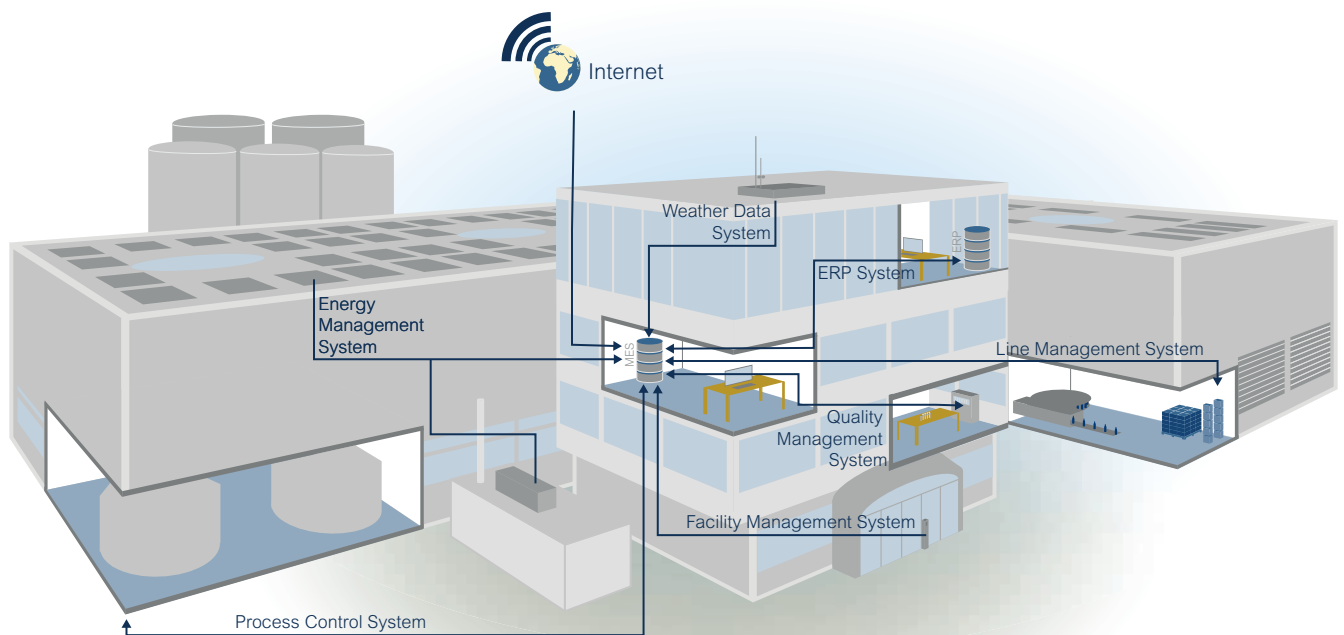
Industrial Internet of Things (IIoT) is usually only associated with conventional machine and plant engineering applications; in other words, production-related activities. That said, the smart factory provides many benefits for the process industry, including digital integration of all industrial facilities and processes. Furthermore, implementation is quite straightforward when using a Manufacturing

Execution System (MES) as the central analysis and reporting unit.

The smart factory

Transforming a traditional factory into a “Industrie 4.0” smart factory results in significant changes to the way it operates. Business processes respond dynamically to changes in the market, while production techniques adapt automatically to ensure an appropriate balance between cost, quality and environmental impact. Production technology will adapt to specific customer needs, identify and eliminate bottlenecks and control plant throughput automatically.

This goal - true to the vision of Industry 4.0 - is achieved by vertically coupling technical and commercial business processes



Networked systems in the smart factory



and horizontally linking processes and systems along the value-added chain. Viewed from a production standpoint, it is not just the company departments that are interconnected - from initial order to outbound logistics - but additionally also the company's systems to those of its suppliers and buyers. Processes can therefore be controlled and improved across the entire plant. Production becomes completely transparent from start to finish, providing the ideal platform for sound commercial and technical decisions. The smart factory additionally enables companies to identify and satisfy individual customer needs, as even the smallest batch size can be produced economically.

Integration of heterogeneous systems via MES

This vision can be brought to life with a correspondingly adapted Manufacturing Execution System (MES). The MES solution from ProLeiT is called Plant Integrate iT, which can be used independently of the process control system Plant iT. The MES integrates the heterogeneous information of the individual production plants and combines the production level with the commercial business processes. Needless to say, companies profit directly from a plant-wide and common database. The more systems that automatically exchange information, the greater the added value for the operator. The many benefits include dynamic order management and the opportunity to develop and improve plant-wide recipes, as well as being able to trace production data. By displaying the interrelations between production data, the MES is the ideal solution for all supervisors.

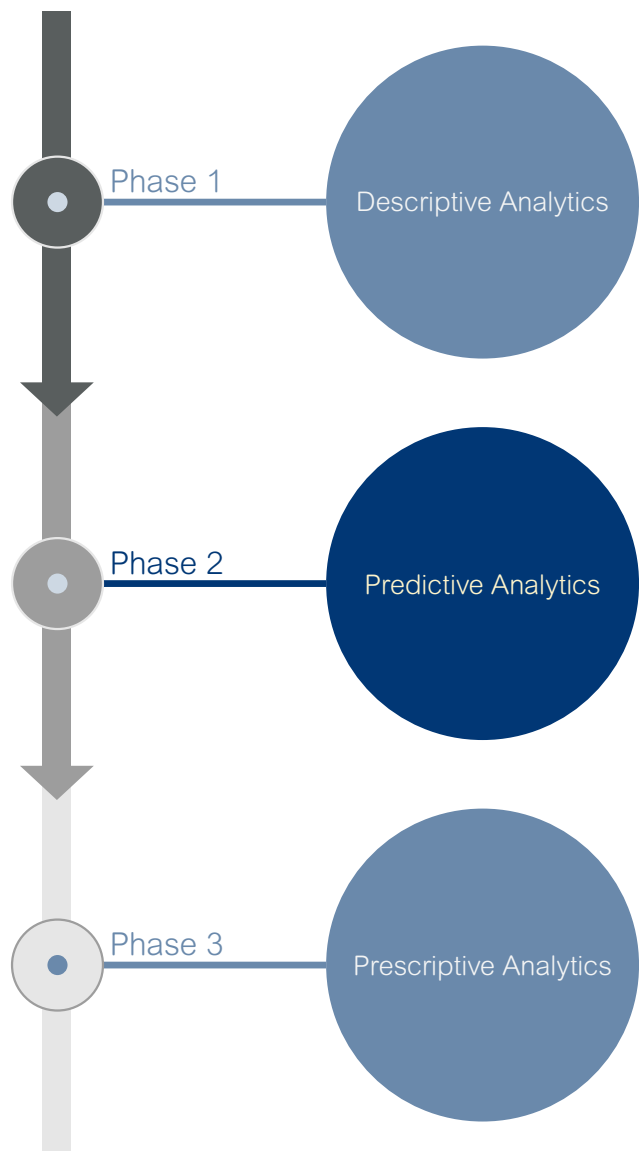
Big data analysis via dashboards

Freely configurable dashboards ensure a clear overview of all the collected production data. Recorded and archived data can be filtered according to various criteria, including time period, order, customer, product, batch, location and energy consumption, as well as interlinked and presented in real time. In many cases, interrelations become apparent that would otherwise be invisible, as the data is either unavailable or stored at various locations and systems in different departments. Supervisors can therefore respond faster to any deviations, sometimes even in real time.

Industrie 4.0 (IIoT) in the real world

Integrating an MES is a crucial step towards changing a traditional factory into an intelligent one. While media articles on Industrie 4.0 (IIoT) portray the characteristics of the smart factory as a vision of tomorrow's manufacturing, operators of an integrated factory can, thanks to ProLeiT, already profit from its many advantages today.

























This applies, in particular, to companies whose production plants have been operating for decades and have a heterogeneous IT structure. The integrated systems and improved data analysis guarantee operators a unique competitive edge.



The method of predictive analysis already applied by ProLeiT helps plant operators to predict the probability of future events more reliably, instead of just analyzing an existing situation. However, our goal for the future is to provide prescriptive analysis that deals with the question of what is needed to ensure a future event occurs/does not occur. It uses automatically captured and continuously processed data to generate recommendations for action. Plant operators are therefore given the opportunity to gain an advantage from future situations, to minimize potential risks and to anticipate the consequences of the respective options.

Industry4.0

Industrie 4.0

Application Level	Stages of Development			
Data processing in production	 No data processing	 Data for process monitoring	 Data for process control	 Data for automated process planning/control
Machine to machine communication (M2M)	 No communication	 Fieldbus/Ethernet	 Internet access	 Web services/ M2M-Software
Company-wide networking	 No networking	 Unique data formats	 Inter-divisional networked data server	 Complete networked IT solutions
Infrastructure in production	 Mail and telecommunication	 Central data server	 Internet based portals with data sharing	 Integration of customers
Human Machine Interfaces (HMI)	 No information exchange	 Local display devices	 Production monitoring/ mobile display devices	 Augmented and assisted reality
Efficiency in handling small batches	 Rigid production means	 Flexible production means and common parts	 Flexible production, modulare products	 Common parts driving modular production in added-value networks

Industry 4.0 at ProLeiT

Source: VDMA Guidelines Industrie 4.0

Practical realisation of Industrie 4.0 (IIoT) – development steps at ProLeiT

Industry expertise

Industry solutions for the process industry

We have been supplying the process industry with integrated automation solutions for more than 30 years. We are familiar with all the technologies and specific requirements of the various sectors. This is our guiding vision – in both our industry-driven corporate structure and the industry-specific functions of our very own process control systems Plant iT and brewmaxx.

From operational data acquisition, process control with extensive recipe management and S88 compatible batching systems to functions for complete, location-independent production management (MES) and integration of ERP, LIMS and maintenance systems – all these processes can be continuously controlled and monitored using Plant iT and brewmaxx. Our system comes pre-packaged with extensive functionality for use primarily in the following industries:

Beverage industry

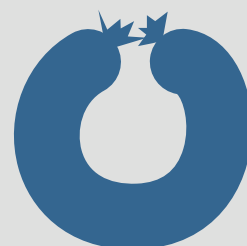
Plant iT offers industry-specific functions for the beverage industry, e.g. recipe-controlled program sequences for liquid handling, automation of sugar and dissolving plants for the production of fruit juices, soft drinks and energy drinks, control of blending plants for the production of fruit juices, waterhouse automation for springs, etc.

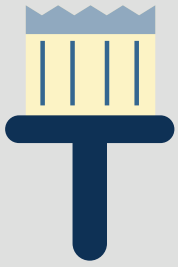
Brewing industry

Plant iT for the brewing and spirits industry is marketed worldwide under the brewmaxx brand. Thanks to many years of intensive cooperation with universities as well as plant and machine manufacturers from the brewing and malting industry, a highly specialized control system has been developed which offers innovative automation solutions for silo systems and malt handling, brewhouses, fermenting and storage cellars, yeast management, filtering systems, filling systems, utilities and CIP plants.

Food industry

Plant iT is used around the world by food industry manufacturers to produce numerous products, e.g. meat, cold cuts and sausages, bakery products, oils, fats, confectionary, basic food substances, as well as feed and mixed feed. A key solution component from Plant iT is the ability of the solution to help meet IFS certification.





Baking industry

Plant iT provides specially integrated functions for the baking industry, including order management, recipe management, process-related materials management, integrated energy management, quality and production optimization, as well as maintenance and repairs.

Chemicals industry

Plant iT is also used within chemical production processes, i.e. for the production of washing products, wax ester, cleaning agents, adhesives, fuels from renewable primary products, synthetics and synthetic products, as well as paints and coatings.



Dairy industry

Plant iT is an advanced, industry-specific system solution which combines extensive IT experience and dairy expertise in a single control system. It is used for production and filling of untreated and treated milk, UHT milk, cream, butter cheese, yoghurts, fromage fraï, desserts, milk powder and lactose.

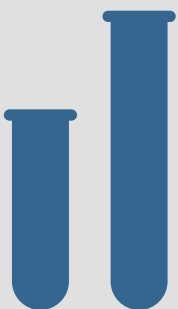
Varnishes and paints

From production, mixing and dosing to filling, the modular process control system Plant iT offers an ideal and reliable overall solution, even in the industrial sector of paints and varnishes. Numerous functions tailored to the industry-specific requirements, including, for instance, an assistant for manual weighing processes, support efficient and convenient plant management.



Pharmaceutical and biopharmaceutical industry

The Plant iT portfolio for the pharmaceutical industry includes a batch system according to ISA-88 for batch and continuous processes, integrated materials management with batch tracing as well as electronic batch recording. Our GMP-compliant solutions satisfy international regulations, e.g. FDA 21 CFR Part 11 Electronic Records and Electronic Signatures.





Plant iT & brewmaxx

Standard system solution

Plant iT and brewmaxx are integrated and PLC-based automation solutions whose base systems include:

- An object oriented process control system with
- integrated recipe management system for
- continuous and/or batch processes with
- integrated MES functionality,
- in a single database,
- on a single server,
- with a single, standardized user interface.

All from one source

Using only our industry leading products, we provide complete automation solutions for the process industry. The whole sphere of automation and information technology from the field right up to the company management level is covered by our extensive industry expertise. We provide turnkey automation solutions beginning with concept development and compilation of the specification through to software generation and commissioning. The range of our services includes:

- Compilation of user requirements and system specifications
- Conception, engineering, delivery and commissioning of
 - Hardware for control technology, including networks
 - Process control systems Plant iT and brewmaxx
 - Solutions for production, data acquisition and energy management
- MES solutions for order management, material management and management reporting as well as batch and product tracking
- Horizontal integration of all process layers and vertical integration of all system levels right up to connection of laboratory and ERP systems (e.g. SAP)
- Qualification of process control technology for plants with regulatory requirements

Established standardization

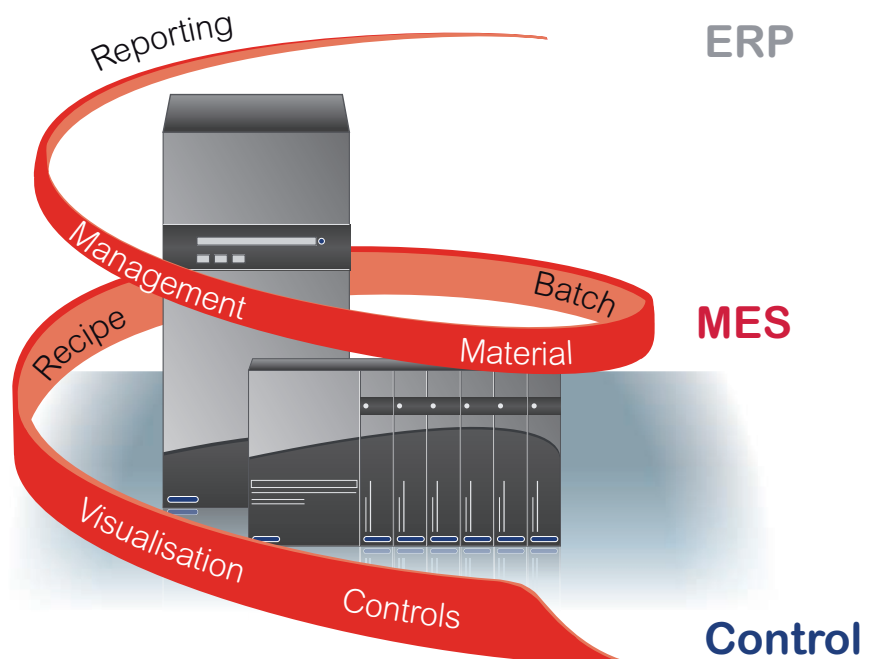
We develop and market technology-oriented process control systems under the brand names Plant iT and brewmaxx. Plant iT and brewmaxx provide a system family that covers control requirements from the control level up to the manufacturing execution level.

Plant iT and brewmaxx enables us to offer efficient engineering to standardized methods. We are proud of the fact that almost all the technical and technological functions can be implemented by parameterization rather than customized programming.

Parameterization instead of programming

Due to the unique Plant iT and brewmaxx class concept, software module classes with fully configurable parameters always controls and monitors all similar objects in the plant. Compared to conventional process control systems, Plant iT offers numerous positive effects, like:

- Shorter commissioning times due to proven software quality
- More efficient procedures for extending, adapting or gradually realizing production plants
- Engineering according to standardised methods ("parameterization instead of programming")
- Enhanced investment protection (PLC manufacturer independent solution)
- Easy-to-use (central GUI for PCS, MES, batch system, etc.)



New features of version 9

Usability and design in a perfect harmony

User Interface

The new Operation Manager is the central user interface for operators and is available not only for the base systems but also for all add-ons and modules. The revamped user interface complies with the latest usability standards and facilitates operation, monitoring and control of production processes.

The presentation of process areas and MES functions, editable menus and numerous new processing functions enables intuitive and effective utilisation of the control system. All elements of the new interactive main menu bar and from the slide-out side menu can be added to the new dashboard via drag & drop.

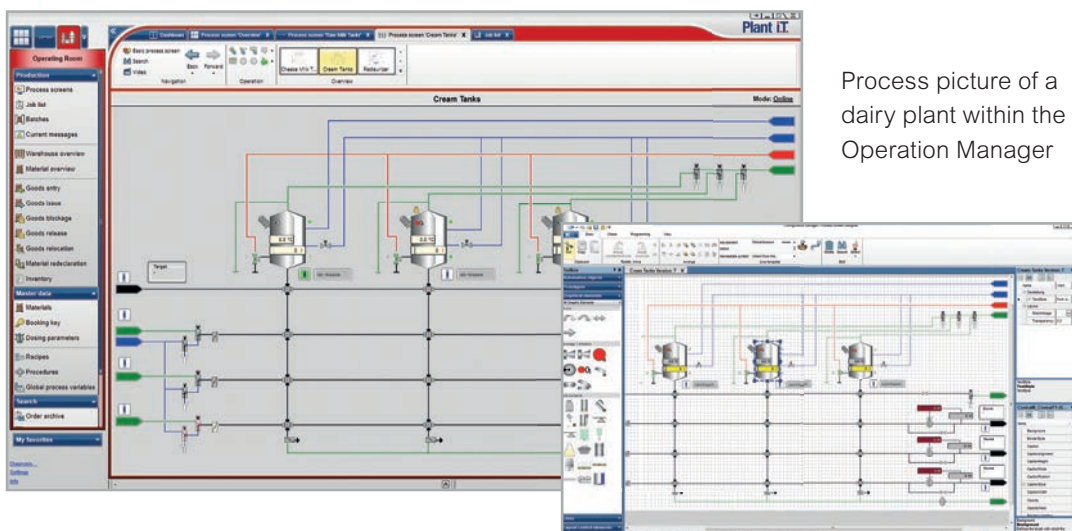
The new function for displaying process pictures on several monitors is particularly convenient. Process pictures can now be moved from the Operation Manager to other monitors. This ensures simpler operation on the latest touch panels with multi-finger operation.

Process Image Designer

It has never been easier to create complex process images using Plant iT & brewmaxx. The new Process Screen Designer is an integral part of the process control systems and offers extensive libraries of industry-specific graphic objects which can simply be added via drag & drop.

So called “Prototypes” already have pre-settings (e.g. graphic object, unit) and only have to be linked to one automation object after being added to the process picture. Automation objects on the other hand already boast all the required settings, e.g. PLC source link. The new vector-based graphical elements are fully scalable and provide optimum display quality for high resolution displays.

With Plant Integrate iT and brewmaxx Integrate we have developed new stand-alone MES solutions to run with or without our process control systems. Production reports can be easily displayed and transferred via a web browser. Based on standard software components (e.g. SSRS from Microsoft) we are able to centrally process and edit information



Process picture of a dairy plant within the Operation Manager

Creation of process pictures with the integrated Process Screen Designer

from various sources, whilst ensuring it is displayed in a leading-edge manner on multiple devices.

Operating Dialogues

The new operating dialogues of the Operation Manager have been specially developed for use on touch interfaces. This particularly facilitates the operation of automation objects via mobile end devices, such as controlling valves.

Process Screen Viewer

The new Process Screen Viewer application enables the display of process images outside the Operation Manager with an individually adaptable arrangement of the individual process images.

Curve Viewer

The new curve viewer of the Operation Manager optimizes the display of measurement curves while providing additional functions for research, commenting and comparing measured values. This means, for example, that order and batch comparisons from differing time periods can be quickly analyzed and displayed.

Web Portal

The Plant iT web portal/brewmaxx web portal ensures the process control systems Plant iT and brewmaxx have a host for web applications with standardized user management, language switching and user interface design. This enables the presentation of all types of reports, messages and measured values via web browser. In addition, the web portal contains a software development kit (SDK), which allows the integration of your own websites and third-party components.

High Attention
Library

High Attention Library

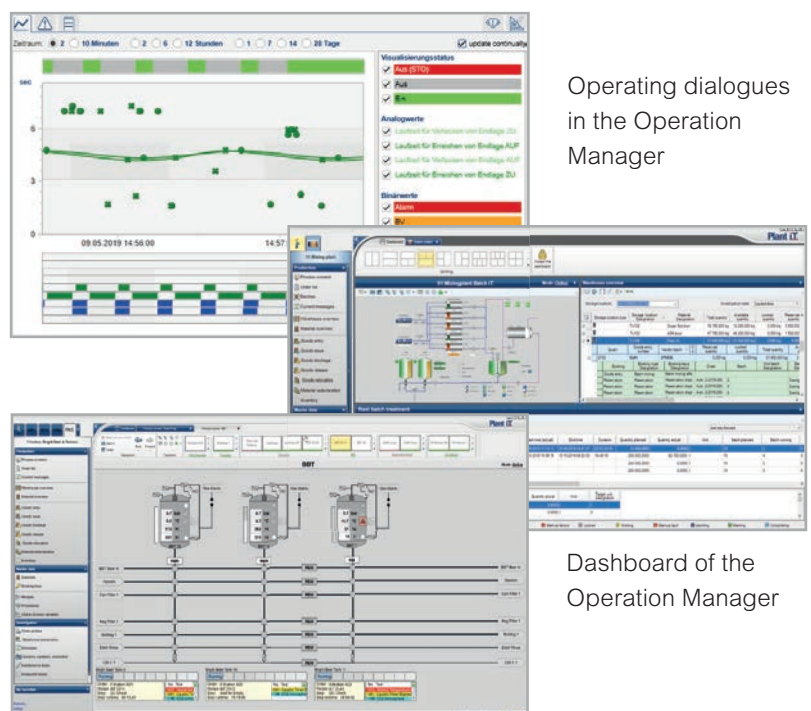
The new high attention library has been specially developed to graphically highlight messages and faults. The colour contrasts are more visible by discreetly displaying normal states (e.g. white, grey) and indicating alarm states in a bright colour (e.g. red). Faults and warnings can thus be perceived more quickly in complex process images.

