Freelance Version 2019
Distributed Control System for
process applications

Freelance
Process automation made easy

Freelance is a full-fledged distributed control system that combines the advantages of both worlds - DCS and PLC. It offers the small footprint of a PLC, together with the full functionality of a DCS. The integrated environment simplifies engineering, commissioning, maintenance and fieldbus management. The intuitive operator interface enables easy operation and diagnosis of the entire system.

Freelance version 2019
With this new version Freelance takes the next step into the future. Freelance 2019 provides significant improvements in all areas: scalability, usability, connectivity, compatibility and security.

Freelance version 2019: Benefits at a glance
- Compatible with previous versions of Freelance components
- New PROFIBUS Master module with built-in redundancy
- Improved availability through control network redundancy
- Increased security through controller lock
- PM 904F controller with up to 4 communication buses
- Modbus TCP and IEC 60870-5-104 remote tele-control protocol on Ethernet for ABB's AC 700F, AC 800F and AC 900F controllers
- With Freelance 2019 up to four (4) monitors can be connected to a single operator workplace.

Freelance is ABB's user-friendly, cost-effective and robust solution ideal for nearly all process industries with the following benefits:
- **Easy to use:** It is very easy to install, learn, engineer, commission, back-up, maintain and expand.
- **Scalable:** Projects can start as small as a few I/Os for skids, package units or single plant equipment and grow to thousands of I/Os controlling the whole plant.
- **Reliable:** It is a proven system with high reliability and availability providing redundancy options supporting solutions without any single point of failure.
- **Value for your money:** Investment goes a long way because of its small footprint and ability to run on any standard computer. Together with its ease of use, this results in savings in installation, engineering, commissioning and life cycle costs.
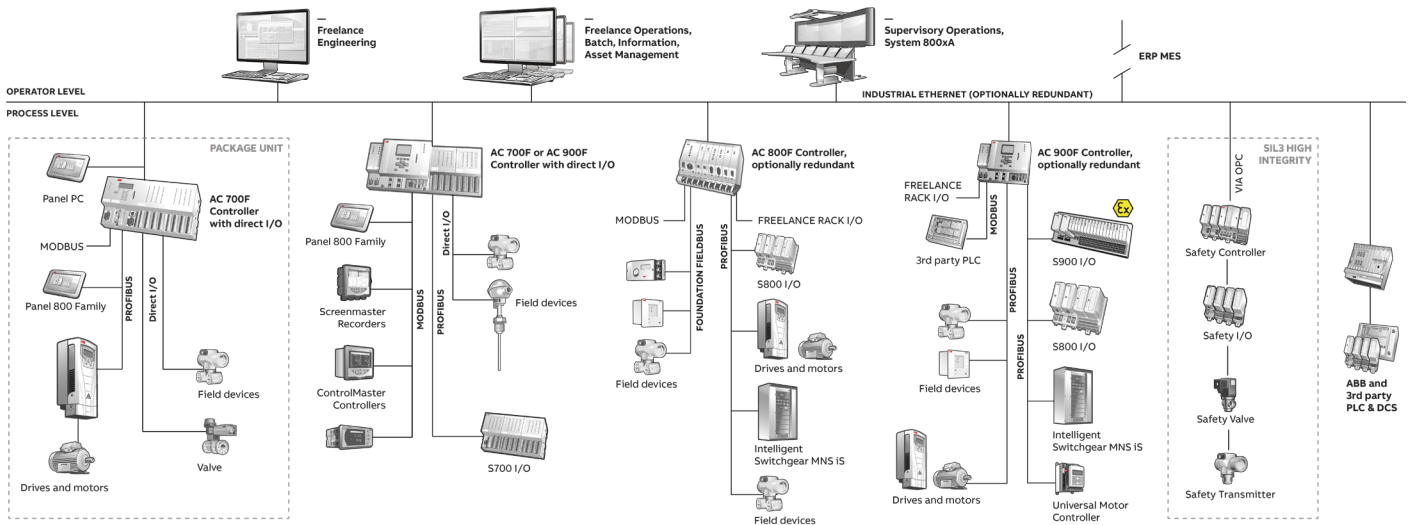
Freelance system overview

Freelance is divided into an operator level and a process level. The operator level contains the functions for operation and observation, archives and logs, trends and alarms.

Open-loop and closed-loop control functions are processed in the controllers, and exchange data with actuators and sensors in the field.

Freelance can go from a typical OEM offering with an AC 700F controller, a Panel 800 and around 50-100 I/Os. The AC 700F can have up to eight direct I/O modules connected to it or have remote I/Os connected via PROFIBUS. Modbus TCP and RTU are also supported.

The Freelance Lite offering can typically have an AC 700F or AC 900F controller and will be in the 250 to 400 I/O range with possibly a Freelance Operations Lite license. This can ramp up to the Freelance Standard and Plus offerings with the AC 800F and/or AC 900F, with or without redundancy. Freelance can go up to thousands of I/Os. Connections include FOUNDATION Fieldbus, PROFIBUS and HART as well. There is also the possibility to connect to supervisory operator stations running on ABB's 800xA system.

Freelance Engineering

Freelance Operations, Batch, Information, Asset Management

Supervisory Operations, System 800xA

ERP MES

OPERATOR LEVEL

PROCESS LEVEL

INDUSTRIAL ETHERNET (OPTIONALLY REDUNDANT)

PACKAGE UNIT

Panel PC

AC 700F Controller with direct I/O

MODBUS

Panel 800 Family

PROFIBUS

Direct I/O

Field devices

Valve

Drives and motors

AC 700F or AC 900F Controller with direct I/O

Panel 800 Family

Screenmaster Recorders

ControlMaster Controllers

Direct I/O

MODBUS

PROFIBUS

Field devices

S700 I/O

AC 800F Controller, optionally redundant

MODBUS

FOUNDATION FIELDBUS

PROFIBUS

FREELANCE RACK I/O

S800 I/O

Drives and motors

Intelligent Switchgear MNS iS

Field devices

Field devices

AC 900F Controller, optionally redundant

FREELANCE RACK I/O

3rd party PLC

MODBUS

PROFIBUS

PROFIBUS

S900 I/O

S800 I/O

Intelligent Switchgear MNS iS

Universal Motor Controller

Field devices

Drives and motors

SIL3 HIGH INTEGRITY

VIA OPC

Safety Controller

Safety I/O

Safety Valve

Safety Transmitter

ABB and 3rd party PLC & DCS

Freelance value propositions

Easy to use

Freelance can be installed on any standard computer and in just a few minutes. A Quickstart Tutorial is available, which allows users to learn at their own pace with detailed instructional videos. It takes less than a week to learn since there is just one engineering tool.

Pre-engineered, ready-to-use displays make engineering much easier compared to other control systems or PLC/SCADA combinations. Additionally, a system-wide project database makes archiving or backup very easy to perform. There is also multiple language support.

The Freelance control system combines user-friendly engineering with an open, modern system architecture. This means:
- Only one tool for engineering, commissioning and diagnostics
- Fieldbus management completely integrated into control system engineering
- Time and cost savings in engineering, commissioning, testing, service and maintenance
- Assembly close to the field: reduction of field wiring and space requirements

- Freelance has a convenient cross-reference feature allowing variables and tags to be found easily in any editor right up to the graphic display. This makes troubleshooting and debugging easier, resulting in faster project execution.

Pre-configured components for the operator level
The engineering of the Freelance operator level is straightforward. The pre-configured visualization components include:
- Faceplates
- Module diagnostics
- Extended troubleshooting capabilities
- Automatically generated SFC displays
- Automatically generated system communication
- Event list, alarm line and message log files
- Trend displays with long-term archiving
These components can be used straight out of the box, eliminating time-consuming manual configuration.

Reliable

Freelance is a well-proven technology that has been around for more than 20 years and is installed in thousands of installations globally since its origination in Germany.

High availability
The technology has proven its worth in industrial use over several years and meets the toughest requirements regarding availability. The hardware can be structured redundantly at all levels. This includes the redundant fieldbus modules, redundant fieldbus lines as well as network and controller redundancy.