Line Management System

With Plant Acquis iT LMS / brewmaxx LMS, a new add-on is available for the basic systems Plant Aquis iT and brewmaxx, which is used, for example, to acquire and analyze fault data. It additionally provides an electronic shift and order log along with a dashboard for viewing current OEE key figures and other KPIs.

Archive Management System

The new Plant iT archive manager / brewmaxx archive manager module enables the archiving of all transaction data of the control system and its presentation for several years. Access to the archive manager is simple using standard Plant iT / brewmaxx clients.



Operating dialogues
in the Operation
Manager

Dashboard of the
Operation Manager

Stand-alone MES & Batch Cockpit

Stand-alone MES Solution

Plant Integrate iT and brewmaxx Integrate are new, stand-alone MES basic systems that can be used together with or without our process control systems. Based on standard software components (e.g. SSRS from Microsoft), information from various sources is centrally processed, prepared and displayed on a wide variety of end devices via the web.

New Automation Classes

New automation classes have been developed especially for SIMATIC controllers, type S7-1511 to S7-1518. These newly created classes are particularly suitable for connecting micro plants and package units (e.g. pasteurisation unit, CIP) and provide a further key component for modular automation (MTP).

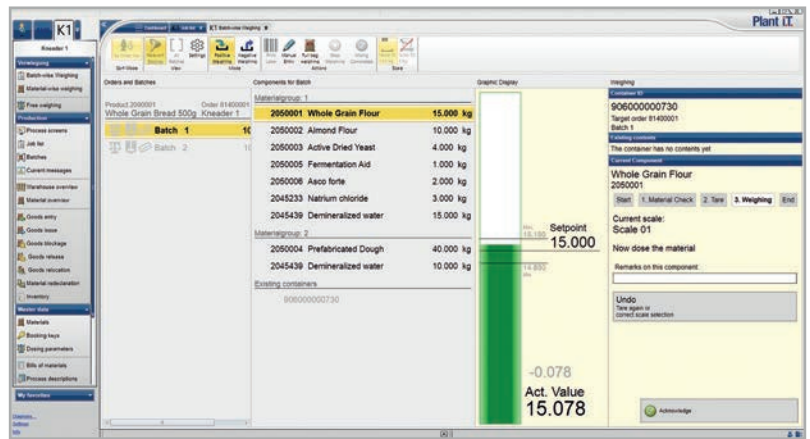
Batch Cockpit

As an option to the new MES solution, Plant Integrate iT Batch Cockpit / brewmaxx Batch Cockpit is a useful add-on for post-processing manually entered production data. The add-on enables the subsequent input of non-automated processes, offers freely definable filters for targeted analyzes of production data and has an audit trail function for viewing the batch record.

The screenshot displays the Plant Integrate iT Batch Cockpit web interface. The main header shows 'TT1 production - this week' with filters for 'Filter with: 2016-W39 (09/19/2016)', 'Process unit: 04 Filtration BE7', and 'Batch type: TT1 Production'. A sidebar on the left contains navigation links like 'Home', 'Reports', 'Dashboards', 'Batch Tracking', and 'Batch Cockpit'. The main content area shows a list of batches on the left and a detailed view of 'Batch 01101940.1' on the right. The detailed view includes a table of production steps with columns for 'Process type', 'Source', 'Material', 'Batch type', and 'Current quantity'.

Process type	Source	Material	Batch type	Current quantity
4 - 01 OT Removal to station	03 Fermentation	Raw beer 20	013 Production	56.156 m³
4 - 01 Filtration dosing	0710650	(020940)	21100365.1	69.893 m³
4 - 01 Filtration dosing	06 Dosing	Filter additives 2		24.017 kg
4 - 01 Filtration dosing	05 Dosing attem	CG7006. Farbst	4506447213.046	
4 - 01 Filtration dosing	05 Service units	04 Appliances 2		34.893 m³
4 - 01 Filtration dosing	11 DIA	(DIA)		

Plant Integrate iT Batch Cockpit



Weighing masks in Plant Batch iT MWS

OPC UA Server, Maintenance Management & MWS

OPC Unified Architecture Server

OPC UA is the manufacturer-independent communication protocol for automation applications in the process industry. Process and production data can thus be exchanged even faster and more securely with partner systems such as SCADA, ERP or quality management systems, and the continuous communication from individual sensors and actuators to the ERP level is optimized. With OPC UA, the connection of package units or intelligent peripheral modules is fast and simple. Built-in security mechanisms ensure maximum IT security when transferring data points. Secure and ideally prepared for the implementation of Industry 4.0 applications.

Maintenance Management Solution

Plant Direct iT Maintenance / brewmaxx Maintenance is a parameterisable solution for evaluating and planning maintenance tasks. With this add-on, individual automation objects, such as valves, motors and frequency inverters, and entire package units can be managed in a clear and concise manner. Essential functions are the automatic evaluation of system classes, the individual parameterization of maintenance, the graphical

evaluation of the switching cycle and – in terms of predictive maintenance – the display of the expected next maintenance date.

Intelligent Weighing Assistant

The add-on Plant Batch iT MWS (manual weighing system) is an assistant system for guided, manual weighing processes. It offers reliable visual monitoring of manual weighing processes, automatic selection of suitable scales, label printing (including job data), weighed components and, if necessary, hazard symbols. The operating staff is reliably guided through the weighing process by means of five different colour gradations and can thus, for example, process part lists in a clear and concise manner. In order to offer the best possible support for processes at the operating station, the application contains workflow data, including, e. g., information about required protective clothing or how to handle certain materials.

System advantages

Technical and technological innovations

There are many good reasons for using a Plant iT or brewmaxx PCS. A few of them are listed below:



Compiler-less system architecture

Plant iT & brewmaxx enable process changes without having to stop production.

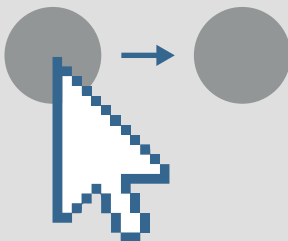
Cost and time savings; minimal risk in case of migration or system extensions, operational flexibility



Standard operating system and database software

Plant iT and brewmaxx are exclusively based on Microsoft operating systems (Windows) and databases (SQL).

Flexibility and transparency; investment protection; detailed visualization of the application for the user; very high level of user acceptance



Process image design via drag & drop

Graphic objects (vessels, valves, pipes) and process pictures can be created very easily using the Process Graphics Designer. A library of industry-specific process graphics are available, which can be inserted via drag & drop and linked automatically to the field devices.

Time and cost savings; Engineering independent system; the integrated application enables, amongst other things, the creation and version management of individual graphic objects and templates

Multilingual process control system

The system is available in the following languages: English, Spanish, German, Russian, French, Portuguese and Chinese. Also full Unicode support is provided.

Independent system, investment protection, transparency; usually simple integration into the existing IT infrastructure





Integrated process recording and replay

Thanks to the add-on Visu-Recorder, Plant iT & brewmaxx are the only systems that offer an application which records all historical process data and allows it to be replayed through the operators terminal.

Transparency and knowledge transfer; perfect application for continuous improvements and staff training

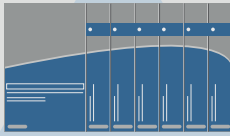


Central user interface

The new user interface has been developed to the latest standards and with the help of usability experts.

Time savings; new operators become familiarized with procedures in a minimum amount of time, high level of user acceptance; simplifies change management

Schneider
Electric



Rockwell
Automation

Siemens

PLC-based process control system

Plant iT & brewmaxx have been developed for programmable logic controls from Schneider Electric, Siemens and Rockwell Automation.

PLC manufacturer independent; maximum flexibility, Standardized solution, globally deployable

MES inside

Integrated MES functionalities

Plant iT & brewmaxx contain integrated MES and energy management functionalities. Information can be visualized and evaluated more effectively using easy-to-create and flexible analysis dashboards. A browser-based web portal enables reports to be opened online, irrespective of where the user may be physically.

Cost and time savings; central system solution with standard interfaces to external systems (e. g. LIMS, ERP).



Object-oriented process control system with automation classes

The need to individually create PLC code is dramatically reduced. The standard Plant iT & brewmaxx version already includes numerous pre-configured automation classes.

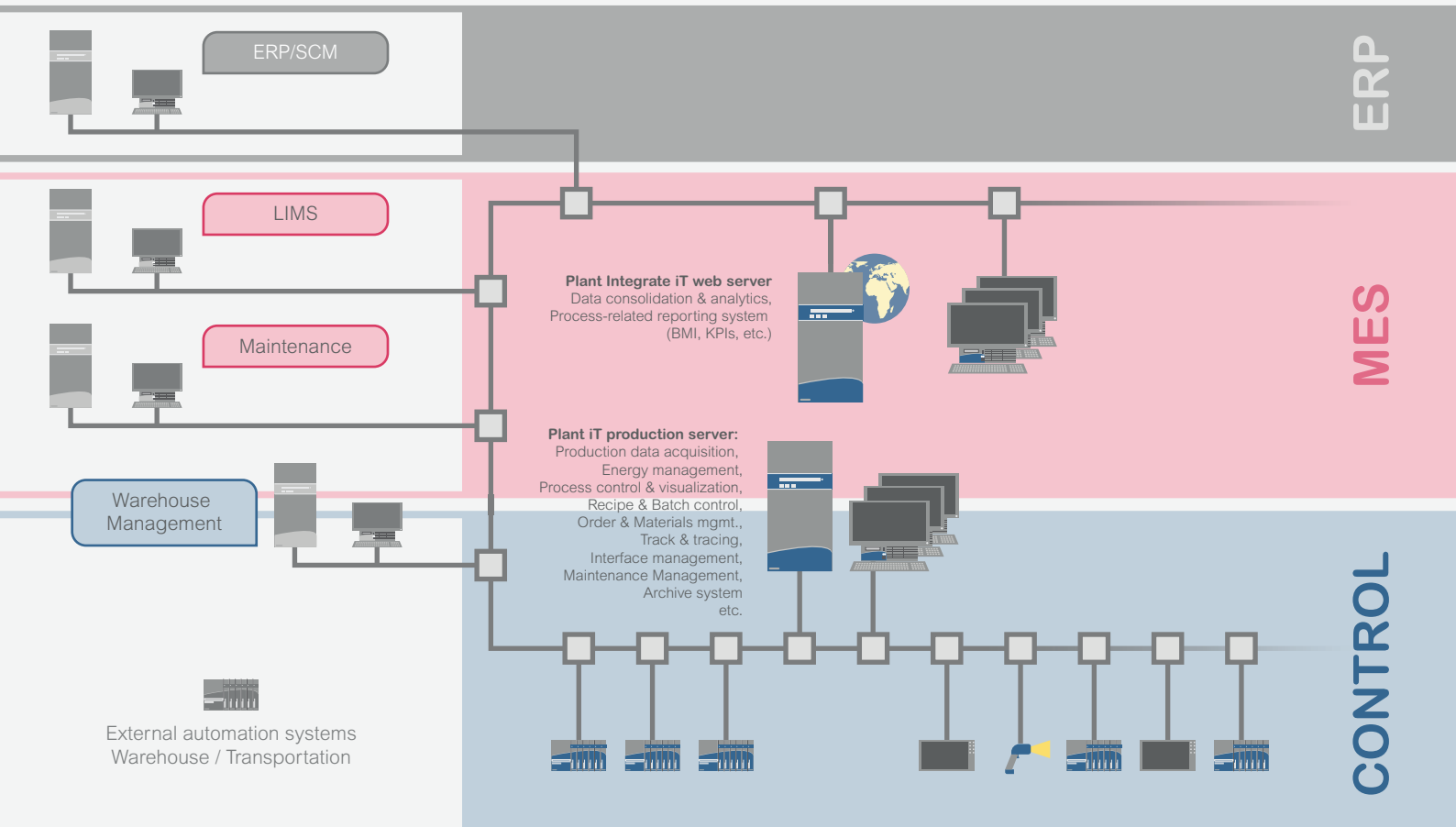
Transparency and knowledge transfer; the module library supports quick commissioning and simple configuration

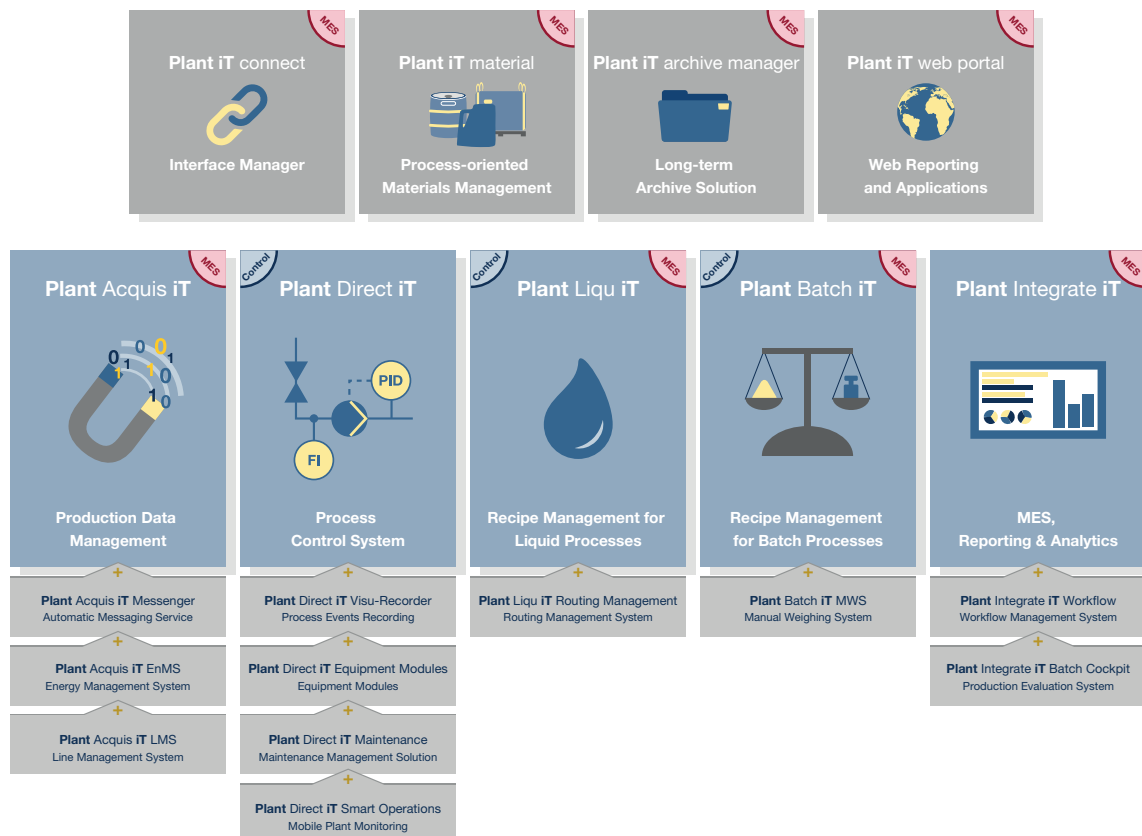
Plant iT.

System requirements



System overview





PLANT iT AT A GLANCE

Plant iT is an integrated and modular software platform, consisting of base systems, modules and add-ons which can be combined flexibly. The core systems as well as the modules and add-ons, are seamlessly integrated, with a central user interface across the system.

The following base systems are currently available:

- Plant Acquis iT – Production data management
- Plant Direct iT – Process control system
- Plant Liqu iT – Recipe management for liquid processes
- Plant Batch iT – Recipe management for batch processes
- Plant Integrate iT – MES, Reporting & Analytics

If required, the Plant iT modules can be combined with the base systems. This is possible at the start of engineering or at a later date. The individual modules have been developed for typical fields of application and

complement the respective base systems with additional technological functions.

The following modules are currently available:

- Plant iT material – Process-oriented Materials Management
- Plant iT connect – Interface Manager
- Plant iT webportal – Web Reporting and Applications
- Plant iT archive manager – Long-term Archive Solution

The following add-ons are tightly integrated with the base systems:

- Plant Acquis iT Messenger
- Plant Acquis iT EnMS
- Plant Acquis LMS
- Plant Direct iT Visu-Recorder
- Plant Direct iT Equipment Modules
- Plant Direct iT Maintenance
- Plant Liqu iT Routing Management
- Plant Batch iT MWS
- Plant Integrate iT Workflow
- Plant Integrate iT Batch Cockpit

PDA

Production Data Acquisition

An increase in efficiency is usually a key requirement when building new production plants or modernizing existing ones. It is essential to optimise production processes, thus increasing productivity while safeguarding product quality. However, the achievement of these goals requires accurate data. Real-time information from the production plant must be available at all times. This is the only way to build a solid basis for all further optimization measures.

Production data acquisition provides the foundation for production optimization whilst taking product liability and quality assurance into account. The following data is basically acquired:

- Machine and process data (statuses, measured values, meters, etc.)
- Energy data
- QA-relevant data (e.g. analysis results)
- Maintenance-related information (operating cycles, operating times, etc.)
- Manual inputs (e.g. laboratory values, offline meter values, additional information)

To ensure the collected data is available throughout the company for analysis and optimization purposes, it must be provided in a consistent and standardised fashion, ideally in a process control system. This involves, however, the realisation of specified data structures and standardised interfaces

to the individual control units of the machine suppliers. We employ the Weihenstephan Standards, which we helped to develop, to guarantee this level of data integration and standardisation.

Complex plants are often supplied as individual plant sections with self-contained control systems. These isolated applications are a particular challenge for integrated automation. Our PDA system Plant Acquis iT allows us to also acquire and provide data to sub-systems. Therefore we can offer a standard

- operating philosophy,
- data acquisition,
- data evaluation and
- data archiving.



Plant Acquis iT

Production data management

Plant Acquis iT acquires, processes and records, operational, machine and energy data for the plant-wide information management. In particular it takes into consideration the heterogeneous and complex nature of subordinated automation systems from which data are acquired.

OPC is used as preferential interface. For systems not supporting OPC an additional, driver-based interface is available. It is designed in such a way that it avoids interfering with the functionality of subordinated systems. Using connection methods like this, easy and flexible interfacing with various controller platforms is possible (e.g. Schneider Electric, Siemens, Rockwell Automation or others).

Data acquisition

Plant Acquis iT acquires and processes (both online and offline) various types of data like

- messages (binary values),
- measured values (analogue values),
- counter impulses/counting results and
- character strings.

In accordance with the Plant iT class concept, corresponding objects are created and parameterised for the recording of these values. The standard system includes additional types of objects that provide particular functions. They can be used either for data recording or processing:

- Manual input objects allow the input of parameterised data points (e.g. laboratory values).
- Formula objects enable the direct mathematical and logical processing of recorded measurements (e.g. the simultaneous calculation of derived values and the acquisition of the actually measured value).

- Event objects can trigger complex activities in the system (e.g. batch switch-over or automatic reporting).
- Maintenance objects offer the possibility of setting up counters for operating hours and switching cycles. They create the basis for using a maintenance management system.

Data analysis

Plant Acquis iT provides the fundamental functions for the immediate analysis of production data:

- Trend representation of analogue and binary data in terms of freely parameterizable and storable views
- Efficient error handling by means of freely parameterizable message groups and profiles
- Weak-point analysis with the help of message hit lists, e.g. analysis of error messages according to frequency or length of appearance

Data may be selected either by time periods, orders or batches. The results can be further refined by easily selecting from entire plant areas, individual units or single objects. For more complex analysis the system offers a data export add-in to Microsoft Excel.

Visualization

Plant Acquis iT also includes a visualization feature. The focus is on providing plant or unit-related status overviews in combination with single, operator-controlled entry of set points. In respect to the functional principle and the applied engineering tools, the visualization feature is fully compatible with the visualization Plant Direct iT offers. The use of identical infrastructure allows visualization functions of Plant Acquis iT and Plant Direct iT to be combined in a homogeneous operator interface.

Open for extensions

Due to its open architecture Plant Acquis iT provides optimal possibilities for application specific enhancements like Excel-based reporting or filling and packaging management.

Via macro enabled standard interfaces Microsoft Excel accesses the central database and enables the flexible creation of reports. The advantages:

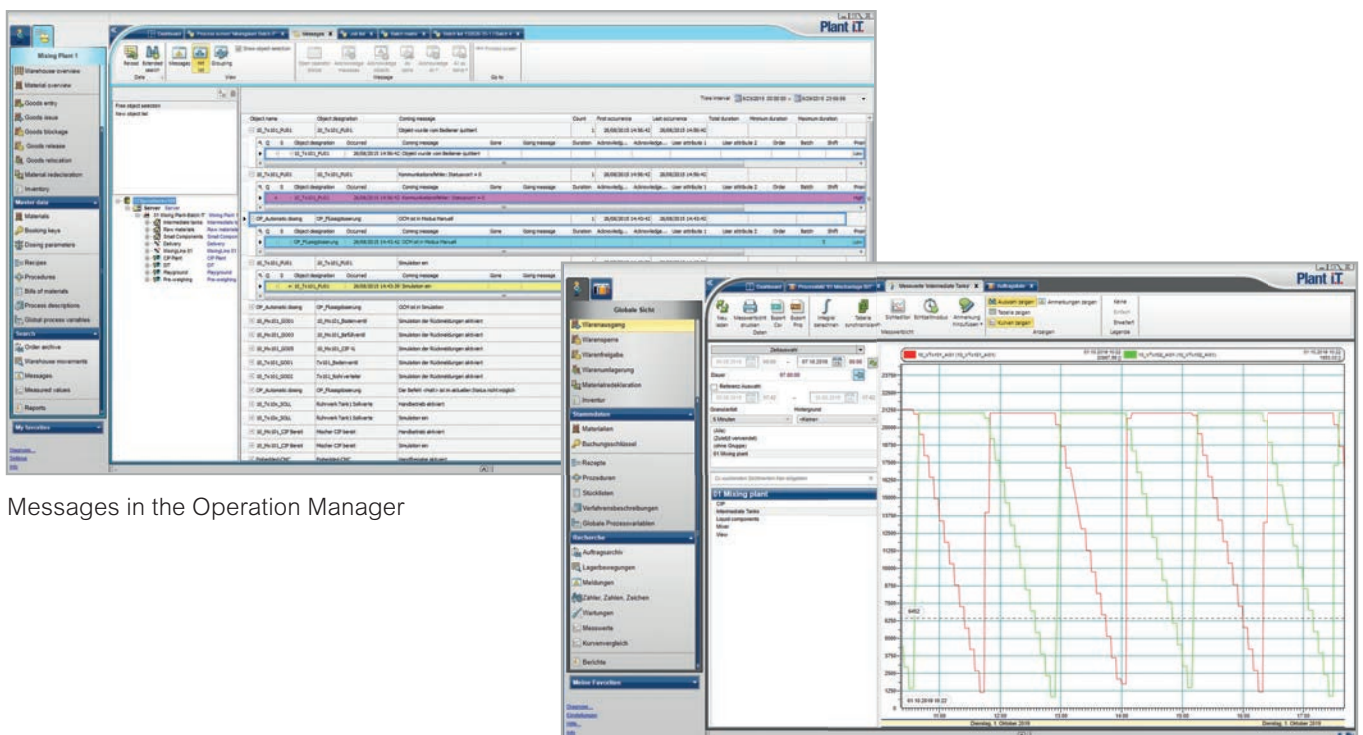
- Utilisation of powerful analytic and presentation functions of Microsoft Excel allows design of tailor made reports based on the acquired production data
- Users familiar with Microsoft Excel can customise reports to suit their requirements

As an alternative the system also offers open interfaces for integration into HTML or XML-based reporting.

Plant Acquis iT also provides a good basis for filling and packaging management and can provide functionality like:

- line-related order lists including data exchange with sub-ordinated control systems,
- plant monitoring,
- filler stop analysis,
- error analysis and
- performance analysis (e.g. following OEE).

These functions strongly support the operating company in optimizing the plant performance.



Messages in the Operation Manager

View of measured values in the Operation Manager

Plant Acquis iT Messenger

Automatic Messaging Service

Besides clearly structured visualization techniques and high-performance data management solutions, reliable alarm systems are an indispensable component for the automation of processing plants.

Using Plant Acquis iT Messenger, plant operators are always kept informed, even when they are not actually on site. In its role as a remote messaging system, the add-on notifies responsible staff in the event of critical alarms.

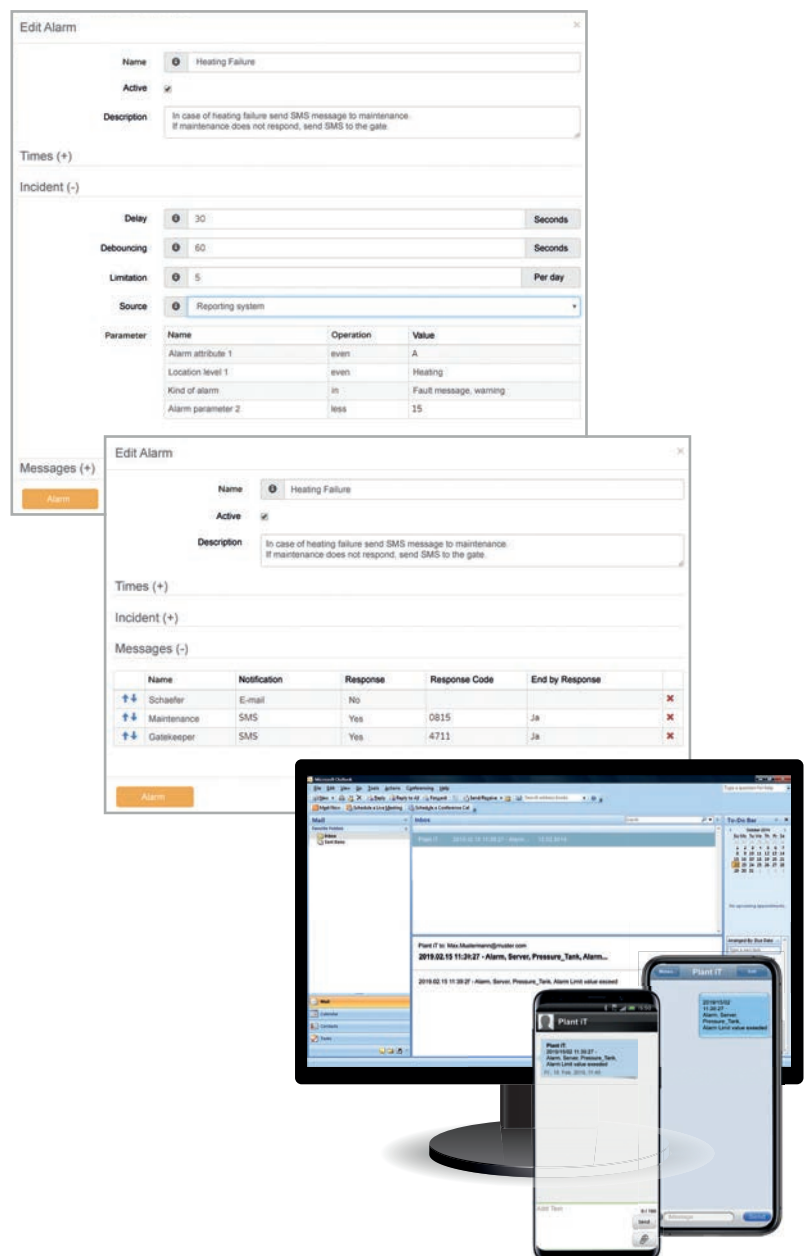
It is possible to set individually which type of message is sent at which time to which person and via which channel. The triggered messages are subsequently logged and archived in the Plant iT system.

The Plant Acquis iT Messenger supports the following communication channels:

- Short Message Services (SMS)
- E-mail (SMTP)

Messages that are not marked as received within a predefined period of time are sent directly to the next recipient specified in the escalation plan.

The add-on can be optionally installed as long as the various communication methods are supported on-site by the necessary technical infrastructure.



Plant Acquis iT EnMS

Energy Management System

Plant Acquis iT EnMS is the energy management system from Plant iT and can be integrated as a process control system add-on at any time. It allows production firms to realise their full potential for improving energy efficiency, to determine and document energy consumption for the production plant and to constantly improve energy consumption.

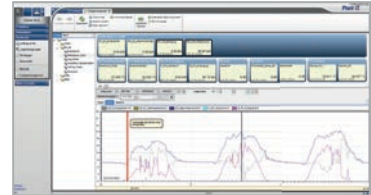
The basis for an energy management system (EnMS) is the recording of all the as-is states of primary and secondary energy sources and other media. A detailed analysis is carried out via energy monitoring. This data is subsequently displayed through uniform reporting – compared with variables over various time periods. The parameters of the intelligent alarm system (when rapidly approaching or exceeding limit values) are set using defined limit values for load peaks and consumers. This enables operators to take precautionary action: Load peaks are avoided and load valleys used in the best way possible.

Energy data acquisition

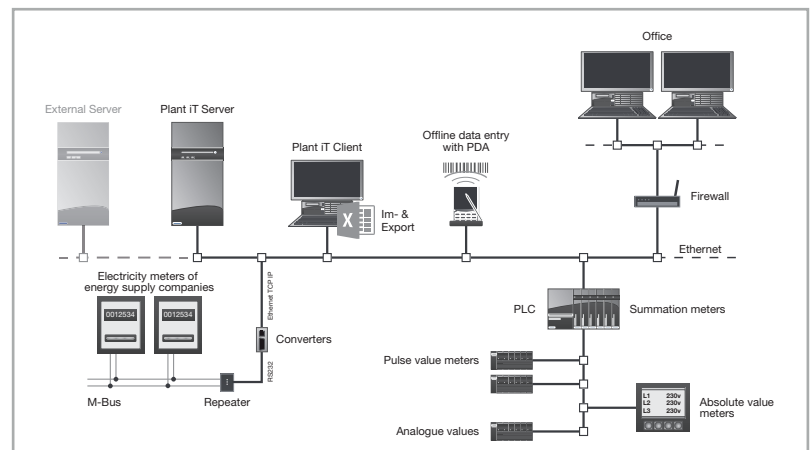
Plant Acquis iT EnMS enables several methods of intelligent energy data acquisition. The traditional method of acquisition contains, for example, the metered values from pulse and absolute value meters, calculated (virtual) meters, summation meters, integral meters, differential meters and analogue values (e.g. ambient temperature). Depending on the available interface, the supply meters of energy supply companies can be connected directly, e.g. , via M-Bus and respective converters. Furthermore, Plant Acquis iT EnMS supports the offline acquisition of energy values with the aid of mobile data acquisition devices (PDAs). These identify the meters using barcode labels and thus enable the manual input of meter values. Additionally, the import and export of data can occur via MS Excel.

Plant Acquis iT EnMS supports the data transfer of energy values both from the Plant iT server and from external servers and databases. The evaluation and analysis of this data can occur either at a workstation (Plant iT Client) of the process control system or alternatively at an external office PC with the aid of an energy frontend.

Secure your competitive advantage with Plant Acquis iT EnMS and profit from a qualified energy management system according to the regulations of the German Federal Office for Economic Affairs and Export Control (BAFA). Small and mid-size businesses but also major corporations use our energy management system. We will be happy to provide you with a tailor-made plan and introduce Plant Acquis iT EnMS in your company.



Plant Acquis iT EnMS is fully integrated in the user interface of the process control system.



Architecture of energy data acquisition with Plant Acquis iT EnMS

Plant Acquis iT LMS

Line Management System

Bottling and packaging of drinks and foodstuffs are the final steps in the value-added chain of food production. Avoiding downtime is a major challenge, because downtime means losses. Since even the shortest amount of downtime, so-called micro-stops, can reduce a system's effectiveness significantly. Improvements are only possible when the key causes of downtime can be identified. Within this context, a Line Management System provides a great solution and helps to determine the causes of downtime. Plant Acquis iT LMS from ProLeiT offers an add-on for the production data management system Plant Acquis iT, thus enabling simple access into the world of Line Management.

In contrast to traditional LMS solutions, Plant Acquis iT LMS allows fast, simple and cost-effective implementation with reduced sensor technology, licensing and engineering requirements. Additional features provided by the add-on include an interface to existing ERP systems, and thanks to user-friendly operation via a web browser, the time-consuming and complex task of installing a client is no longer necessary.

Minimizing downtime, maximizing plant efficiency

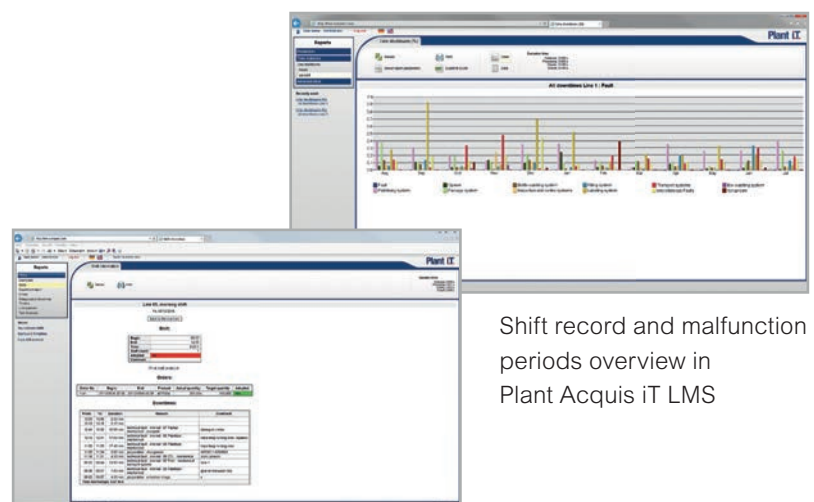
Plant Acquis iT LMS records system and machine downtime automatically, reliably and exactly. The causes of downtime and other system or order-related data can be entered at any time manually via drop-down boxes. And predefined causes of faults can be enhanced and extended according to your individual needs. The threshold value for micro-faults can also be defined individually.

The entire data can be analyzed down to the finest detail with the help of the drill-down-function: downtime periods can then be arranged hierarchically with varying levels

of detail from the overall bottling plant to individual units. Plant Acquis iT LMS then outputs the generated reports at every office PC in the Intranet or on smartphones and tablets. Furthermore, customer-specific data can be entered and evaluated.

Optimum performance thanks to comprehensive functions

The extensive range of the add-on Plant Acquis iT LMS addresses the needs of varying professional groups in the process engineering industry: for instance, production managers profit from the fast, web-based lists stating the causes and times of faults, while supervisors can use a generated report to gain an overview of the current plant situation before starting a shift. The user-friendly, menu-guided user interface allows plant operators to quickly and, in particular, consistently determine the causes of faults. Paper-based recording, which was always prone to errors, is now a thing of the past. Maintenance staff can extend Plant Acquis iT LMS simply by configuring parameters. They are also provided with a quick overview of a plant's weak points and can identify its potentials for optimization.



Process control

There are SCADA solutions and process control systems that offer little or no industry functionality whatsoever. Some systems only cover the functionality of a certain type of machine or a specific process sector. However, this prevents integrated information processing. Plant and machine manufacturers are increasingly faced with the challenge of these problems and therefore demand a centralised, efficient and industry-based overall solution for integrated automated production plants.

Plant iT offers this centralised solution for our core industries: food & beverage industry and pharmaceutical & chemicals industry. Our process control systems allow the integration of all production line processes or an entire production facility. The high level of standardization of our control systems guarantees numerous advantages, such as the simplification of processes (engineering) or the application of a standard user interface (operation). The latter means that an overview of extremely complex production methods can even be delivered for staff at various production sites: irrespective of whether they are in Europe or the USA using Schneider Electric, Siemens or Rockwell Automation controllers.

Our transparent and compiler-less process control system Plant iT has a modular design and complies with the principle of “parameterisation instead of programming”. This enables us to carry out add-ons or modifications without having to stop production. The elimination of individual programming codes ultimately leads to a highly transparent and flexible automation solution. The central engineering environment with a common database for all the base systems and modules enables rapid commissioning and reduces the amount of required maintenance and add-ons for future applications.



Plant Direct iT

Process control system

Plant Direct iT includes – beside the functionality of Plant Acquis iT – an extensive set of technical and technological, pre-configured automation classes. The range of technical classes includes a functionality for e. g. valves, drives, controllers, and controlling frequency converters. The technological classes, on the other hand, provide the functionality for mapping process sequences. The main representatives of this group are phase controllers, the Object Control Matrix (OCM) and the logic class. Using these classes, the parameters of the process functionality become fully configurable – from the valve to the sequence control.

Parameterization instead of programming

Plant Direct iT supports parameter-based process control. This ensures that previously parameterised sequences can be varied easily by dynamically combining them with various parameter sets, i.e. for considering different operating modes of a plant or products to be processed.

The client/server architecture, the intuitive user interface and the object-related class concept turn Plant Direct iT into a future-proof automation solution in comparison to traditionally programmed controls with higher-order visualization.

Intelligent automation classes

A secure process control, combined with maximum transparency for the operator's staff, and efficient engineering are the main requirements for a control system, irrespective of whether it is used for new plants, plant extensions or retrofitting. Plant Direct iT enables extensive parameterisation of technological functionalities. Only specific

requirements have to be programmed directly. The class concept of Plant Direct iT guarantees the highest functional quality, as similar objects are controlled and monitored by just one software module. This ensures reusability and enables the effective qualification and validation of the system, if required.

Plant Direct iT provides maximum flexibility for interventions during operation and therefore reduces the frequency and duration of downtime. The system permits adaptations during production without neglecting safety aspects, since the system can log all changes in detail. This applies to all types of operation interaction as well as to any intervention with the system's engineering (Audit Trail).

Class structure

A class in Plant iT includes a closed system consisting of three seamlessly integrated components and completely controls the function of a technical component (e. g. a valve) or an entire step-controlled process sequence:

1. Class description

The class description is located in the central database of the system server and includes the structured mapping of all the properties of this class, including all status information and the command set.

2. Operating dialogue (class dialogue)

The operating dialogues are available to the operators in the process images on the client via which the system is controlled. Each individual object can be operated and monitored via the operating dialogues.

3. Control logic (class handler)

The control logic is implemented in the PLC and controls the technical component (e. g. the valve) via the I/O system. All the components form a functional unit and are synchronized

with regard to status information and operating parameters. These parameters can be changed during operation. This provides maximum flexibility with regard to the selection of changes to be transferred and the time of transfer. If necessary, a single parameter can be changed for a specific object during operation.

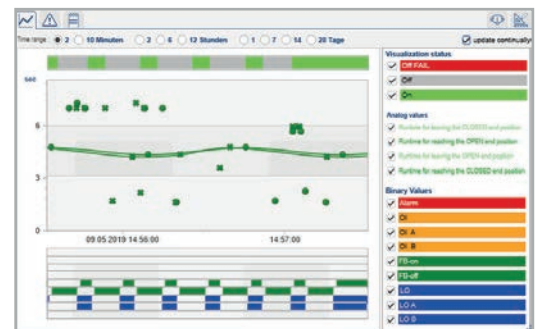
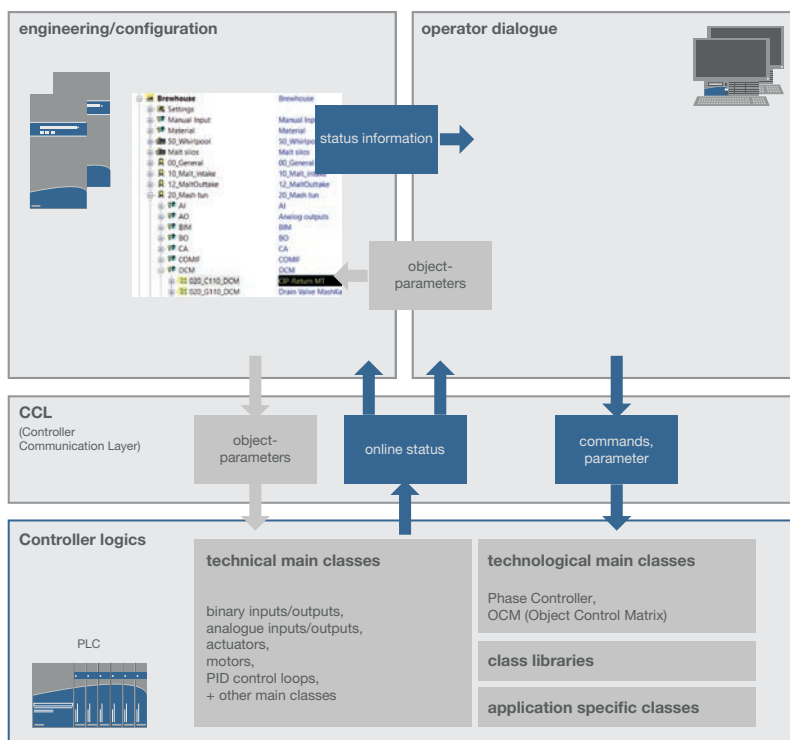
The system standard already includes an extensive set of technical and technological classes which is constantly further developed. The basic technical classes range from a basically equipment-neutral functionality, e.g. valves, drives, measured values and controllers, through logic functions to highly-qualified, equipment-specific functions, e.g. complete control of a certain model range of frequency converters.

The Sequence Controller and the Object Control Matrix (OCM) provide two high-performance technological classes for mapping complete process sequences. The system additionally supports the development of further class libraries. The required infrastructure, including templates and documentation, is available in the system

standard. Plant iT objects can be cascaded and provide an API, which permits access from conventional PLC code. Since the Plant iT system software and application-specific PLC programs can be operated in parallel in just one controller, the system also allows the realisation of very complex tasks.

Creation of customer-specific classes

The transparency of Plant iT enables the development of individual standard automation classes, which can be seamlessly integrated into the system and flexibly combined with the base classes. Respective templates and documentations are part of the base system. Whether plant operators, machine or plant suppliers wish to standardise and encapsulate their know-how in individual classes, or system integrators use an individual class library as an efficient engineering tool and visible proof of their industry know-how - Plant Direct iT is the perfect platform.



Operator dialogue of the class Analogue Input

The Plant iT automation class principle

Integration from valve to sequence control

Plant Direct iT not only provides classes for technical objects, but also offers classes for parameterizing complete process sequences according to various methods. Continuous processes are, in particular, preferably mapped by a purely interlock-based sequence control. Besides the classes for automation objects, a logic class is available via which the activation and interlock conditions can be parameterised for each individual object.

The second method is the mapping of process sequences in the form of sequences for which Plant iT also provides the respective classes.

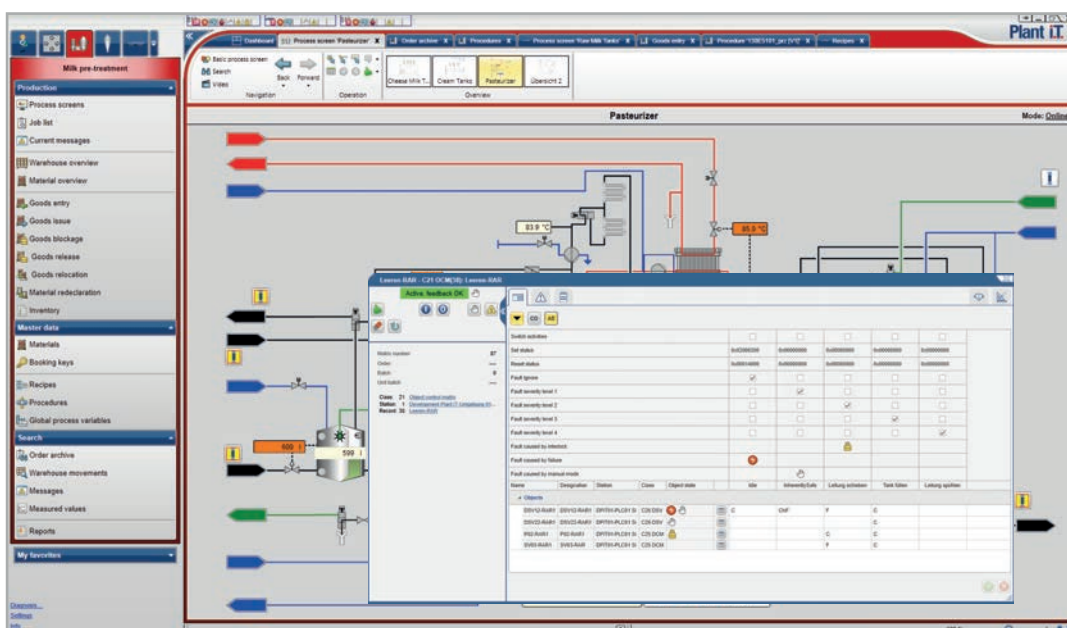
The “OCM” class enables the parameterisation of activations and the monitoring of a definable group of technical objects (actuators and sensors) for various activities that need to be executed in the process sequence. In a matrix, the parameters of each object are configured to determine how it should be treated when calling a specific individual activity (e.g. monitoring the “Off” and “Alarm” status for “Inherently safe” activity). The activities defined in an OCM can be called in any combination via a higher-order sequence control.