Regulatory compliance
With a view to meeting the requirements of regulatory authorities such as the American FDA (Food and Drug Administration) or the EFSA (European Food Safety Authority), Freelance provides a series of features that facilitate the validation procedure.

Examples include:
- Encrypted log and trend data
- Audit trail functions
- Access rights and user administration (security lock).

— Scalable

Freelance can be easily scaled up from a small system of a few I/Os to a large system of up to thousands of I/Os. Expansion can be done with minimal engineering effort.

All controller types can be used in combination in a single system. They are suitable both for installation in the control room and for use in junction boxes directly in the field.

- The AC 700F controller has a small footprint that supports PROFIBUS. It can support up to eight direct I/O modules.
- The AC 800F controller can be equipped with up to four fieldbus modules of type serial, PROFIBUS, FF HSE or Freelance CAN bus. Optionally, AC 800F supports redundancy.

- The AC 900F controller also supports PROFIBUS and Freelance CAN bus and truly extends the hardware portfolio of the Freelance distributed control system. The AC 900F modular controller offers expanded flexibility via a pluggable SD card, more Ethernet ports, redundancy options for high availability and power enough for around 1,500 I/Os per controller. It can support up to ten direct I/O modules.
- More connectivity: Four (4) communication interfaces in new AC 900F with PM 904F.

The lite version of Freelance Operations also provides for enhanced scalability of the system on the operator level.

See the architecture drawing on page 3 for more information about scalability.

— Value for your money

The big advantage of Freelance is the savings it provides in project engineering.

The easy-to-use features and use of only one tool for configuration of graphics, controllers and field devices allows engineering and commissioning time to be reduced, resulting in faster start-ups.

Freelance has a small footprint (comparable to a PLC), which means less space requirement for cabinets. Since the system uses intelligent peer-to-peer architecture, there is no need for expensive server PCs.

In fact, Freelance can run on any standard computer with minimum specifications. It is installed in just a few minutes.

Freelance Version 2019 still supports Freelance hardware from its first version. Freelance 2019 runs on both Windows 10 and Windows 7.

Freelance controllers

AC 900F

- Optional LCD display supporting e.g. security through controller lock, easy backup of your application and easy access to process variables.
- Typically around 1,500 I/Os supported (up to 400 I/Os with the lite CPU)
- G3 compliant as standard
- Option to run controllers either redundantly (CPU redundancy, fieldbus module redundancy) or non-redundantly
- AC 900F Plus (PM 904F) / AC 900F Standard (PM 902F): four (4) built-in Ethernet ports supporting Modbus TCP/IP or 60870-5-104 telecontrol protocol
- Lite CPU PM901F: three (3) built-in Ethernet ports supporting Modbus TCP/IP or 60870-5-104 telecontrol protocol
- Two (2) serial ports supporting Modbus RTU/ASCII or IEC 60870-5-101 telecontrol protocol
- CAN bus module for connection of Freelance Rack I/O
- Optional PROFIBUS master modules (up to two for PM 902F and PM 901F. PM 904F can have up to four) providing integrated line redundancy and supporting exchange during the plant is in operation (hot-plug)
- Direct connection of S700 I/O modules (up to 10), including modules combining inputs and outputs in just one module. This can reduce footprint and costs.
- I/O modules can also be connected remotely via PROFIBUS
- SD card support

AC 800F

- A outstanding feature is that it can be equipped with a set of fieldbus modules, covering all major fieldbuses used in process automation.
- Option to run controllers either redundantly (CPU redundancy, fieldbus module redundancy) or non-redundantly.
- Fieldbus-compliant components such as remote I/O, field devices and network components can be used.
- Optional G3-compliant
- Typically around 1,000 I/Os supported

AC 700F

- Typically around 300 I/Os supported
- This PLC-like controller comes with a very small footprint. Up to eight (8) S700 direct I/O modules can be plugged to the right side of the controller module.
- An alternative to remote I/Os, AC 700F can be placed directly in the field, offering a very flexible and cost-effective solution for an "intelligent" Ethernet I/O station.
- I/O modules can also be connected remotely via PROFIBUS. This allows for high flexibility in installation.
- Controller lock via the display
- SD card support

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AC 900F

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AC 800F

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AC 700F

Freelance I/Os

Freelance's PROFIBUS Master modules enable connection of ABB's remote I/O units such as S700, S800 or S900.