The “Phase Controller” class enables the parameterisation of entire process steps, including the required transitions and branch targets. Calling OCM activities within these steps results in a completely parameterised sequence control.

Objects of these two classes can be implemented as independently operating instances, but are primarily intended to act within the context of a higher-order sequence control (e.g. Plant Liqui iT or Plant Batch iT) which dynamically provides them with order and recipe-specific parameters.

Efficient source/target control

The application of Phase Controller and OCM enables variable process control with regard to the allocated plant resources. Parameterisation of the technical objects to be used by an OCM occurs as object lists which can be dynamically allocated to an OCM matrix. Activities for a specific sequence must therefore only be parameterised once. They can, however, be executed for various resources (e.g. source tanks) by combining different object lists.



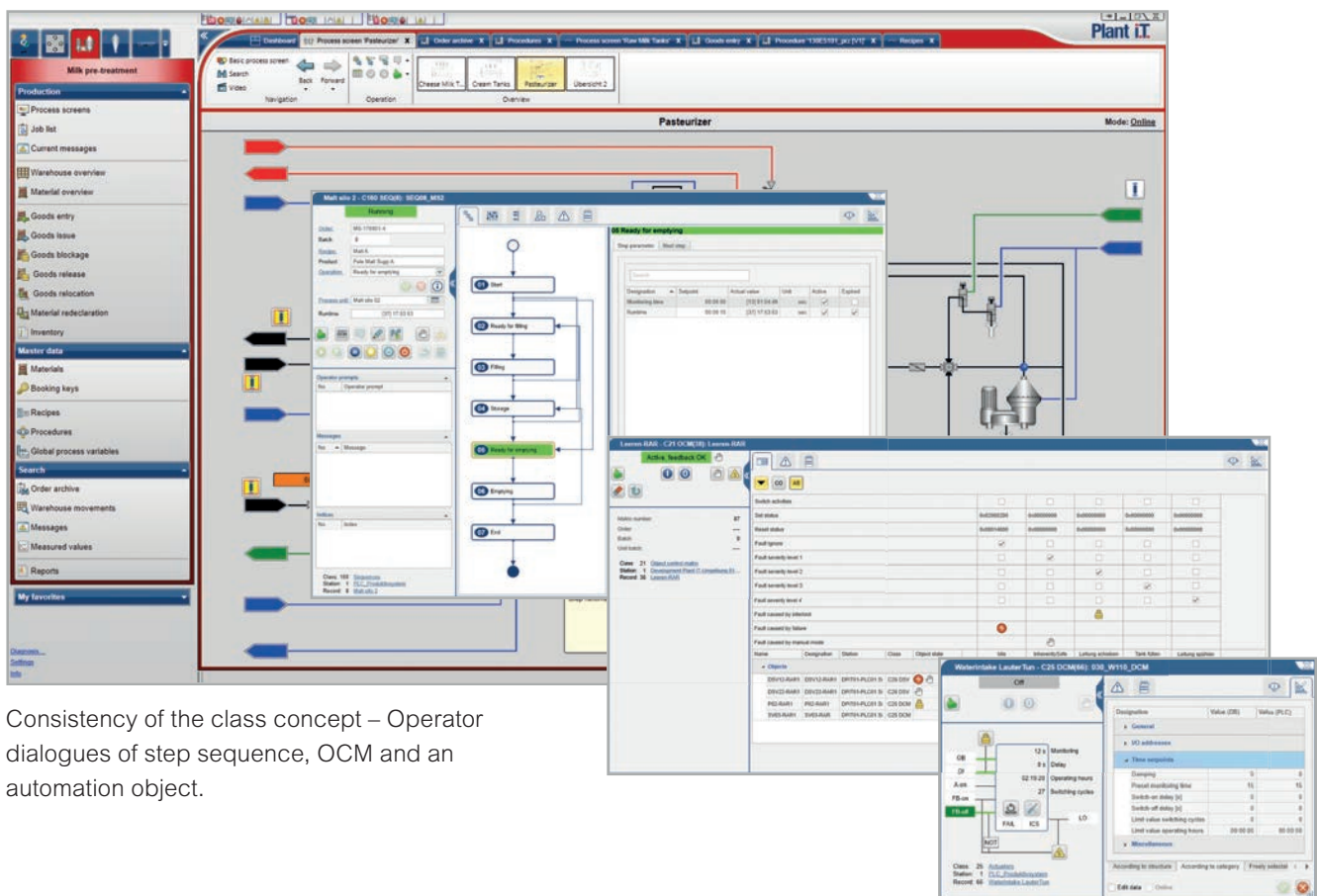
Object Control Matrix (OCM) with an automation object

Material-related process control

Plant Direct iT allows the realisation of material-related automation solutions. Plant iT material, the module for process-related materials management, can be accessed directly from the process control. Transaction-accurate booking records can be created for each individual material transaction in more or less real-time from the current process via system-internal standard functions. This enables material-related process control, including inventory management, and – combined with a higher-order order management – batch tracing.

Automatic record and playback of process activities

The unique Plant Direct iT Visu-Recorder automatically records and provides playback of process activity. The add-on runs directly within Plant iT. No additional hardware, software, or infrastructure is required. The recorded historical data from the process can be replayed directly from any operator workstation. The date and time in history, along with playback speed can be selected freely. While monitoring your plant in real-time, then being able to jump back in time to analyse and compare performance is an invaluable tool for developing best practice.



Consistency of the class concept – Operator dialogues of step sequence, OCM and an automation object.

Plant Direct iT Maintenance

Maintenance management solution

Efficient maintenance planning is essential to ensure and maintain maximum plant availability. The add-on Plant Direct iT Maintenance is a parameterizable solution for evaluating and planning all maintenance tasks. Individual automation objects, such as valves, motors and frequency inverters, and entire package units, such as compressors, packers or pasteurization units, can be clearly managed thanks to the intuitively designed solution.

Plant Direct iT Maintenance provides the process industry with real potential for optimization in several respects: the extensive analysis functions allow maintenance staff to examine the maintenance objects with regard to varying categories, including operating cycles, operating hours or the service cycles defined in each case. Thanks to the add-on, shift supervisors can, at the start of each shift, gain an overview of which maintenance measures have been carried out and which production units need to be maintained/serviced in the near future. Production managers, on the other hand, benefit from greater machine and plant availability and the resulting increase in productivity.

Key functions at a glance:

- Automatic evaluation of system classes,
 - e. g. digital control module (DCM), motor control (MC) and user classes
- Extensive analysis options
 - Evaluation of the frequency and duration of operating cycles, operating hours and specified service cycles. If desired, the database can be exported to Excel.
- Individual parameterization of maintenance
 - Free parameterization options for any number of maintenance operations per object via operating cycles, operating hours or service cycles (also possible via Excel)
- Transparency and operating convenience
 - Reliable graphical representation with varying colour gradations for determining pending or already exceeded maintenance intervals
- Graphical evaluation of operating cycles
 - Clear mapping of operating cycles that have occurred with regard to frequency and duration per maintenance object (deviations per month / deviations per object)
- Predictive maintenance
 - Display of the expected next maintenance date based on collected data

The main goal of every company is to increase efficiency and productivity. However, there are factors that have a negative impact on productivity, throughput and performance. The challenge is to localise these factors quickly and intuitively!

No additional hardware, software or infrastructure is required to install the add-on. The recorded, historical process data can be played back directly from every operating station of the control system.

Recorder. It is also possible to change over at any time from current real-time monitoring of the production plant to a historically selected point in time. Production analyses can therefore be carried out quickly and conveniently.

The Visu-Recorder not only supports constant improvement of the plant but also the upskilling of staff and process optimization worldwide. The add-on is additionally a useful tool to shorten commissioning times significantly.

The screenshot displays the Plant Simulation software interface. The main workspace shows a process flow diagram for a chemical plant. At the top, there are two large circular tanks labeled 'Tank 01' and 'Tank 02', each with a level indicator showing '0.00 m' and '0.00 m' respectively. Below the tanks, there are two large vertical cylindrical vessels. The flow starts from a 'Water' source on the left, passes through a valve and a pump, then splits into two parallel paths. Each path goes through a valve and a pump before entering one of the two large vertical vessels. The outputs of these vessels are combined and pass through a series of valves and pumps, eventually leading to a 'Emptying' unit on the right. The interface includes a left sidebar with navigation options like 'Process overview', 'Order list', 'Current messages', 'Hardware overview', 'Material overview', 'Goods entry', 'Goods leave', 'Goods handling', 'Goods release', 'Goods valuation', 'Material calculation', 'Inventory', 'Maintenance', 'Scenarios', 'Routing list', 'Recipes', 'Processes', 'Global process variables', 'Reports', and 'No toolbar'. The top status bar shows 'All lines process under' and 'Process overview: Simulation'. The bottom of the interface features several data windows: 'G256Q001 Filling Line' and 'G256Q002 Emptying Line' on the left, and 'FIFO Filling' and 'FIFO Emptying' on the right. These windows display simulation data such as 'Order: Emptying 21.05.04 18:18', 'Recipe: EmptyingFullProductionOne', 'Step', 'Step runtime: 00:00:00', and 'StepStart: idle'.

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Plant Direct iT Equipment Modules

For context-specific applications

The various equipment modules (EMs) are context-specific applications and optionally available as an add-on for Plant iT systems. Depending on the plant section, manufacturer and function, various equipment modules are provided.

Examples of this include:

- **Equipment module PolyEM:** The EM Polygon calculates a value (Y of X) from a traverse line. Several traverse lines, consisting of 11 support points, are stored in the database. Using a sequence interface, a data set is, e.g., selected according to the recipe and loaded in the PLC.
- **Equipment module WMEM:** The EM water mixer provides a downstream vessel (e.g. a mash tun) with water whose temperature and flow-rate can be adjusted. There are two different modes of operation available, one with two control valves and one with three control valves. Alternatively, a fixed positioning value mode can be operated via a chain of commands.
- **Equipment module AEM:** The EM agitator controls the agitator in a vessel or tank.
- **Equipment module CEM:** With the EM single-stage cooler, one cooler operates with a PID controller. The aim is to reduce the temperature of a product as constantly as possible.

- **Equipment module TEM:** The EM temperature zone is used for controlling the temperature. This module can control both cooling and heating zones via digital valves and via control valves with analogue signals.
- **Equipment module HEM:** The EM heating zone is used for controlling the temperature. It can control heating zones via digital valves and via control valves with analogue signals.
- **Equipment module EZKEM:** The EM single zone cooling cools a vessel to a target temperature. Up to eight valves can be controlled depending on the fill level.
- **Equipment module EWMEM:** Thanks to an additional decoupling filter, the extended EM water mixer controls the temperature and the flow rate of a water mixer.
- **Equipment module AEEM:** The EM extract value uses at least two extract values entered at specific times to determine when the stipulated target extract value is or will be reached.

Designation	Value (DB)	Value (PLC)
Object record valid		Yes
Object locked	No	No
Feedback to OCM	Feedback OK	Feedback OK
Lock supervisor key	No	No
Return status of feedba...	No	No
Report activation	No	No
Station number for CA1	0	0
Contamination area 1	0	0
Station number for CA2	0	0
Contamination area 2	0	0
Type of DCM	DCM witho...	DCM withou...

Class: 610 Route Equipment Module
Station: 6 Development Plant iT-Umgebung 01-...
Record: 2 C610_REM_S06_R02

Automation of continuous processes

Production plants in the beverage industry are often characterised by traditional plant structures and outdated control system technology. Existing stand-alone solutions prevent continuous communication between individual areas of the plant. This is further complicated if SCADA or control systems from various manufacturers, which are unable to communicate with each other at all or only to a limited extent, are used for individual process areas or manufacturing cells. This inevitably leads to reduced performance, as the required level of transparency in conjunction with uniform and centralised automated data acquisition cannot be guaranteed. A measurement of standardised key productivity figures is thus time-consuming and prone to errors due to numerous manual transfers.

Our process control systems, on the other hand, offer the necessary integration – from goods receipt automation, through production to actual product filling – while ensuring compliance to EU Directive 178/2002. We recognised the specific demands of the beverage industry for more than 30 years ago, when we started developing our process control systems. This is why, Plant iT is equipped with the appropriate functions.



Plant Liqu iT

Recipe management for liquid processes

Plant Liqu iT is particularly suitable for controlling and monitoring hybrid processes that contain a mixture of batch and continuous processes. The process control system Plant Direct iT including Plant Acquis iT are seamlessly integrated into Plant Liqu iT, thus offering users the perfect combination of operating convenience, safety and transparency. Plant Liqu iT offers additional automation classes, which have been built to match the requirements of the beverage industry and covers the following key functions:

- Sequence-based process control with configurable parameters and complete integration of the process control system Plant Direct iT
- Technology-related recipe control (definition of procedures consisting of one or several sequences and their combination with dynamically selectable parameter sets)
- Special technological classes, e.g. for realizing transfer processes with automatic change of source or target tanks
- Automatic route control (routing) as well as
- Special functions for tank farm management

When using Plant Liqu iT in combination with Plant iT material, additional material classes, including material parameter management and inventory management, are additionally available as well as complete batch tracing in case of an order-related operating mode.

Similar to all other components of the Plant iT system range, Plant Liqu iT and all its functions comply with the principle of “parameterization instead of programming” and the open system architecture principle. If necessary, Plant Liqu iT also provides the respective interfaces for the software-related integration of application-specific solutions.

The “sequence” class

Plant Liqu iT enhances Plant Direct iT with the option of mapping entire technical and order-related processes in sequences. Each sequence is a class instance with fully configurable parameters in terms of the defined steps, functionality within these steps and their transitions (branching points and step enabling conditions). When engineering the step-internal functionality, already defined objects (e.g. valves, measuring points) and, in particular, the process-related class OCM (Object Control Matrix) are used. Plant Liqu iT classes which have been specifically tailored to the beverage industry (e.g. FIFO for handling queues and automatic tank changes) complete the basic functionality of Plant Liqu iT and enable the parameterisation of entire process sequences.

Each sequence can be monitored in detail via a separate operating dialogue and, if necessary, also controlled. An online view of the transitions of each sequence allows extensive analyses and direct intervention in the process sequence. All relevant events and data, including possible interventions, are recorded and subsequently available in a detailed sequence record for later checks and documentation purposes. During operation, an efficient sequence overview provides a precise overview of all the plant sequences and their current status at any time. If irregularities occur, the operator can intervene directly from this overview.

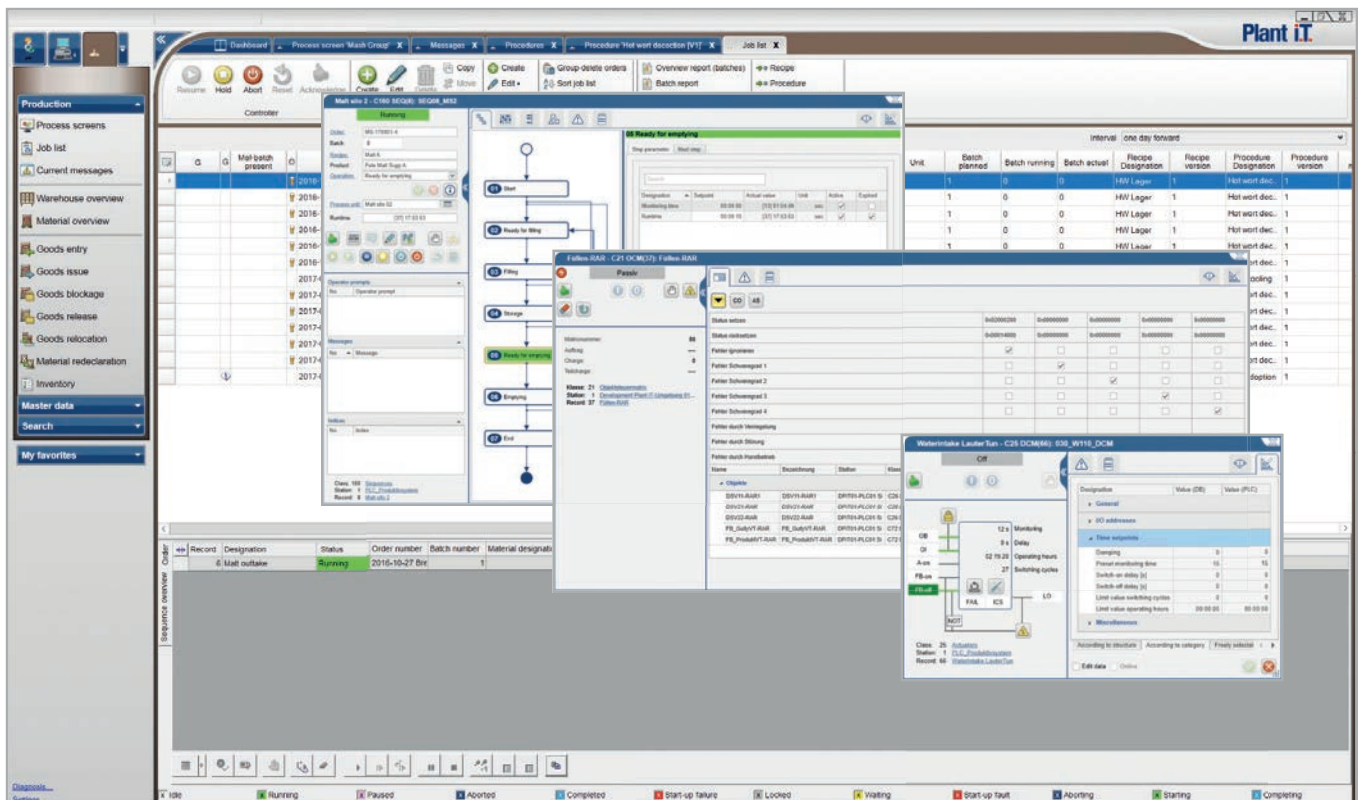
Recipe control

Particularly for plants where a wide range of products and semi-finished products are produced using the same or similar process sequences, Plant Liqu iT offers a special functionality for recipe-controlled processes based on a simplified procedural

model. Process sequences are described as procedures, consisting of one or several sub-procedures which in turn include one or several operations. Each sub-procedure equals an instance of the “sequence” class and the steps defined for this instance represent the operations. By combining this type of procedure with various parameter sets of the same structure, it is possible to generate master recipes, e.g. for producing various products with the same procedure. The system differentiates between recipe and equipment parameters. Recipe parameters are dependent on products. Various replacement methods are available for the recipe parameters; these methods specify for each parameter whether it should be treated as a constant with regard to a recipe or can be individually specified at the beginning of a process sequence. Equipment parameters are always independent on products. They describe technical properties of the plant and are thus generally treated as constants.

Route control (routing)

For multi-product plants with a network structure, Plant Liqu iT enables the complete parameterisation of the usually complex mapping of various routes which might have to be selected depending on the product. This considerably facilitates operation and system adaptations for modifications, extensions or procedure adjustments. A special equipment module, the REM (Route Equipment Module), in connection with OCM objects enables the parameterisation of a fully automatic route control. The sequence addresses a variable number of REM objects which can be allocated to it either statically (technically determined routes) or dynamically (source, target or product-dependent routes). Depending on the part routes or plant sections to be used, each REM addresses statically or dynamically allocated OCMs which check the actuator and sensors allocated to them.



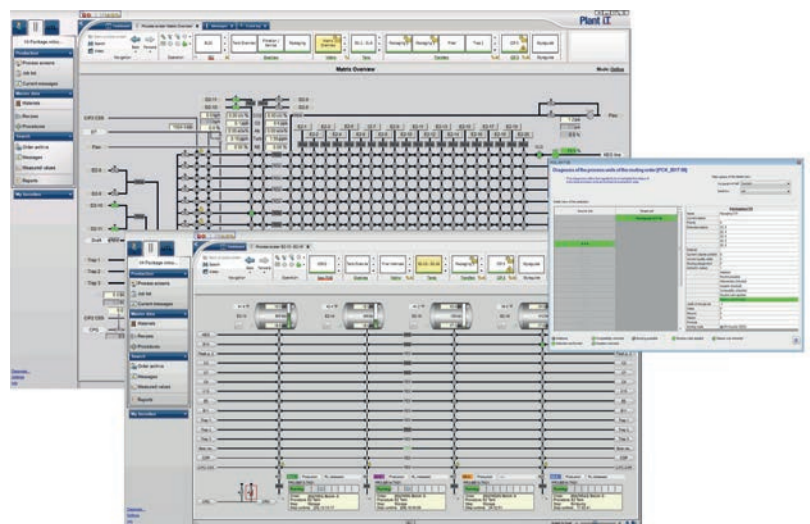
From order list to step sequence and from OCM directly to the valve

Tank farm management

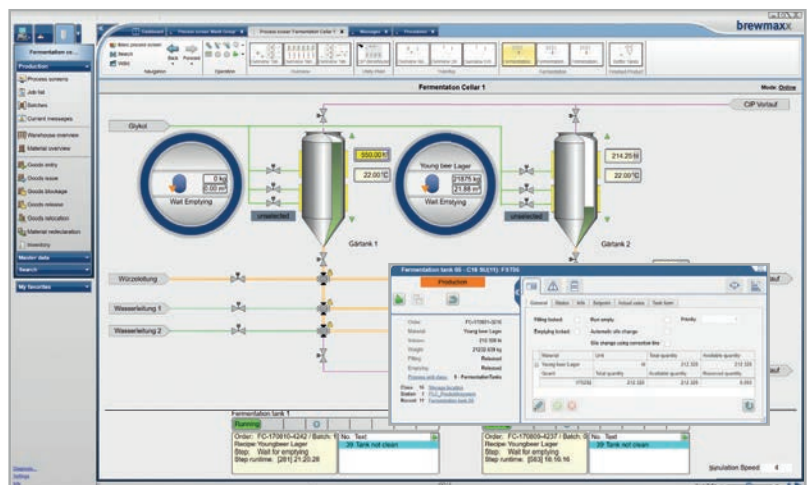
Especially for mapping processes with a high number of source/target combinations, Plant Liqu iT offers two efficient tools for handling tank farms - the Tank Farm Wizard and the Tank Farm Overview. The Tank Farm Wizard provides parameterisation help, enabling the parameterisation of complex tank farms, including the permissible route combinations and interlocks. Adaptations in case of extensions or modifications can thus be planned easily and accurately. The Tank Farm Overview offers a detailed multi-layer online view of the current statuses of the entire tank farm, a tank group or a single tank. All the key parameters (e.g. filling quantity, cleaning status, current order) and the currently executed process steps (e.g. filling, emptying, cleaning) are presented in a clear and concise manner. If irregularities are detected using the tank status display, the operator can access the operating dialogues of the respective tank directly from the overview of the process image.

Material-related process control

Plant iT material, the system component for process-related materials management, can be accessed directly from the process control. Transaction-accurate booking records can be created for each individual material transaction more or less in real-time from the current process via system-internal standard functions. This enables material-related process control including inventory management, order management and batch tracing.



Plant Liqu iT Routing Management



Tank farm process picture with operator dialogue

Plant Liqu iT Routing Management

Routing Management System

Using the optionally available add-on Routing Management, it is possible to integrate the route control of Plant Liqu iT rule-based routing orders with a dynamic route search and allocation into order processing. A major advantage of the add-on is the opportunity to accept the routes or a part of the routes already engineered in the FIFO (First In, First Out) sequences in the route engineering.

Integrated in the standard user interface

Operation of the Routing Management occurs via the Plant Liqu iT standard user interface, the Operation Manager. When using the Routing Management, the user interface is extended with additional tabs in the following dialogues:

- **Order list:** The «Routing» tab is added to the order list in the detailed information on the selected order. This is where the route is displayed and, if necessary, manual release takes place.
- **Order processing:** The extended «Routing» tab displays the route matrix. Furthermore, with manually created routing orders, the source, target and route can be manually selected.

Simple planning of routing orders

Each process area contains a sub-folder for rule-based routing orders. This folder contains a route matrix in which the existing routes are planned per sequence. Several routing rules can be created for one rule-based routing order. A routing rule defines how the routing process is to be processed and how the order is started in the Operation Manager. The order template is also specified in the routing rule. The order template determines the sub-procedure to be started from the recipe or the procedure.

The prerequisite for the planning of routing processes requires a basic parameterisation of sequences with respective FIFO objects (First In, First Out), a suitable order template and a procedure or a recipe to be started by the routing process.

Application example

A user program in a PLC searches for a route to drain a tank. For this the user program creates an order with rule-based routing. The routing order then automatically selects a suitable target tank, starts the order and controls the sequence with the appropriate recipe. A route consists of the following plant sections and routes:

- Source plant section
- Source route consisting of up to four line sections
- Main route consisting of up to four line sections (optional)
- Target route consisting of up to four line sections
- Target plant section



Batch system according to ISA-88

Plant Batch iT is the central process control system for controlling and monitoring recipe-controlled batch processes. Plant Batch iT is the ideal automation solution for accurately handling the simultaneous processing of a wide variety of production orders for various products in just one plant.

Current standards, e.g. ISA-88, were consistently implemented while simultaneously considering real applications. The base system Plant Direct iT is completely integrated and covers the structural level of ISA-88 closest to the process.

Order and batch-related production data acquisition is provided by Plant Acquis iT, which is as well as Plant iT material an integral part of Plant Batch iT.

The seamless integration of the process control system Plant Direct iT into the batch system enables maximum flexibility during operation and complete process transparency from the production order to the individual actuator or sensor currently used for processing the order. Users can therefore use the plant's potential to the full, since interventions in the production are possible at any level and at any time and safeguarded by Plant Batch iT. Moreover, users can analyse and correct a possible fault without having to contact the technical staff.

Main product features

- Compatible with ISA-88/DIN IEC 61512
- Order management and processing
- Electronic Batch Recording according to CFR 21 Part 11
- Recipe management incl. bills of material and version management
- Parameterisation of sequences and creation of master recipes
- Integrated interfaces for Plant iT connect & Plant Integrate iT
- Including Plant Acquis iT, Plant Direct iT and Plant iT material



Plant Batch iT

Recipe management for batch processes

With Plant Batch iT it is possible to implement the procedural, physical and recipe model as well as manage resources in accordance with ISA-88 in combination with an additional functionality resulting from our extensive experiences in automating recipe-controlled processes. Next to the availability of the production line as a structural element of a plant, three plant section types have been defined and implemented in the physical model. The use of

- storage units,
- processing units and
- transfer units

considers the fact that pure storage locations, “real” plant sections and pure transportation equipment, e. g. pipe systems, must be treated quite differently within the context of a batch system.

The strict interpretation of the ISA-88 recipe model would lead to unnecessary administration effort for many applications without achieving significantly enhanced process transparency. Plant Batch iT therefore simplifies the recipe model in several layers depending on the application requirements. The partial or complete breakup of the plant section into a structural element simplifies the master recipes with regard to their structure. For further simplification, the number of recipes to be administered can be reduced considerably through a special recipe model of Plant Batch iT.

BOM-based production

Plant Batch iT can process so-called procedure descriptions while adhering to the separation of master and control recipes. In principle, they are master recipes which contain variables instead of precise product-related values. The generation of a control recipe then takes place during runtime via an order-related, dynamic combination of a procedure description with a bill of materials which can also include complex sets of recipe parameters besides a list of ingredients and quantities. This extended type of the recipe model has two main advantages:

When producing a wide variety of products according to the same procedure, only a few procedure descriptions are required, i.e. the effort for maintaining the master recipes is reduced significantly

The possibility of the BOM-based processing of production orders provides the ideal basis for efficient cooperation of Plant Batch iT and numerous ERP systems, as these systems usually “think” in bills of materials

Order management and processing

The central element for controlling and monitoring production is the order management of Plant Batch iT, which provides the production staff with three detailing levels:

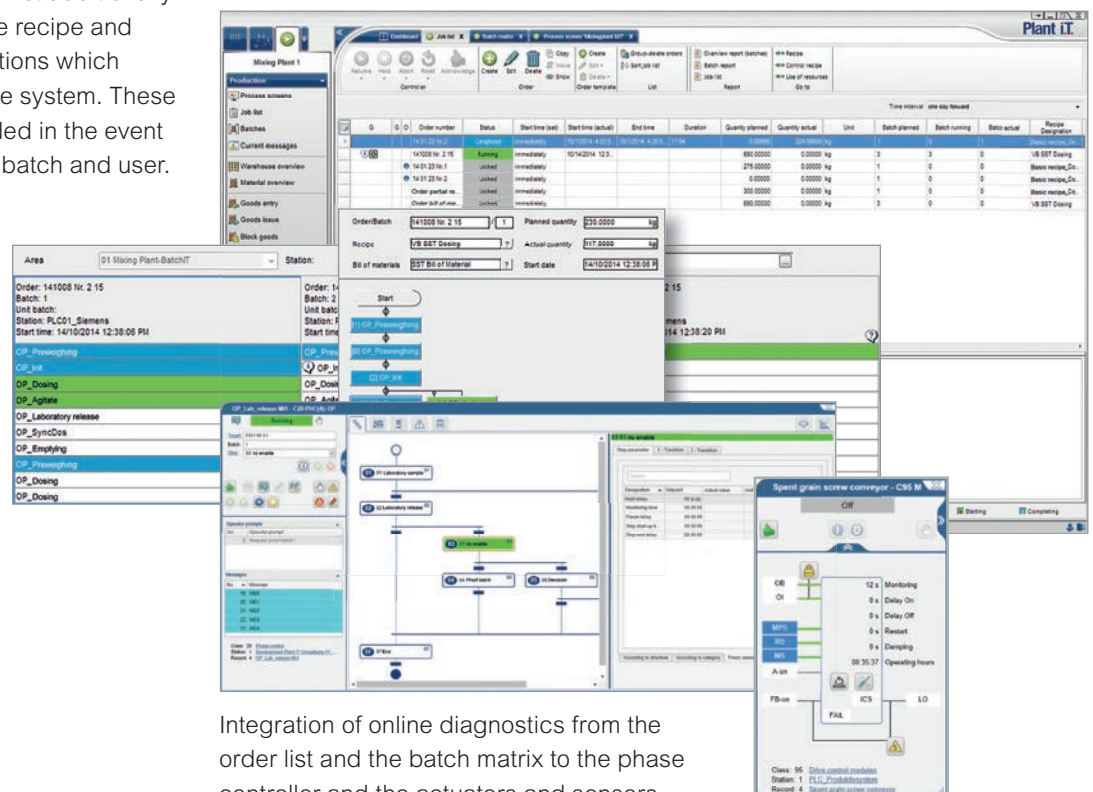
- Order list
- Batch matrix
- Batch list

The order list offers an overview of all dispatched orders and individual batches of the order. All relevant order data and the current status are displayed online. Orders can be dispatched manually via the user interface of Plant Batch iT or via the standard interfaces of Plant iT from a higher-order system (e.g. SAP PP-PI). The batch matrix shows an online status overview table of all the batches being processed from the active orders, right down to the operation. The batch list provides a detailed overview of a single batch currently being processed and direct access to the operation-internal functionality, represented by an object of the Phase Controller class.

Interventions at order or batch level (e.g. start, stop, continue, cancel) are possible at any of the described levels. The batch list additionally allows the modification of all the recipe and order parameters for the operations which have not yet been started by the system. These types of intervention are recorded in the event log with reference to the order, batch and user.

Line	Material number	Material name	Quantity	Unit	Unit	Start	Rührerdrehzahl [1/min]	Rührzeit [sec]
1	Additiv01	Additiv01	10.0000	kg			10.0000	0.0000
2	Additiv02	Additiv02	20.0000	kg			10.0000	0.0000
3	Fluid01	Fluid01	30.0000	kg			10.0000	0.0000
4	Fluid02	Fluid02	70.0000	kg			10.0000	0.0000
5	Water	Water	100.0000	kg			10.0000	0.0000

View of a Plant Batch iT bill of material list



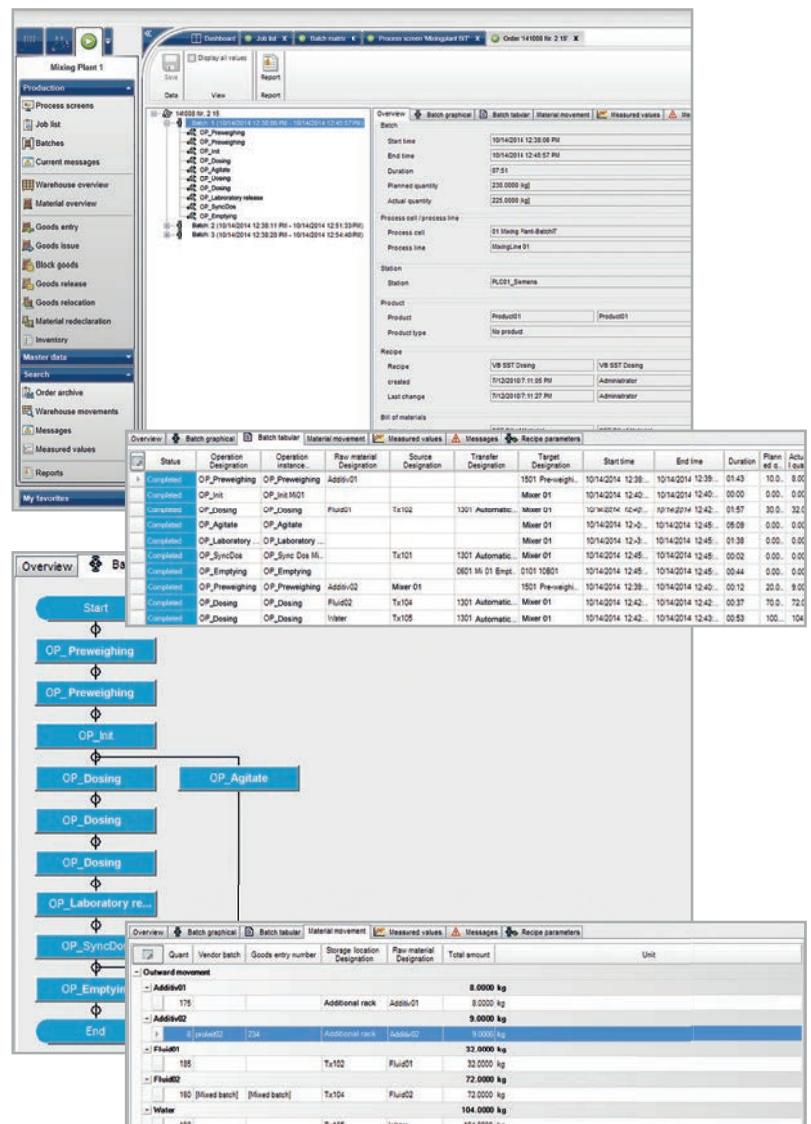
Integration of online diagnostics from the order list and the batch matrix to the phase controller and the actuators and sensors

Electronic Batch Recording

Plant Batch iT records all order and batch-relevant data and summarises it in an Electronic Batch Record (EBR). The batch record contains all the relevant header data of the production order to which the respective batch belongs and a detailed image of all the data similar to how it is displayed in the batch list at that time, as the batch is correctly completed or cancelled. The batch record can also be extended by:

- Step records of the Phase Controllers (operation-internal sequences),
- Graphical views of order-related production data
- Order-related message lists and measured value curves and
- Material movements

The batch records are available online for a freely definable period, but can also be exported or archived.



Phase log

Operation: OP_Dosing [OP_Dosing]
 Start time: 10/14/2014 12:40:04 PM [GMT +00:00 (GMT Standard Time)]
 End time: 10/14/2014 12:42:00 PM [GMT +00:00 (GMT Standard Time)]
 Order number: 141008 Nr. 2 15
 Batch number: 1
 Running number: 15

Date	Time	Cycle counter	Line	Status	Name of phase	Designation of the phase	Pending command	Trigger for log entry
▼ 10/14/2014	12:40:04 PM	1	2	Starting	01 Initializing	01 Initializing		Phase start, Command change, Status change
▼ 10/14/2014	12:40:04 PM	3	2	Running	01 Initializing	01 Initializing		Phase end
▼ 10/14/2014	12:40:04 PM	3	3	Running	02 Dosing rough	02 Dosing rough		Phase start
▼ 10/14/2014	12:41:53 PM	540	3	Running	02 Dosing rough	02 Dosing rough	Resume after Pause/Hold/Locked	Phase end
▼ 10/14/2014	12:41:53 PM	540	4	Running	03 Dosing fine	03 Dosing fine	Resume after Pause/Hold/Locked	Phase start
▼ 10/14/2014	12:41:57 PM	566	4	Running	03 Dosing fine	03 Dosing fine	Resume after Pause/Hold/Locked	Phase end
▼ 10/14/2014	12:41:57 PM	566	5	Running	04 Post run	04 Post run	Resume after Pause/Hold/Locked	Phase start
▼ 10/14/2014	12:42:00 PM	580	5	Running	04 Post run	04 Post run	Resume after Pause/Hold/Locked	Phase end
▼ 10/14/2014	12:42:00 PM	580	7	Running	05 Homogenizing	05 Homogenizing	Resume after Pause/Hold/Locked	Phase start, Result change of a monitoring function, Result change of a transition
▼ 10/14/2014	12:42:00 PM	581	7	Running	05 Homogenizing	05 Homogenizing	Resume after Pause/Hold/Locked	Phase end
▼ 10/14/2014	12:42:00 PM	581	8	Running	06 Homogenizing	06 Homogenizing	Resume after	Phase start, Result change

Order research in the order archive with batch view, material movements and phase protocol

Integrated materials management with batch tracing

Raw materials, semi-finished products or finished products are the actual core resources of any process. The transaction-accurate tracing and precise allocation to individual orders and batches are essential for batch processes. In order to meet this requirement, Plant Batch iT is intrinsically tied to the process-related materials management Plant iT material. The generation of the booking records required for inventory management and batch tracing is, whenever possible, carried out automatically by Plant Batch iT and in close coordination with the order and batch ID. To enable consistent and comfortable batch tracing, the evaluations carried out in Plant iT material allow direct branching to a batch record of Plant Batch iT and vice versa.

Storage location	Storage location designation	Material designation	Total quantity	Available quantity	Locked quantity	Reserved quantity	Density (kg/m³)	Measured value	Capacity (kg)	Volume (m³)	Priority	Run empty	Automatic bill change	Bills change using cor.	Filling locked
100	Apple Reactor Germany	749.000000 kg	749.000000 kg	0.000000 kg	0.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
101	Warehouse address	3.674.47601 kg	3.674.47601 kg	0.000000 kg	400.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
102	Warehouse address	6.880.00000 kg	6.880.00000 kg	0.000000 kg	200.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
103	CP Tank	17.860.00000 kg	17.860.00000 kg	0.000000 kg	0.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
104	Apple Juice Standard	87.245.38900 kg	87.245.38900 kg	0.000000 kg	0.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
105	Super solution	18.564.00000 kg	18.564.00000 kg	0.000000 kg	300.000000 kg	1.00000000	4.712.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
106	A/C ester	27.680.00000 kg	19.840.00000 kg	0.000000 kg	14.500.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
107	Guaid	14.600.00000 kg	0.000000 kg	0.000000 kg	27.680.00000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
108	Thermische Ols	14.600.00000 kg	0.000000 kg	0.000000 kg	27.680.00000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
109	A/C ester	14.600.00000 kg	4.220.00000 kg	0.000000 kg	10.380.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
110	Valter	18.741.00000 kg	18.741.00000 kg	0.000000 kg	0.000000 kg	1.00000000	0.000000 kg	0.000000 kg	0.000000 kg	0.000000 m³					
111	A/C ester	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
112	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
113	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
114	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
115	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
116	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
117	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
118	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
119	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
120	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
121	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
122	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
123	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
124	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
125	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
126	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
127	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
128	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
129	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
130	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
131	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
132	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
133	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
134	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
135	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
136	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
137	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
138	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
139	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
140	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
141	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
142	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
143	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
144	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
145	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
146	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
147	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
148	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
149	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					
150	Guaid	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 kg	1.00000000	0.00000000 kg	0.00000000 kg	0.00000000 kg	0.00000000 m³					

Integrated materials management

Plant Batch iT MWS

Manual Weighing System

Adding materials manually is a task that is regularly needed in the process industry. These may be anything from small quantities for laboratories to quantities recorded using platform scales. Potential sources of error at this stage are basically due to the fact that weighing orders are written down by hand and safety regulations are not met. Inefficient weighing processes and off-specification batches caused by erroneous additions additionally lead to reduced quality and a notable loss of time and raw materials.

Intelligent weighing assistant

ProLeiT's Manual Weighing System (MWS), an add-on for the modular process control system Plant iT, delivers an intelligent weighing assistant that enables the clear processing of bills of material while visually and reliably guiding operators through the weighing process aided by five colour grades. In order to offer the best possible support for processes at the operating station, the application contains workflow data, including, e.g., information about required protective clothing or how to handle certain materials.

Furthermore, the MWS helps operators select the most suitable scales depending on the stipulated weighing and tolerance range. After

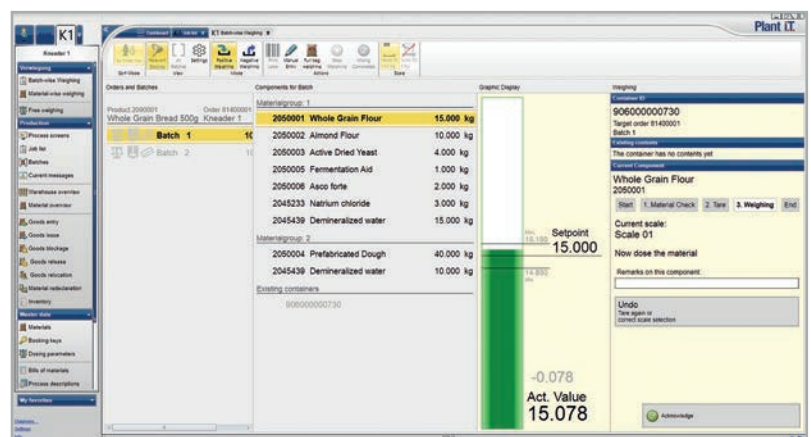
completing a weighing process, a label can be created for the packaging. The barcode of this label integrates all relevant information about the order data, weighed components, including quantities, and, if necessary, handling and danger symbols.

Optimization potential on all levels

The Manual Weighing System from ProLeiT helps to optimise weighing processes at every level of the process industry: Production managers profit from the traceability of the applied materials and can rely on improved safety standards due to the reliable operator guidance. Moreover, utilisation of barcodes and scanner ensures a particularly high level of safety when adding components. The work of staff at operating stations is significantly aided by clearly structured visualization techniques and stored workflows, while the complete overview of all existing production orders enhances rationalised work practices. The quality management system can also play a greater role in optimizing weighing processes by customizing workflows, thus guaranteeing adherence to customer-specific regulations and instructions at all times.



Operating dialogues in Plant Batch iT MWS



Weighing mask in Plant Batch iT MWS

Specific information

Increasing competitive pressure, growing globalisation, adherence to quality standards, legal obligations to provide electronic documents ...

Nonetheless, the production of food and goods has actually become easier due to the increasing automation of manufacturing processes. But this is also the reason why it has become easier for other companies to produce similar products to the same or better quality and at lower costs. Brand manufacturers, in particular, are faced with increasing competitive pressure. This situation is further exacerbated by increasingly strict regulations and legislation, e.g. the legal obligation to provide supporting documents for batch and product traceability. Many companies are overwhelmed by an irresistible flood of information, as their core competency is the actual production process and not the optimization of accompanying production processes.