S700 I/O is meant for basic applications where traditionally PLC I/Os have been used. S800 I/O and S900 I/O are typically used in process automation.

One of the benefits using Freelance in combination with remote I/Os is that it can be placed in junction boxes in the field instead of in the control room.

S700
- Can be used as direct I/O for AC 700F and AC 900F Freelance controllers.
- Can be used as PROFIBUS remote I/O with AC 700F, AC 800F, AC 900F or other PROFIBUS Masters.
- Small footprint - the modules are featured with a high packing density, several modules are available with inputs and outputs mixed in one module. Fourteen (14) different module types are currently available, covering a wide variety of applications and giving maximum flexibility.

S800
- A comprehensive, distributed and modular process I/O system that communicates with controllers via PROFIBUS.
- Installation in the field as remote I/O, close to sensors and actuators. Ability to exchange modules and reconfigure the system during operation.
- Redundancy options in all areas allow a high degree of availability.

- For harsh environments, the I/O modules are compliant to G3 severity level of ISA-S71.04, Environmental Conditions for Process Measurement and Control Systems.
- A pass-through feature makes it possible to configure and examine all HART-compliant field devices directly from the Freelance engineering tool.

S900
- Can be installed directly in zone 1 and zone 2 hazardous areas and modules are compliant to G3.
- Communicates with the control system level as remote I/O using the PROFIBUS standard, therefore reducing marshalling and wiring costs.
- Sturdy, error-tolerant and easy to service.
- A pass-through feature makes it possible to configure and examine all HART-compliant field devices directly from the Freelance engineering tool.
- Redundant communication ensures maximum availability.
- Integrated disconnection mechanisms allow replacement during operation, meaning that there is no need to interrupt the primary voltage in order to exchange the power supply units.
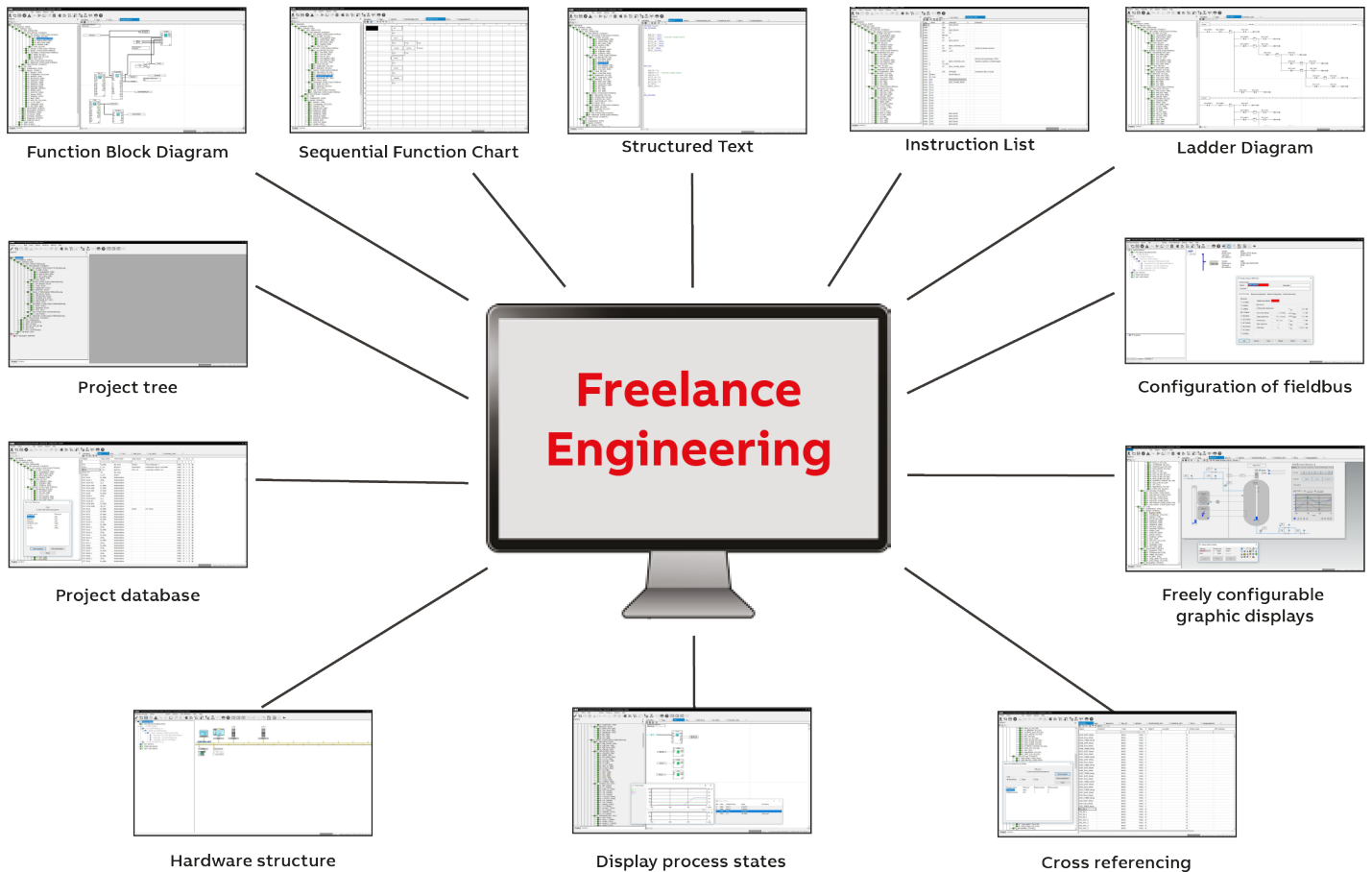
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S700 I/O

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S800 I/O

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S900 I/O

Freelance Engineering and Operations

Function Block Diagram   Sequential Function Chart   Structured Text   Instruction List   Ladder Diagram

Project tree

Project database

Hardware structure

Freelance Engineering

Configuration of fieldbus

Freely configurable graphic displays
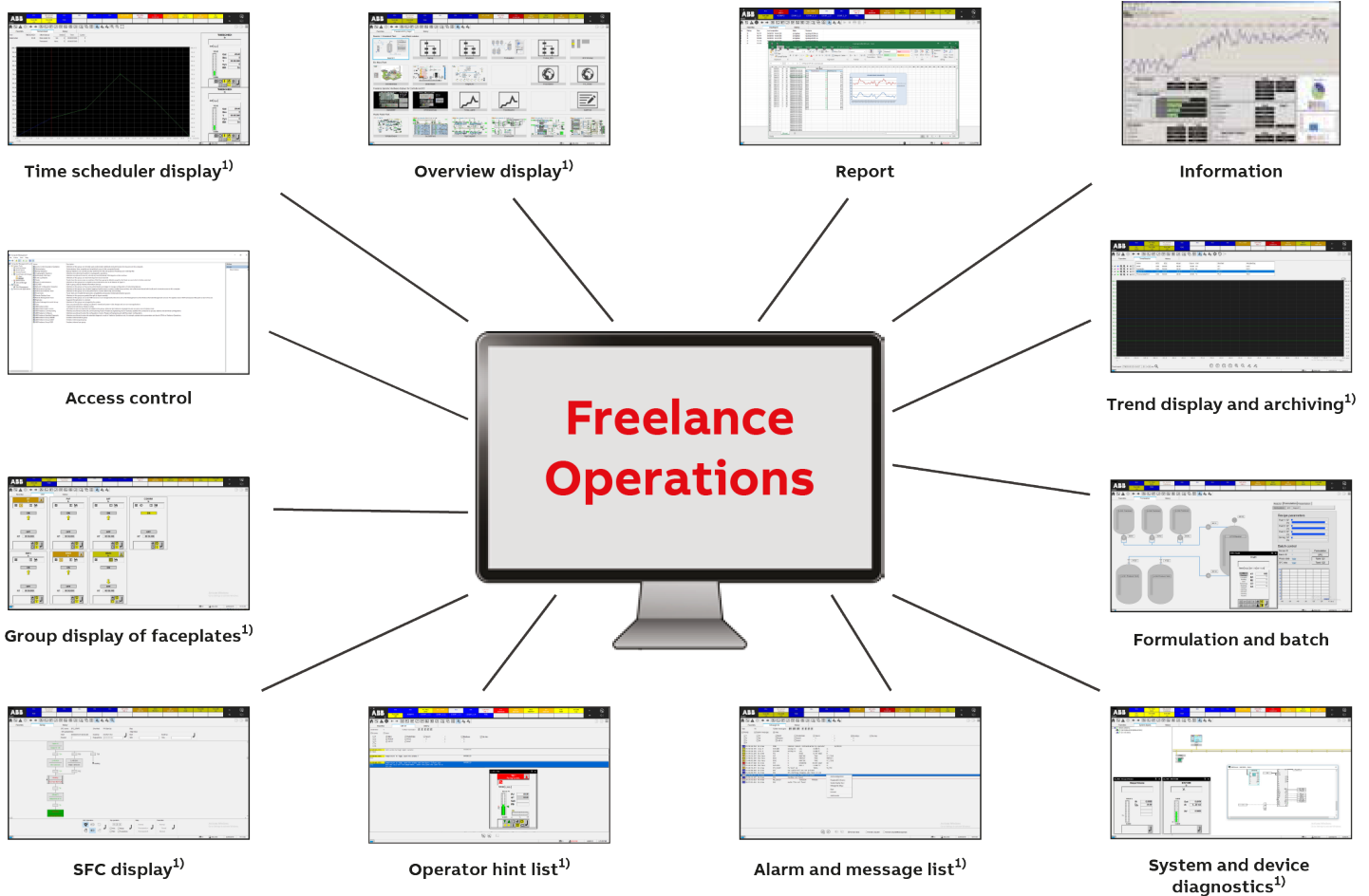
Display process states   Cross referencing

Freelance Engineering

With Freelance, all engineering work is performed with one single tool, Freelance Engineering. It works hand in hand with Freelance Operations. onfiguration of all plant objects – ranging from process graphics to field devices of the entire plant – is easy and intuitive to perform. Free- lance 2016 still supports Freelance hardware introduced more than 20 years ago.

Freelance Engineering – Benefits at a glance
- Intuitive auto router in Function Block Diagram (FBD) editor
- Both project tree and editors can be viewed simultaneously for easier navigation
- Direct copy paste between several editors
- Optimized for efficient engineering, fewer clicks with auto-accept
- Direct import/export to Microsoft® Excel®
- Excel-like filter and sort functions in variable/ tag list
- Graphical project preview for easier distinction of project
- Compatible with former versions

Time scheduler display[1]

Overview display[1]

Report

Information

Access control

Trend display and archiving[1]

Group display of faceplates[1]

Formulation and batch

Freelance Operations

SFC display[1]

Operator hint list[1]

Alarm and message list[1]

System and device diagnostics[1]

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[1] Pre-engineered and ready-to-use displays

Freelance Engineering is used to configure and commission the entire system including the controllers, field devices and Freelance Operations. Usually, portable equipment such as laptops, which allow configuration both in the office and on site, is used. All five programming languages specified in IEC 61131-3 are available. Users especially appreciate how quickly they are able to familiarize themselves with the tool. Supported by a uniform database throughout the system as well as cross reference functions, Freelance Engineering enables you to conduct the entire system configuration quickly and easily, including:

• Configuring and parameterizing the field devices and I/Os
• Setting the bus topology and parameters such as transmission rates and addresses

Freelance Engineering is used for all Freelance controller types. It supports FDT/DTM and also user-defined hardware templates for the efficient configuration and maintenance of field devices. This eliminates time-consuming tasks of integrating device GSD files. In addition to intuitive graphical parameterization dialogs, a DTM also offers comprehensive diagnostics functions for field device maintenance.