However, if manufacturing companies wish to retain or strengthen their market position, they must focus, in particular, on efficient production and process procedures. Production processes and product information have to be fully monitored and weaknesses minimised continuously. This is the only way to reduce manufacturing costs and maintain product quality. Nevertheless, a seamless data environment is essential to supply the right information for process optimization.

In recent years, manufacturing execution systems have become the established solution for these complex tasks. MES solutions can act as the data hub for a company, realizing vertical and horizontal integration in real time. However, there is not always unanimous agreement on what MES actually means in each individual case and on the best way to implement MES solutions.

MES included

Our process control systems support the ISA-

88 for process industries and S95 for MES. Our MES solution covers the following requirements and can give answers to the following questions:

- Execution management – What will be produced where and by whom?
- Specifications management – How do you want to produce?
- Resources management – Who will produce, what and where?
- Data acquisition & analytics – How was a product produced?
- Tracking & Tracing – When, where and by whom was a product produced?



Plant Integrate iT

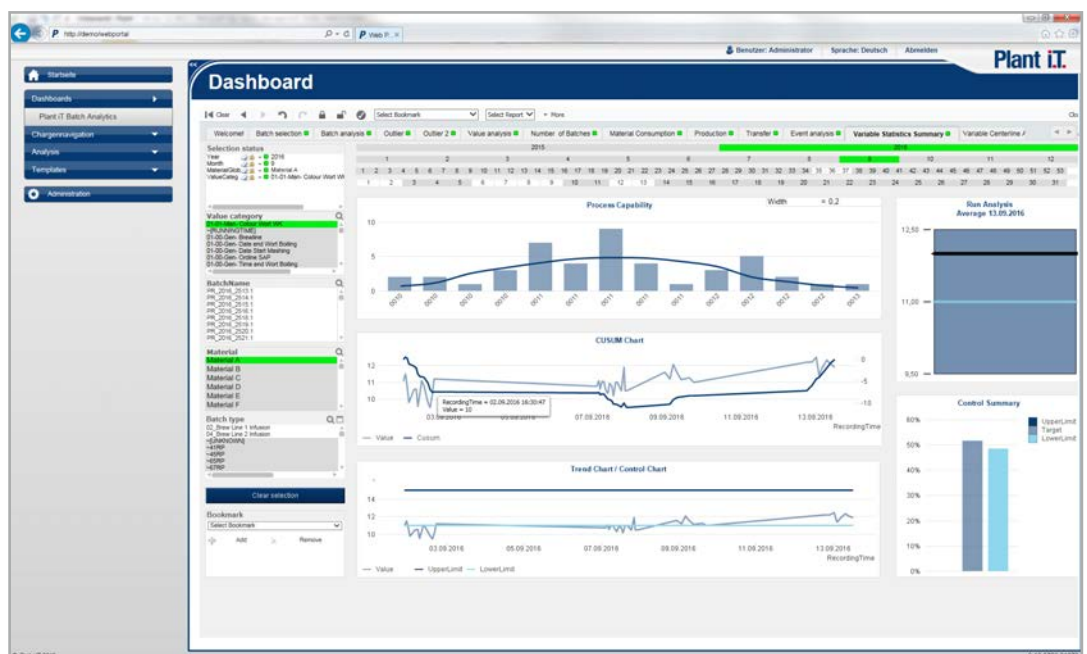
MES, Reporting & Analytics

Plant Integrate iT allows the “visualization” of all production data. A key prerequisite for achieving this objective is integrated information management at MES level, which can be integrated and operated infinitely across process sequences and departments. Plant Integrate iT can be used to merge and evaluate the required data from individual production areas. Access to this central information platform via Internet Browser occurs using Microsoft standard software and therefore provides maximum flexibility and protection when realizing company-wide MES reporting systems.

Reporting and integration services

Plant Integrate iT uses, amongst others, the Microsoft Reporting Services and the data model in the MES database. This database has been specifically developed for the integration of data from several servers and various production systems and to ensure efficient data import and export. This means, for instance, that direct requests with Excel are supported and standardised routes are provided when reporting. Furthermore, several languages and change traceability are thus guaranteed. Project-specific requirements can be easily extended thanks to the MES database structure.

The implementation of an MES reporting



The clearly structured dashboards in Plant Integrate iT enable data recording at a glance

system with Plant Integrate iT therefore has a high level of standardisation, which can be extended as necessary by individual requirements. Standard functions include, for example:

- Report Designer for end users
- Background printing and report subscriptions
- Pivot tables and presentation graphics
- Interactivity (sort, open/close or switch to a follow-up or detailed report)

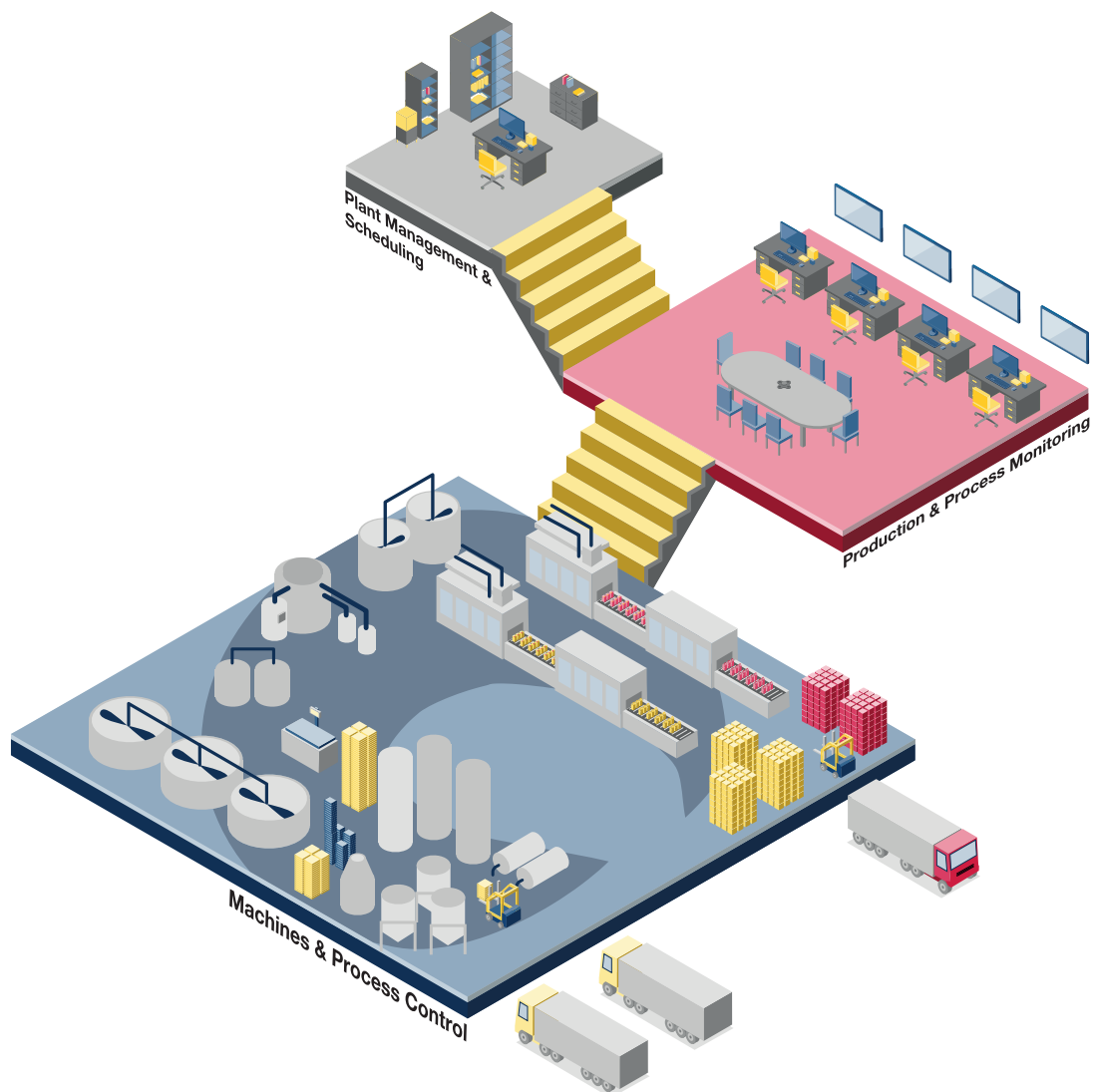
Due to the wide distribution of the Microsoft Reporting Services, a wide range of literature, training courses and add-ons are available from other providers.

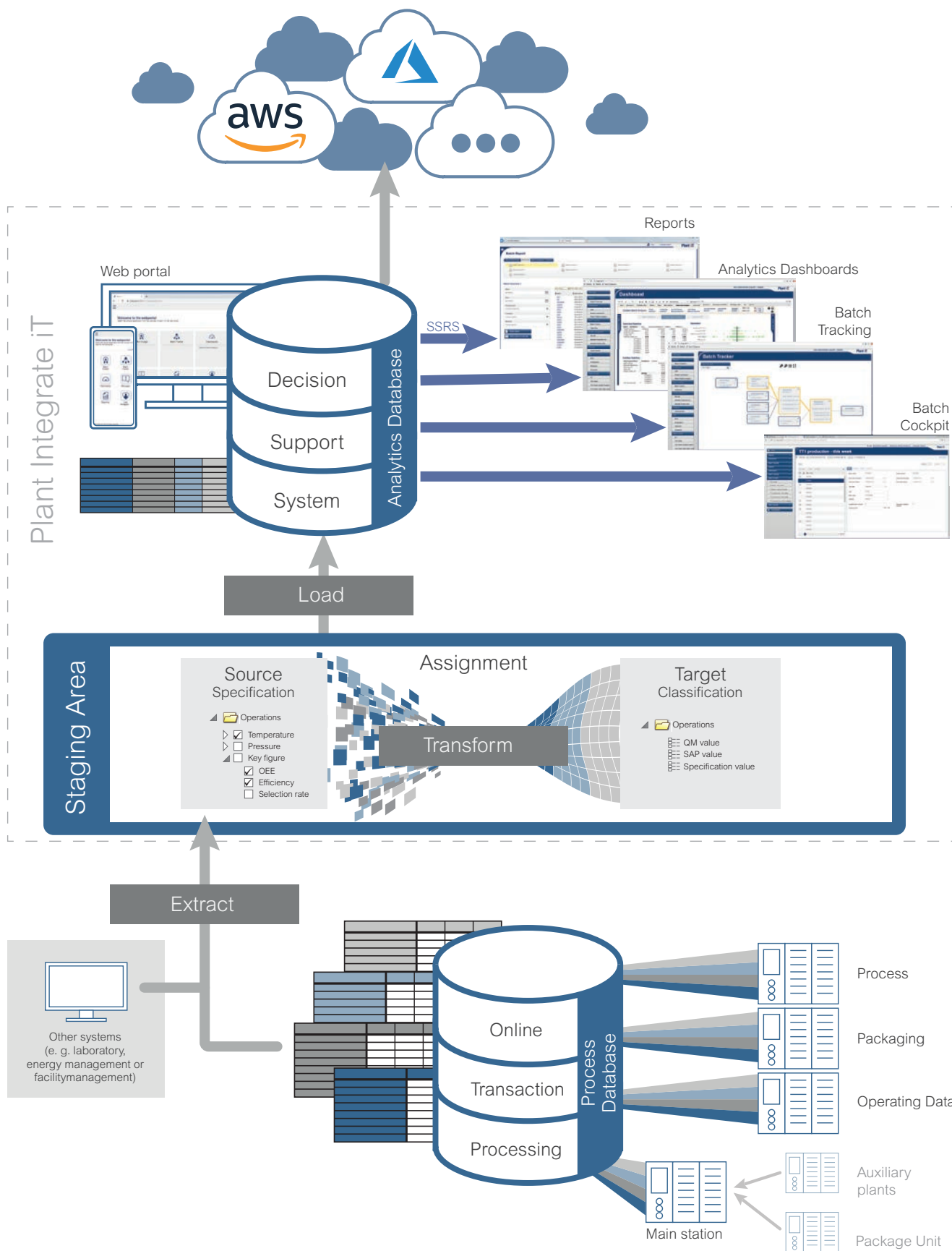
Integration services

Based on the Microsoft Integration Services, Plant Integrate iT offers numerous new functions. The graphical engineering of data flows and program logic is therefore possible. Various standard interfaces (e.g. SQL, OLAP, Mail, FTP, Excel, ASCII, XML) are additionally available.

Plant Integrate iT supports the application of Integration Services due to:

- In-house developed components for interlinking SAP while retaining their configuration in the Configuration Manager
- In-house developed components to send telegrams to a PLC
- Logging and Audit-Trail of the transactions in the MES database web portal





Plant Integrate iT – Processing of data via staging area into the MES database

Analytics dashboards

Business Intelligence (BI) dashboards could be the base for company decisions. A fast access to all production-related information could be a clear competitive advantage especially for production plants with a high number of products and product variants. This is why so called analytic dashboards must have the following characteristics:

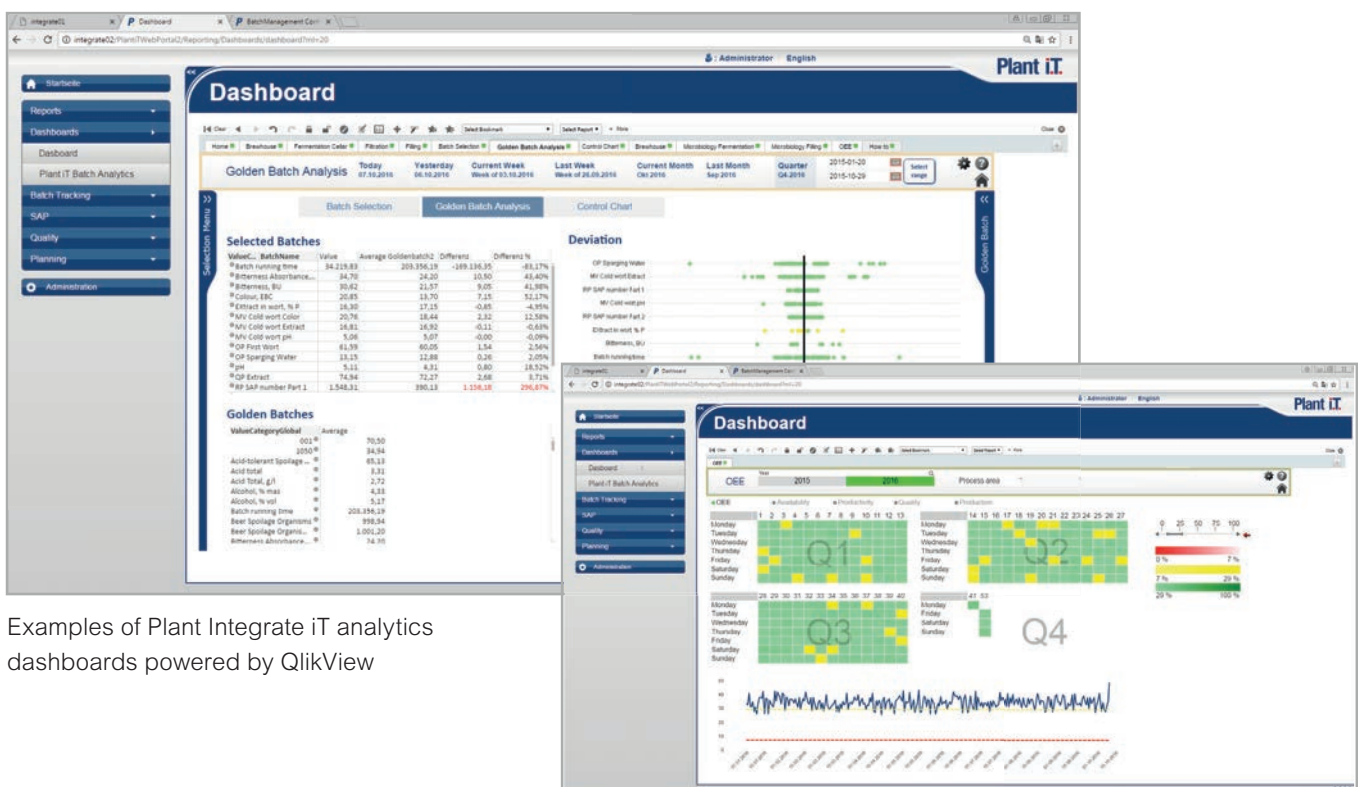
- Easy interfacing
- Quick creation
- Quick adoption
- High, interactive accessibility
- Easy to use

Business Discovery is a whole new way of doing things that puts the business user in control. Forget predefined analysis paths and long periods spent waiting for traditionally prepared, static reports. Combine data from various data sources – and receive direct answers to your questions. As a cooperation partner of Qlik, we can offer these functionalities to our customers, too. As of Version 9, the technology of Qlik is an

integrated part of our systems. Various software components of Qlik are used, especially for our MES reporting and workflow management systems. This seamless integration into our system databases offers our customers a better visualization of their information and an optimization of the display of these information on web-based and mobile (end user) devices.



Plant iT Cloud Connector ensures ideal connection to cloud services such as Microsoft Azure or Amazon Web Services. Prepared process and measured values are available for collection by cloud solutions and subsequent location-independent analysis. Cloud Connector allows plant operators to benefit from context-sensitive data and their company-wide availability in the cloud. This enables flexible data analysis using artificial intelligence (AI) or machine learning (ML).



Examples of Plant Integrate iT analytics dashboards powered by QlikView



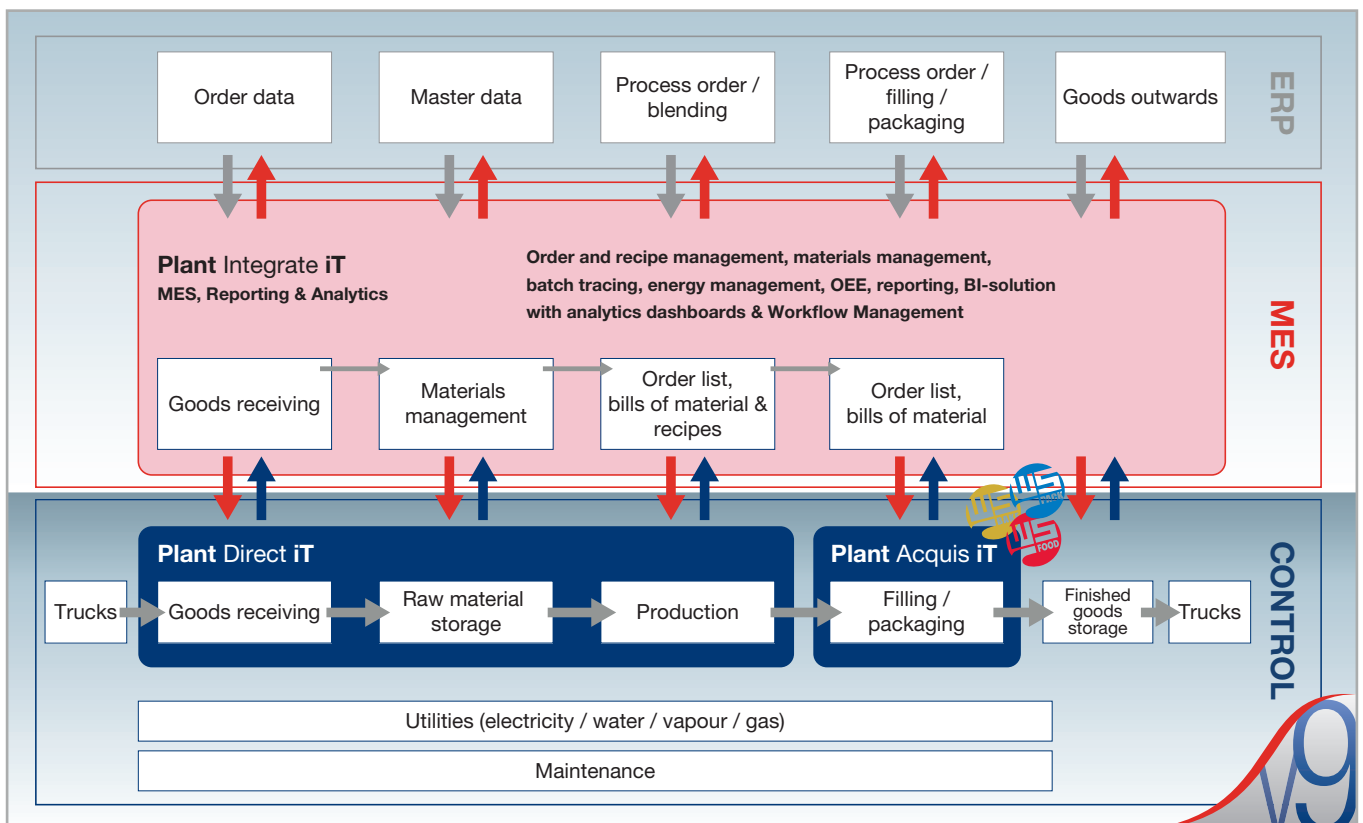
Plant Integrate iT Workflow

Workflow Management System

Plant Integrate iT provides an efficient MES workflow management system for production-relevant business processes. The database-supported system can be used for managing and monitoring automatic and manual processes in the production environment. This includes, for example, order processing, quality assurance (e.g. sampling) and the support of logistics processes or the collection and provision of data which arises during production and in the production environment. This data is used as the basis for production-relevant reporting and as a data source for higher-order systems.

The workflow management system can be used for the following MES areas:

- Warehouse and inventory management (e.g. product and material parameters, handling units, stock taking)
- Production management (e.g. recipe/BOM management, production logistics)
- Quality management (e.g. management of specification values)
- Maintenance and servicing (e.g. operating hour counter, machine maintenance, operating cycle counter)



Process information of a production plant

The following example functions show how Plant iT Workflow can be used in production plants:

- Goods receipt
 - Individual configuration of the income workflow
 - Digital acquisition of bills of delivery
 - Integration of barcode scanners & scales, added with handhelds and check lists
 - Initiation of lab samples and acquisition of lab values
 - Target warehouse selection
 - Conclusion of goods receipt & transmission to ERP system
- Order control
 - Partition of an ERP order into multilevel production processes
 - Split of the bill of material into existing process structures (e.g. process orders & packaging orders)
 - Confirmation of booking relating to ERP order structure
 - Aggregation of several orders (unique production orders with different packaging orders)
- Supply control
 - Controlling and monitoring of goods requests and material supplies
- Related to goods with bill of materials or groups of goods
- Support of various storage types (e.g. high-bay racking, block storage)
- Integrated interfaces to warehouse management systems (e.g. SAP-EWM)
- Quality acquisition
 - Automatic generation of inspection lots, per lot size or per time, with display of job instructions
 - Plant wide overview and status information, with integrated specifications management and rework workflow
- Packaging orders
 - Grouping of packaging orders, based of production orders
 - Printing of supply notes
 - Creation, edition and deletion of production orders und packaging orders
- Energy management
 - Energy data acquisition
 - Creation of consumption reports
- KPIs and OEE
 - Data acquisition in accordance to WS Food
 - Display of most important KPIs and plant information

The screenshot shows the 'Unit Management' interface in Plant iT Workflow. It displays a list of production orders. The columns include: Order Number, Material, Plant No., Planned Start, Start Time, Planned End, Due Time, Planned Quantity, Unit of measurement, Status, and Batch No. The interface is color-coded with green for active orders and yellow for others.

Parameterization of materials master data in Plant iT Workflow

The screenshot shows the 'Order List' interface in Plant iT Workflow. It displays a detailed view of production orders. The columns include: Order No., Material, Plant No., Planned start, Start time, Planned stop, Stop time, Planned Quantity, Produced Quantity, Unit of measurement, Plant, Progress, Status, and Order type. The interface is color-coded with various colors for different order types and statuses.

Plant-wide order list in Plant iT Workflow for controlling and monitoring status of production orders

Modern production companies realise: high data availability during production gives a real competitive advantage over every rival. Transparency is the order of the day when it comes to gaining a precise overview of production activities and optimizing them extensively. Effective and efficient processes can therefore only be achieved when you are well informed of the current plant status regarding capacities, materials and costs – at all times. The ability to know which batch is produced when, how and where and at which level of quality is thus elementary.

Maximum data sovereignty

The image displays four screenshots of the Plant iT Batch Cockpit software interface, demonstrating its capabilities for batch management and production monitoring.

- Top Left Screenshot:** Shows the 'This week' overview screen. It features a sidebar with navigation options like 'Home', 'Reports', 'Dashboard', 'Batch Tracking', and 'Batch Cockpit'. The main area displays a table of batches with columns for Batch name, Start time, End time, Duration, Batch type, Location, Material, and Status. A filter bar at the top allows users to filter by 'Filter with: 2018-03-26 (2018-03-26)'.
- Top Right Screenshot:** Shows the 'TT1 production - this week' screen. It provides a detailed view of a specific batch, including its name, start and end times, duration, and location. The interface includes a sidebar with navigation options and a main area with a table of batches.
- Bottom Left Screenshot:** Shows the 'TT1 production - this week' screen. It provides a detailed view of a specific batch, including its name, start and end times, duration, and location. The interface includes a sidebar with navigation options and a main area with a table of batches.
- Bottom Right Screenshot:** Shows the 'TT1 production - this week' screen. It provides a detailed view of a specific batch, including its name, start and end times, duration, and location. The interface includes a sidebar with navigation options and a main area with a table of batches.

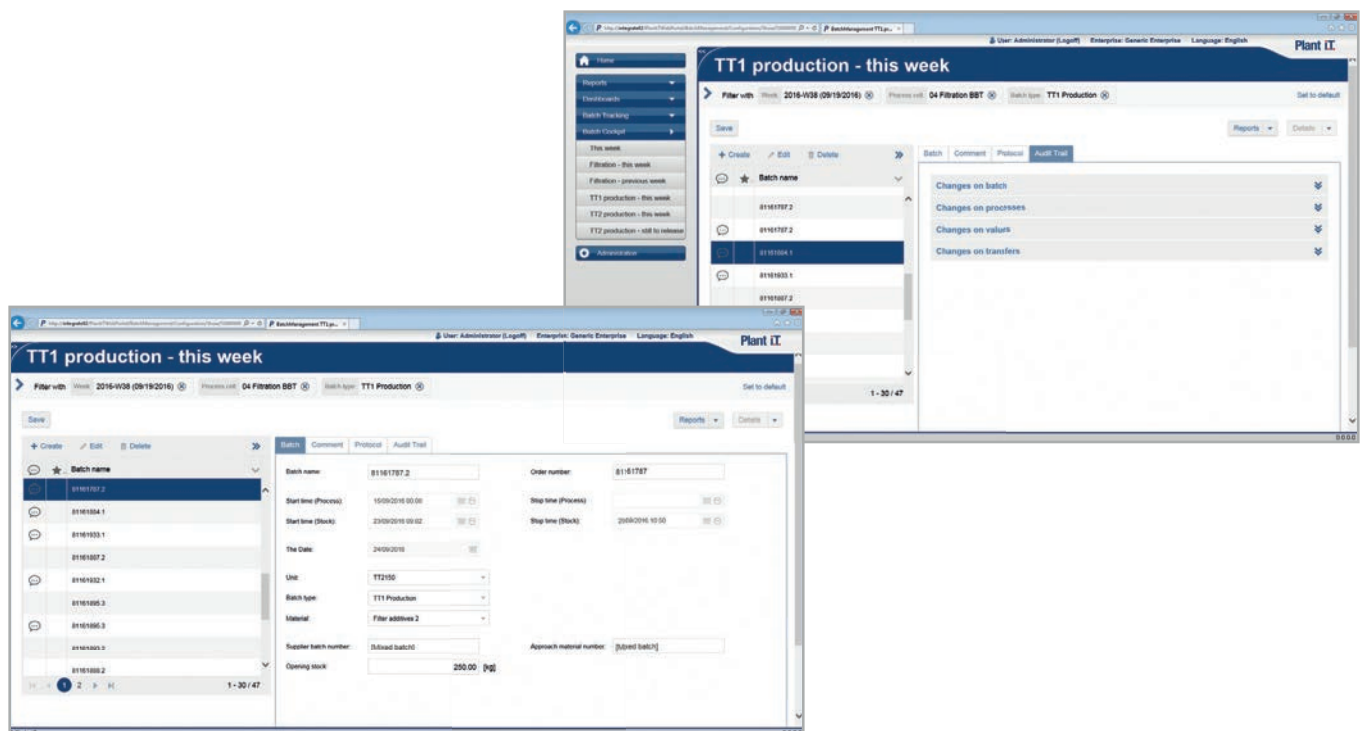
transparency and more effective plant utilisation in the process industry. The add-on is designed for evaluating, processing and validating production data. In addition, it is possible to post-process manually recorded data and thus correct any errors directly. As a result, time-consuming and cost-intensive data corrections in higher-order systems are no longer required.

Freely definable filters, for example “time period”, “batch type” or “status”, enable convenient and targeted analysis of the recorded production data. Moreover, off-specification batches can be tracked. Plant operators can view the data that is most valuable to them.

Complete traceability

The Audit Trail function provided by Batch Cockpit allows you to review and analyse batch records. As a result, all changes can be traced in full at a glance – both in the front end and in the database. Audit Trail displays, among other things, information about the user, the applied end device and when the change was executed. Needless to say, this guarantees complete traceability at all times.

The Batch Cockpit from ProLeiT represents the entry point to integrated batch analysis. Thanks to seamless integration in other functions of our MES solution Plant Integrate iT, all the data can be further processed and prepared productively.



Plant iT web portal

Web Reporting and Applications

Websites opened via the web portal can be run on various internet browsers and retrieved from PCs and mobile devices. It is not necessary to install third-party software (Java, Silverlight, Flash, or similar) on the clients.

The web portal enables the retrieval of Plant iT reports from several production servers and the retrieval of reports of a Microsoft Reporting Services server. Reports created via Microsoft Reporting Services, in particular, can process data from various sources (e.g. third-party databases, OLAP, web services).

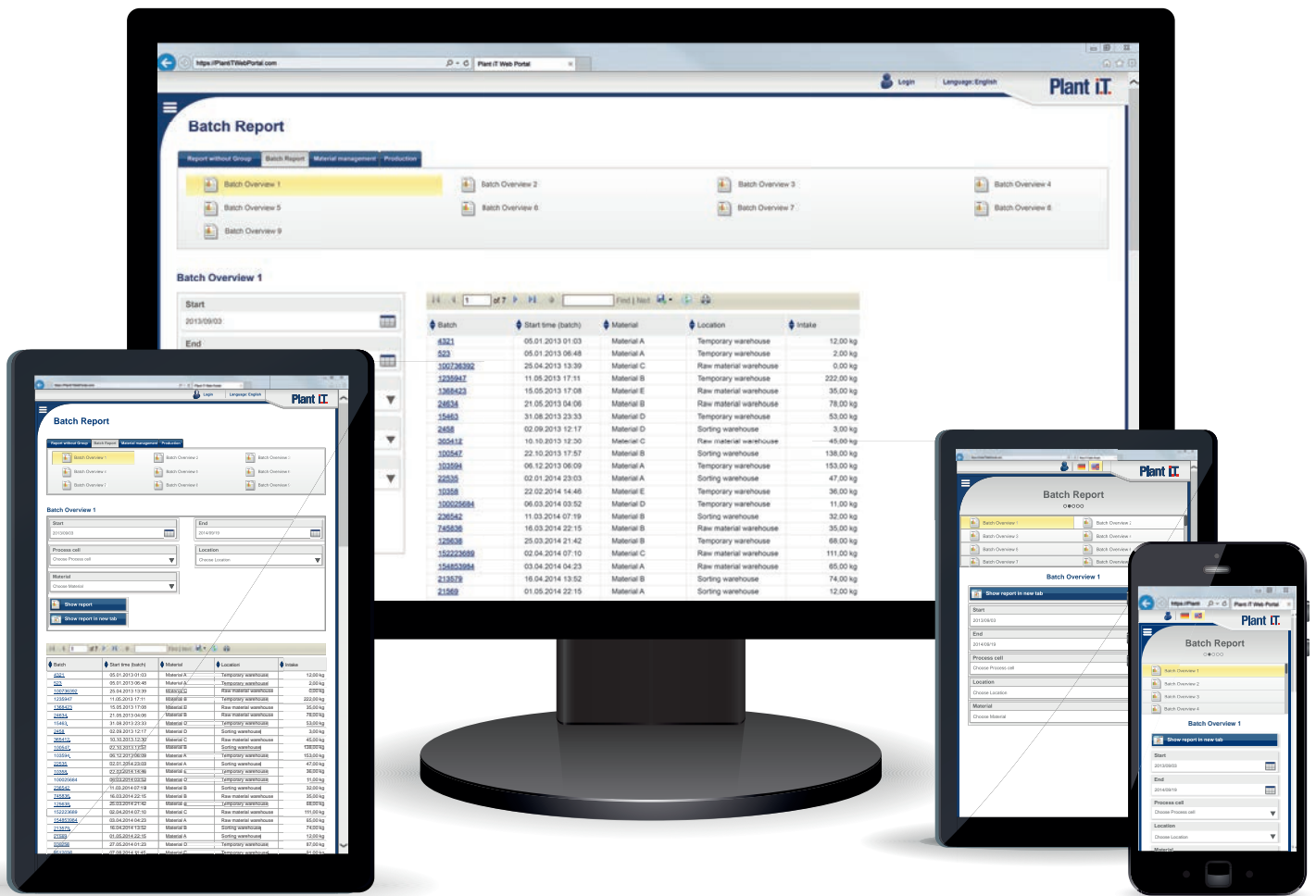
All the reports from all the sources are displayed in the same user interface along with their parameters. The web portal remembers the most recent settings of key parameters (e.g. time period, plant, material) and pre-assigns them for the next visit or the next report. This means repeating input values can thus be avoided or reduced.

The Plant iT user management is used in the server-related web application. Users therefore only need to be created centrally once. Rights management takes place in the central Plant iT Configuration Manager.

The web portal can be additionally extended by ASP.NET MVC modules. A template is provided for this purpose. External websites can also be integrated.

The Plant iT web portal module is already included with the basic systems Plant Direct iT, Plant Liqu iT, Plant Batch iT and Plant Integrate iT.





Plant iT archive manager

Long-term Archive Solution

Data and information are the key assets of any company. Keeping them readily available to meet respective customer requirements is an indispensable criterion. The Plant iT archive manager module offers a solution for archiving all transaction data recorded in the control system. The research requests are executed via existing Plant iT clients. Various filters (e.g. order number, recipe, receiving goods number) enable convenient search options according to detailed information within the respective batch, including, for instance, recipe parameters, operator intervention or consumption levels.

Efficient long-term archiving

All the control system's transaction data is then available for research purposes for three years or more. Data can be transferred from the production server to the archiving system by simply copying the database backups.

The user-friendly design of the Plant iT archive manager enables the intuitive operation of the module and rapid access to data stored in the archive. Moreover, the streamlined software design is achieved without additional drivers, applications or other add-ons.



Global view

Master data

- Materials
- Booking keys
- Recipes
- Procedures
- Bills of materials
- Process descriptions
- Investigation
- Order archive
- Warehouse movements
- Messages
- Counters, numbers, characters
- Maintenance tasks
- Measured values
- Reports

Order archive

Search for:

Investigation period: 5/1/2016 00:00:00 - 9/2/2017 23:59:59

Order number	Mat batch present	Recipe Designation	Recipe version	Procedure number	Procedure version	Start sequence Designation	Product	Product Designation	Process line Designation	Start time	End time	Duration	Planned quantity	Unit	Batch planned
444412	<input type="checkbox"/>	_Doe	4	0			<Default Material>	Default material	Delivery	2/1/2017 3:09:02 PM	2/1/2017 3:54:02 PM	45:00	40.0000	kg	2
444410	<input type="checkbox"/>	_Doe	4	0			<Default Material>	Default material	Delivery	2/1/2017 2:38:42 PM	2/1/2017 2:45:32 PM	06:50	100.0000	kg	5
4444	<input type="checkbox"/>	_Doe	4	0			<Default Material>	Default material	Delivery	2/1/2017 2:08:15 PM	2/1/2017 2:22:43 PM	14:28	100.0000	kg	5
Lup-20170109-1	<input type="checkbox"/>			23	1	108Tank2				1/9/2017 4:56:32 PM	1/9/2017 10:12:15 AM	[10] 17:15:43	0.00		0
fgi	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:52:06 PM	11/8/2016 4:52:19 PM	00:13	0.00000		0
ufhu	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:34:49 PM	11/8/2016 4:34:56 PM	00:07	0.00000		0
jk	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:31:45 PM	11/8/2016 4:31:56 PM	00:11	0.00000		0
2	<input type="checkbox"/>			48	2	SEQ_FKR20				10/27/2016 9:40:18 AM	10/27/2016 9:41:48 AM	01:31	0.00000		0
54854	<input type="checkbox"/>			40	2	SEQ_FKR20				10/27/2016 9:33:27 AM	10/27/2016 9:34:55 AM	01:28	0.00000		0
#	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:12:35 PM	10/24/2016 6:12:40 PM	00:05	0.00000	M	0
phg	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:11:53 PM	10/24/2016 6:11:59 PM	00:06	0.00000	M	0
800	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:03:45 PM	10/24/2016 6:08:30 PM	04:45	0.00000	M	0
444	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 5:58:01 PM	10/24/2016 5:58:31 PM	00:30	0.00000	M	0
161102-1	<input type="checkbox"/>			1	1	108Box Emptying				10/24/2016 1:35:04 PM	11/3/2016 2:25:44 PM	[10] 00:50:40	0.00		0
161024-2	<input type="checkbox"/>			1	1	108Box Emptying				10/24/2016 1:34:16 PM	10/24/2016 1:34:42 PM	00:26	0.00		0
161102-1	<input type="checkbox"/>			4	1	108Tank1				10/21/2016 11:10:09 AM	11/3/2016 2:23:49 PM	[13] 03:13:40	0.00		0
161021-1	<input type="checkbox"/>			4	1	108Tank1				10/21/2016 11:10:04 AM	10/21/2016 11:10:09 AM	00:05	0.00		0
161018-1	<input type="checkbox"/>			28	1	SEQ_11				10/19/2016 9:18:49 PM	10/19/2016 9:26:11 PM	07:23	0.00000		0
LTG-160529-1	<input type="checkbox"/>			11	1	50_FILLINGLINE01				9/29/2016 2:16:50 PM	9/29/2016 2:16:50 PM	00:00	0.00000		0
	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:27:35 AM	9/20/2016 11:29:06 AM	01:31	0.00000		0
	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:20:03 AM	9/20/2016 11:27:28 AM	07:25	0.00000		0
hpg	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:14:11 AM	9/20/2016 11:18:57 AM	04:46	0.00000		0
Lup-20160916-1	<input type="checkbox"/>			4	1	108Tank1				9/16/2016 10:21:59 AM	9/16/2016 10:23:57 AM	01:58	0.00		0
160916-1	<input type="checkbox"/>			4	1	108Tank1				9/16/2016 10:19:16 AM	9/16/2016 10:20:47 AM	01:31	0.00		0

Archiving note: Comment for the order | Comment for the product | Comment for the recipe | Comment for the procedure | Comment for the bill of materials

Users can conveniently search for batches in the familiar system environment via various filters

Global view

Master data

- Materials
- Booking keys
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444410	<input type="checkbox"/>	_Doe	4	0			<Default Material>	Default material	Delivery	2/1/2017 2:38:42 PM	2/1/2017 2:45:32 PM	06:50	100.0000	kg	5
4444	<input type="checkbox"/>	_Doe	4	0			<Default Material>	Default material	Delivery	2/1/2017 2:08:15 PM	2/1/2017 2:22:43 PM	14:28	100.0000	kg	5
Lup-20170109-1	<input type="checkbox"/>			23	1	108Tank2				1/9/2017 4:56:32 PM	1/9/2017 10:12:15 AM	[10] 17:15:43	0.00		0
fgi	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:52:06 PM	11/8/2016 4:52:19 PM	00:13	0.00000		0
ufhu	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:34:49 PM	11/8/2016 4:34:56 PM	00:07	0.00000		0
jk	<input type="checkbox"/>			48	2	SEQ_FKR20				11/8/2016 4:31:45 PM	11/8/2016 4:31:56 PM	00:11	0.00000		0
2	<input type="checkbox"/>			48	2	SEQ_FKR20				10/27/2016 9:40:18 AM	10/27/2016 9:41:48 AM	01:31	0.00000		0
54854	<input type="checkbox"/>			40	2	SEQ_FKR20				10/27/2016 9:33:27 AM	10/27/2016 9:34:55 AM	01:28	0.00000		0
#	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:12:35 PM	10/24/2016 6:12:40 PM	00:05	0.00000	M	0
phg	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:11:53 PM	10/24/2016 6:11:59 PM	00:06	0.00000	M	0
800	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 6:03:45 PM	10/24/2016 6:08:30 PM	04:45	0.00000	M	0
444	<input type="checkbox"/>	Recipe_Select...	1	27	1	_01	03_Draft	03_Draft		10/24/2016 5:58:01 PM	10/24/2016 5:58:31 PM	00:30	0.00000	M	0
161102-1	<input type="checkbox"/>			1	1	108Box Emptying				10/24/2016 1:35:04 PM	11/3/2016 2:25:44 PM	[10] 00:50:40	0.00		0
161024-2	<input type="checkbox"/>			4	1	108Tank1				10/24/2016 1:34:16 PM	10/24/2016 1:34:42 PM	00:26	0.00		0
161102-1	<input type="checkbox"/>			4	1	108Tank1				10/21/2016 11:10:09 AM	11/3/2016 2:23:49 PM	[13] 03:13:40	0.00		0
161021-1	<input type="checkbox"/>			4	1	108Tank1				10/21/2016 11:10:04 AM	10/21/2016 11:10:09 AM	00:05	0.00		0
161018-1	<input type="checkbox"/>			28	1	SEQ_11				10/19/2016 9:18:49 PM	10/19/2016 9:26:11 PM	07:23	0.00000		0
LTG-160529-1	<input type="checkbox"/>			11	1	50_FILLINGLINE01				9/29/2016 2:16:50 PM	9/29/2016 2:16:50 PM	00:00	0.00000		0
	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:27:35 AM	9/20/2016 11:29:06 AM	01:31	0.00000		0
	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:20:03 AM	9/20/2016 11:27:28 AM	07:25	0.00000		0
hpg	<input type="checkbox"/>			40	2	SEQ_FKR33				9/20/2016 11:14:11 AM	9/20/2016 11:18:57 AM	04:46	0.00000		0
Lup-20160916-1	<input type="checkbox"/>			4	1	108Tank1				9/16/2016 10:21:59 AM	9/16/2016 10:23:57 AM	01:58	0.00		0
160916-1	<input type="checkbox"/>			4	1	108Tank1				9/16/2016 10:19:16 AM	9/16/2016 10:20:47 AM	01:31	0.00		0

Archiving note: Comment for the order | Comment for the product | Comment for the recipe | Comment for the procedure | Comment for the bill of materials

In the user interface of the Plant iT archive manager, it is possible to select and load the exact databases that are of interest for the user

Plant iT material

Process-oriented Materials Management

One of the key instruments for the effective management of order and recipe-controlled production processes is a process-related materials management with a transaction-accurate online view of all material transactions.

They are recorded on the basis of a process-compliant warehouse structure and in addition to precise inventory management also enable investigations and evaluations, in particular batch tracing.

The optionally available module Plant iT material provides this functionality and can be flexibly combined with all Plant iT components. Plant Batch iT is an exception here. The module for materials management is already an integral part of the Plant Batch iT base system.

Master data management

The relevant properties for storage locations, materials and warehouse transactions are parameterised in the system. Besides an extensive set of properties, Plant iT material considers the special requirements of the process industry when defining storage locations by differentiating various types:

- Automatic storage location (storage unit): Permanently connected to the plant, material transactions are controlled by an automation system (e.g. tanks, silos)
- Manual storage location: No physical connection to the plant, material transactions take place manually (e.g. forklift truck) or are controlled by an external system (e.g. automatic transport system)
- Docking storage location:

Temporarily connected to the plant via automated docking equipment, material transactions are controlled by an automation system (e.g. containers, big bags)

Materials with an identical set of relevant properties are summarised in material classes (e.g. liquid raw materials, granulates, finished products) and described by parameterizing these properties. The system differentiates between material parameters and batch parameters which enable the correct consideration of such material properties which may vary with each individual material batch (e.g. active agent concentration).

Warehouse transactions are initially classified according to booking types (e.g. inflow, outflow) and additionally rendered more precisely via transaction keys (e.g. goods receipt of silo goods, automatic dosing). Each



recorded material transaction is assigned a booking type and a transaction key to enable precise selection for evaluations. The recording of material transactions usually takes place automatically, triggered by system-internal standard interfaces from the individual system components, but can also be executed manually via the Plant iT material user interface.

Investigations and evaluations

Material and inventory overviews (warehouse status) are an important part of Plant iT material. For investigations, the transaction overviews (list of selected material transactions) and the booking archive are available. The flexible combination of the following selection criteria

- warehouse/storage location,
- material/material classes,
- time period,
- order/batch ID,
- goods receipt ID,
- supplier batch,
- booking type,
- transaction key or
- recipe and bill of material

turn these standard views into a very efficient tool. Details about each individual material transaction can be viewed online at any time and the use of special archiving mechanisms ensures quick response of the system even in case of large data volumes without the loss of detailed information. Depending on the storage location type, Plant iT material allows direct operator interventions from spontaneous stocktaking to triggering a docking or undocking process for a container.

Batch tracing

The standard evaluations (inventory and transaction overview) provide direct access to the complete batch tracing function of Plant iT material. Starting at a freely selectable entry point in the storage model, investigations can be carried out in both directions. An overview divided into predecessors (upstream) and successors (downstream) with presentation of the information similar to the warehouse and transaction overview facilitates navigation.

With an order-related operating mode using Plant Batch iT or Plant Liqu iT, their batch or sequence records are interconnected with batch tracing. Plant iT material enables direct navigation to a batch record of Plant Batch iT or Plant Liqu iT and vice versa, ensuring that plant sections which cannot be defined as a storage location can still be included in the batch tracing.

Plant iT connect

Interface Manager

“Parameterisation instead of programming” is the central principle of the entire Plant iT system platform. Plant iT connect uses this principle to implement communication interfaces between a Plant iT system and external systems. Client/Server and host-based systems (e.g. ERP, LIMS or Maintenance) as well as intelligent measuring and analysis instruments, e.g. inspection systems and weighing systems, are supported. Plant iT connect provides a parameterisation frontend in the central engineering environment of Plant iT which can be used to completely plan an interface. To achieve this, the communication transactions and their contents are parameterised after the target system-dependent selection of a suitable communication channel. For each of the interfaces implemented via Plant iT connect, the system offers a detailed online analysis function, which allows an extensive analysis of communication processes.

Simple implementation of communication interfaces

The module Plant iT connect can be combined with any base Plant iT system and consists of an engineering interface, various communication channels and the system service. It is used for the implementation of communication interfaces for exchanging information between the process control system and various external systems. The range includes:

- Client/Server or host-based systems (e.g. ERP systems such as SAP, LIMS, maintenance systems)
- PC and PLC-based systems (e.g. automation systems and SCADA systems)
- Intelligent measuring and inspection systems (e.g. inspectors, inline analysis instruments)

The engineering interface

The user interface of Plant iT connect is only required for parameterizing and monitoring communication interfaces. It is seamlessly integrated into the Configuration Manager, the central engineering environment of Plant iT. With regard to the various available communication channels, the parameterisation dialogues have a uniform structure. They are automatically adapted to the special characteristics of the respective channel in terms of their content.



Communication channels

The type of communication is specified for each interface to be parameterised by selecting a communication channel. Tasks of the communication channel include the interface-compliant preparation of the data to be transferred and the use of standardised functions for sending and receiving data packages. The parameterisation of data transfers is realized with standard Microsoft components (SSIS). The following communication channels are available:

- SSIS Package
This package contains the communication channels BAPI, iDoc/RFC and RFC Client/Server

The system service

The Plant iT connect service acts at the operating system level. Its primary task is to coordinate and log the communication transactions. Incoming data is prepared and forwarded to the correct communication channel. As the central instance, the service assumes key parts of data preparation. It therefore relieves the communication channels and enables a flexible extension of the system with additional types of communication.

Typical application scenarios

iDoc and RFC communication are used, among others, for the data interface to the SAP modules MM, PP and PM:

- SAP-MM interface
Depending on the requirement, a transaction-related, bi-directional data exchange on materials master data and individual material transactions takes place via this interface. It is also possible to periodically synchronise information on material inventories.
- SAP-PP interface
Production orders including respective bills of materials are transferred from SAP to Plant iT via this interface, which in turn informs SAP about order-related data, e.g. order status and actual values, such as produced quantities.
- SAP-PM interface
This interface is used to transfer counter values and measured values from the SAP module for planning and monitoring maintenance activities in the plant (e.g. current statuses of operating hours counters and operating cycle counters).

Plant iT compact

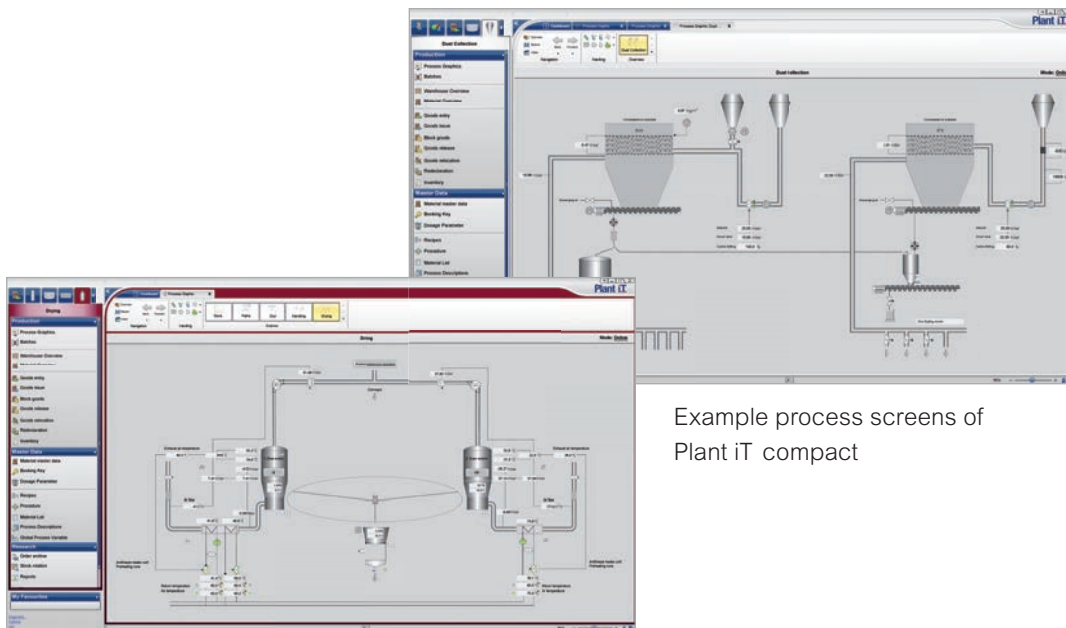
Process control systems for compact units

Our process control systems for the food, beverage and brewing industry are also available as a compact entry-level solution. Plant iT compact consists of pre-configured automation classes, step sequences, order list and recipe management and is built to run with one programmable logic controller (PLC) and up to two workstations.

Manufacturers as well as machine and plant suppliers can utilise Plant iT compact for applications ranging from production data acquisition (PDA) through to full process control. It is an optimized solution for smaller plant areas like CIP plants, pasteurizers or inline mixer.

Benefits of Plant iT compact:

- Minimal hardware requirements – serverless process control system
- Easy handling and operation – pre-configured Plant iT process control system
- Integrated Ethernet extension* – use of the onboard Ethernet interface of the PLC
- Minimal investment costs – for software and hardware
- Multi-language support – language packages for English, Spanish, German, French, Portuguese and Russian
- Scalability of Plant iT – reusability of engineering makes expansion to full system easy
- License-free Visu-Recorder compact included – Recording and replay of process activities



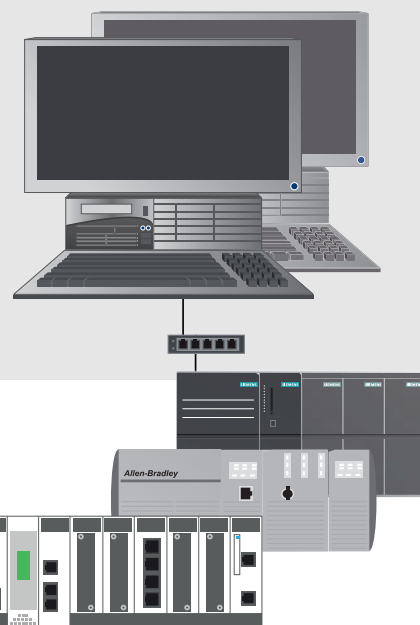
Example process screens of Plant iT compact

Components of Plant iT compact

Software licences of:
MS SQL Server Express Edition, MS Windows, Plant iT compact
incl. Visu-Recorder

Workstation:
PC/Workstation incl. TFT

Supported controllers:
Schneider Electric, Siemens, Rockwell Automation



* for Siemens controllers only

1 PLC & 1 Client



Plant iT express

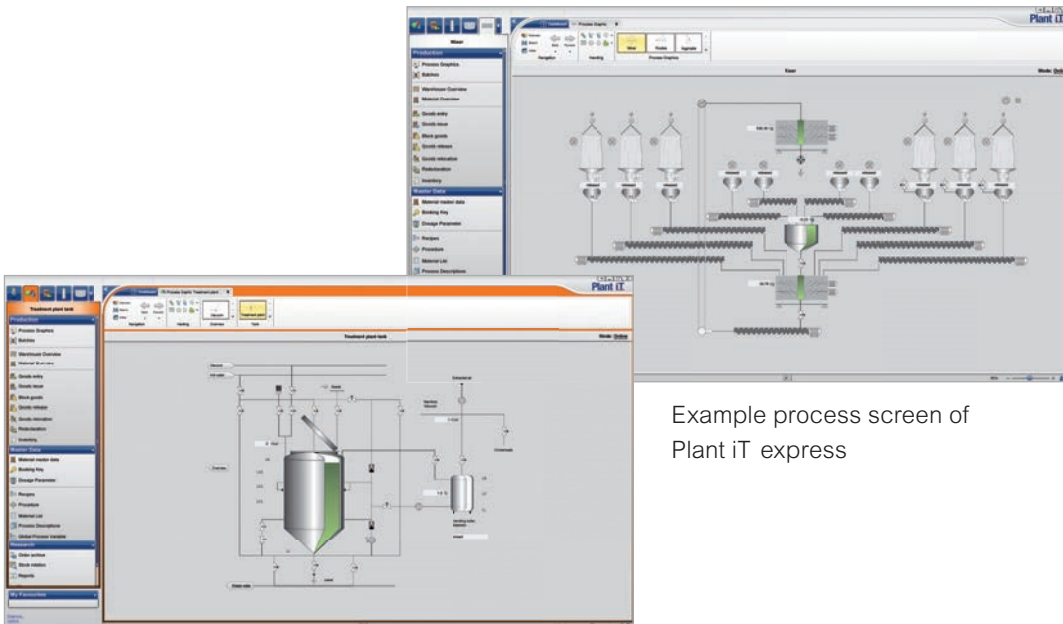
Process control systems for small and medium-sized plants

Plant iT express is an attractive solution for small and medium-sized plants. The Plant iT express licence package consists of an extended number of pre-configured automation classes than the compact licence and is built to run with up to two programmable logic controller (PLC) and up to two workstations.

Manufacturers as well as machine and plant suppliers can utilise Plant iT express for applications ranging from production data acquisition (PDA) through to full process control. It is an optimised solution for small up to mid-size plant areas like utilities, water treatment, filtration and CO² plant.

Benefits of Plant iT express:

- Easy handling and operation – pre-configured Plant iT process control system
- Two full clients and PLCs – for small up to mid-size plants
- Extensive automation classes – matches the scope of the Plant iT full version
- Minimal hardware requirements – serverless process control system
- Multi-language support – for English, Spanish, German, French, Russian and Portuguese
- Scalability of Plant iT – reusability of engineering makes expansion to full system easy
- Discounted licence fees for the Visu-Recorder express – recording and output of process visualizations



Example process screen of Plant iT express

Components of Plant iT compact

Software licences of:
MS SQL Server Express Edition, MS Windows, Plant iT express

Workstation:
PC/Workstation incl. TFT

Supported controllers:
Schneider Electric, Siemens, Rockwell Automation



2 PLCs & 2 Clients



Plant iT Smart Control

Mobilize control rooms with Plant iT Smart Apps

Web applications for mobile devices have the purpose of ensuring a substantial gain of mobility and flexibility for the control and monitoring of fully automated systems.

Our brand-new App Plant iT Smart Control enables operators to perform production steps such as switching actuators, simulating sensors or acknowledging a fault message via a smartphone, tablet or PC. The newly acquired flexibility allows operators to leave the control room without ever losing sight of the most important plant data. The only requirement is a Plant iT system version of 9.70 or higher.

Another major advantage of the web application is its quick & simple operation via web browser. Hence, no separate download via App Store is necessary, all that it takes is an installation on the web server.



The key functions of Plant iT Smart Control:

- **Maximum Flexibility –**
Wherever you are - with Smart Control, the entire plant can be monitored and controlled from any location. Faults and notices can be acknowledged. Sequence controls can be paused and resumed.
- **Optimal Support –**
Our App is not only the ideal support for plant operators and shift supervisors, but also extremely useful in maintenance, commissioning and servicing. Expensive terminals on site are no longer needed.
- **High Data Security Level –**
To ensure a high level of data security, the application is equipped with a wide range of security functions. The entire data exchange between the user and the Plant iT system takes place via TLS encryption.
Furthermore, the reading of data and writing of commands is only possible for authenticated users with enabled user rights.
- **Responsive Design –**
The application is fully adapted to the screen resolutions of smartphones, tablets and PCs, allowing usage on your device of choice.
- **Integrated Help Functions –**
An integrated help function within the app supports the user in case of questions about the app and its operation. Even without prior training or daily use of the control system, smooth handling is guaranteed.
- **Easy Data Exchange –**
The App enables users to assign each object with a unique URL and thus share objects or map their access in the form of a QR code, e.g. to notify maintenance staff about a problem object.

Service & Support

As the manufacturer of the process control systems Plant iT and brewmaxx and the MES solutions Plant Integrate iT & brewmaxx Integrate, we offer you quick and full post-commissioning support during the entire life cycle of your production plant.

Engineers with extensive project experience are at the core of our support team. When faced with a range of complex support requirements or technology problems, project and development teams are integrated into the problem-solving process in an appropriate manner. We can therefore respond to your request without delay and in a way that really suits you best.

High level of system availability

Our portfolio provides you with active support for your Plant iT and brewmaxx system. Irrespective of whether your production plant runs 8/5 or 24/7, the continuity and improvement of your business processes is the main focus of our service deliveries. The application of proactive services, e.g. 24/7 system monitoring or regular manual

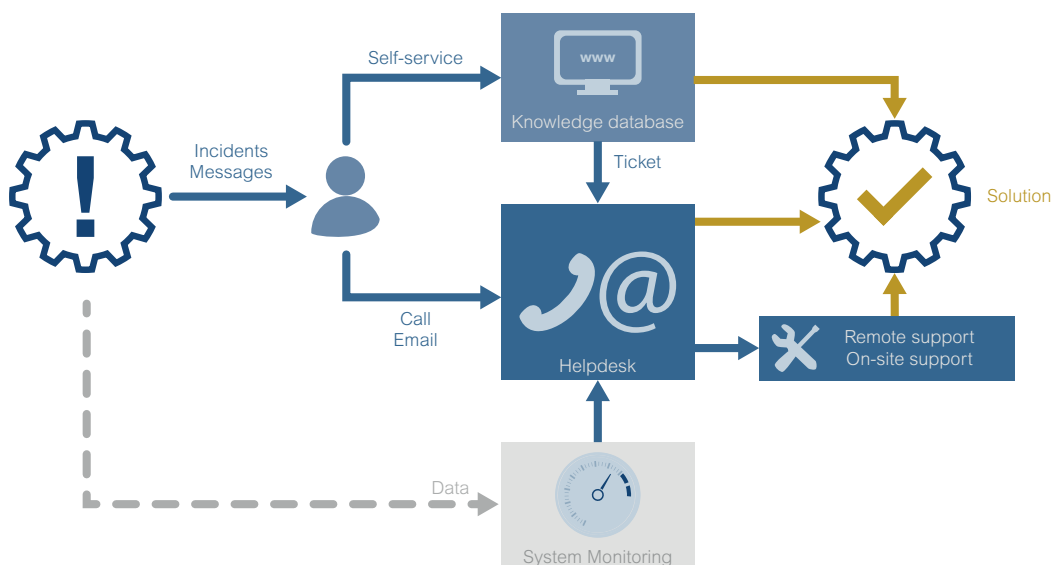
maintenance, guarantee not only improved system availability, but also minimise the required effort in the event of malfunctioning.

Automatic 24/7 monitoring

Thanks to our monitoring solution system, the system functions of your Plant iT and brewmaxx plant can be monitored 24/7. System monitoring immediately detects IT infrastructure problems and any deviations from standard operating conditions. This means plant faults can be analyzed faster and the causes of malfunctioning are easily identified and eliminated – act instead of react.

Faster, more qualified support

The entire team, consisting of support specialists, project planners and developers, will deal with your requests in a consistent and professional manner during service hours (Monday to Friday between 9am and 5pm, CET); extended support can be arranged, if required.



All service requests are sent to the ProLeiT help desk. Our service staff store your request which is subsequently processed at various support levels.

ProLeiT Academy

Training directly from the manufacturer

The ProLeiT Academy offers our customers and partners an extensive range of standard training courses for the process control systems Plant iT and brewmaxx. The various contents of the training courses relate either to our process control systems or to typical user groups. The following training courses are currently offered throughout the year:

- Product training courses:
Open training, according to the training course calendar for customers and partners
- User training courses:
Individual training, scheduled and coordinated for customers and partners

In close cooperation with end customers, system integrators and plant and machine manufacturers, individual workshops, tailored to the project-specific working and development environments, are additionally offered. Plant Acquis iT courses for production data acquisition or energy management, as well as special programming courses for developing customer-specific automation classes are examples of this.

An overview of all standard product training courses can be found on our website via the following link:

<https://www.proleit.de/training.html>

Our trainers are experienced members of staff who will provide you with valuable background information, techniques and tips and tricks to facilitate your daily work with our process control systems.

The courses are usually held at our headquarters in Herzogenaurach or at the premises of our subsidiaries. Additionally, we also offer individual workshops that are run by our trainers at a location of your choice.



Selected references

Plant iT & brewmaxx – installed in more than 1,800 plants

- AB InBev (Group)
- Adelholzener Alpenquellen GmbH
- Almarai Company Ltd.
- Ambev S.A. (Cebrasa Brewery)
- Asahi Beer K.K. (Group)
- Bad Dürkheimer Mineralbrunnen GmbH & Co. KG Heilbrunnen
- Baer (Lactalis Suisse SA)
- Baptista Bakery Inc.
- BASF Construction Polymers GmbH
- BASF Personal Care and Nutrition GmbH
- Bayer HealthCare AG
- Beijing Yanjing Brewery Co. Ltd.
- Bell's Brewery Inc.
- Bertin Ltda.
- BK Giulini GmbH
- Brillux GmbH & Co. KG
- Calidad Pascual S.A.U.
- Caramuru Alimentos S/A
- Carlsberg (Group)
- Chemson Ltd.
- Clariant Produkte GmbH
- Coca-Cola Erfrischungsgetränke AG
- Comanche Biocomustíveis de Canitar Ltda.
- Danone GmbH
- Diageo (Group)
- DMK Deutsches Milchkontor GmbH
- East African Breweries Ltd.
- Eckes-Granini Deutschland GmbH
- Efes (Group)
- Ensinger Mineral-Heilquellen GmbH
- Enviral A.S.
- Esco - European salt company GmbH & Co. KG
- Feldschlösschen Getränke AG
- Firestone Walker Brewing Co., Inc.
- Franken Brunnen GmbH & Co. KG
- Franz Kaldewei GmbH & Co. KG
- Fresenius Kabi AG
- FSB Backwaren GmbH
- Glockenbrot Bäckerei GmbH & Co. oHG
- Granol Indústria Comércio Exportação S/A
- Grolsche Bierbrouwerij Nederland B.V.
- Haka Kunz GmbH
- Hassia Mineralquellen GmbH & Co. KG
- Heineken (Group)
- Henkel Waschmittel GmbH
- Henkell Freixenet
- Heraeus Holding GmbH
- Israel Beer Breweries Ltd.
- Jack Link's Europe GmbH
- J. Bauer GmbH & Co. KG
- Jowa AG
- Juhayna Food Industries S.A.E.
- Kaanlar Food Industry
- Kenana Sugar Company
- Kerry Ingredients GmbH
- Kiesel Bauchemie GmbH & Co. KG
- KWS Saat SE
- Luye Pharma AG
- Martin Bauer Holding GmbH & Co. KG
- MAUTNER MARKHOF Feinkost GmbH
- Merck KGaA

- Molkerei Alois Müller
GmbH & Co. KG
- Münzing Chemie GmbH
- Naturella Getränke
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- OMIRA Oberland-Milchverwertung Ravensburg GmbH
- Pfänder KG
- Privatbrauerei Erdinger Weißbräu Werner Brombach GmbH
- Privatbrauerei Fritz Egger
GmbH & Co. KG
- Rehau AG & Co. KG
- Royal FrieslandCampina (Group)
- Sachsenmilch AG
- Schwenk Zement KG
- Sierra Nevada Brewing Co.
- Sigma Alimentos (Group)
- Silesia Gerhard Hanke
GmbH & Co. KG
- Tara (Milco Industries Ltd.)
- Warsteiner Brauerei
Haus Cramer KG
- Werner & Mertz GmbH
- Wimm-Bill-Dann Foods (Group)
- Grupo Ybarra Alimentación S.L.



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