Freelance Engineering offers great support to optimize workflows. Freelance leverages the familiar Microsoft environment to allow easy navigation. For instance, the tag or variable list can be sorted and filtered similar to Microsoft Excel spreadsheets. Both lists can be easily exported to or imported from an Excel spreadsheet.

Freelance Engineering features:
- A single software tool for configuration of the automation functions, the operator interface with displays and logs, and fieldbus parameters
- Graphical configuration
- A function block library with 220 tried and tested functions, greatly exceeding the basic ones outlined in IEC 61131-3
- An extensive macro library containing more than 200 graphic symbols, which can be extended by the user
- A project tree for flexible program generation and transparent program structuring
- Verification of automation functions to find and remove errors quickly and easily
- Convenient cross-reference function allowing variables and tags to be found easily in any editor right up to the graphic display
- Importing and exporting of programs, displays, variables, tags and parts of the project tree
- Password protection to prevent unauthorized project modification
- Password protection for user-defined function blocks
- Uniform and auto-generated system-wide graphical documentation of the entire user program, system communication and all field device parameters
- The project file (application) backup can be stored on any storage medium and can easily be transferred. The single project file includes the complete project with all programs, graphics, controllers, and field device parameters.
- Testing and simulation of user programs (e.g. interlocks) even without connected hardware using the controller emulator
- Bulk data manager allows to import signal lists from planning tools via Excel and fast duplicating of typical solutions.

Versatile communication
You can use the following as required: Ethernet, OPC, TCP/IP, PROFIBUS, FOUNDATION Fieldbus, MODBUS and HART. In addition, use audio instructions to obtain a solution in the event an alarm, video integration or secure internet connection.

The structure of the field level
ABB offers an extensive selection of devices that are fine-tuned to meet the needs of the relevant area of use. Thanks to established communication standards, integration into Freelance is quite simple. Using PROFIBUS together with the controllers, intelligent field devices can be integrated into the system directly or via remote I/Os.

The choice of fieldbus type
In accordance with the concept of plug-and-produce, Freelance allows the integration of all common fieldbuses – providing the user the freedom to choose the fieldbus type.

Bus Type	AC 700F	AC 800F	AC 900F
PROFIBUS-DPV1	Yes	Yes	Yes
FOUNDATION Fieldbus	No	Yes	No*
HART via remote I/O	Yes	Yes	Yes
MODBUS Master and Slave	Yes	Yes	Yes
MODBUS TCP	Yes	Yes	Yes
CAN for Freelance Rack I/O	No	Yes	Yes
Telecontrol protocol IEC 60870-5	Yes	Yes	Yes

*in preparation

With focus on Engineering Efficiency we improved all filtering and sorting functionality. Also the auto routing capabilities in the Function Block Diagram editor has been improved.

With this new version it is possible to backup/restore the whole project application file including all operator graphic displays, logic programs, and even field device parameters directly via SD Card within the controller (AC 700F and AC 900F).

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Freelance Operations

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01 Multi monitor support

Freelance Operations meets all standard process control requirements with regard to operation and observation at an attractive price. Freelance Operations configuration is fully integrated in Freelance Engineering. Optional batch and historian packages are also easy to integrate.

Freelance Operations supports quad monitor operation to facilitate staying continuously tuned with essential information like the alarm list, while inspecting at the same time for example the progress of a sequential function chart, trend archives, or the system display with extended diagnostics. Several Freelance operator workplaces can work seamlessly together.

Amongst other things, Freelance Operations offers the following visualization features:
• Clearly structured faceplates for operator interventions which can also be combined as required in group displays
• Trend displays including historical data and long-term archiving

• Alarm pages for specific plant areas, sequence control displays, shift logs, event logs and data archiving
• Standardized and automatically generated system display for system hardware diagnostics
• Free graphic displays: the static background can be created with any graphics editor, then be imported and enhanced with dynamic graphic elements
• Control aspect for interlocking displays.
• Freelance Operations Lite has full functionality and is only limited in number of free graphic displays
• Multi monitor support in Freelance 2019.

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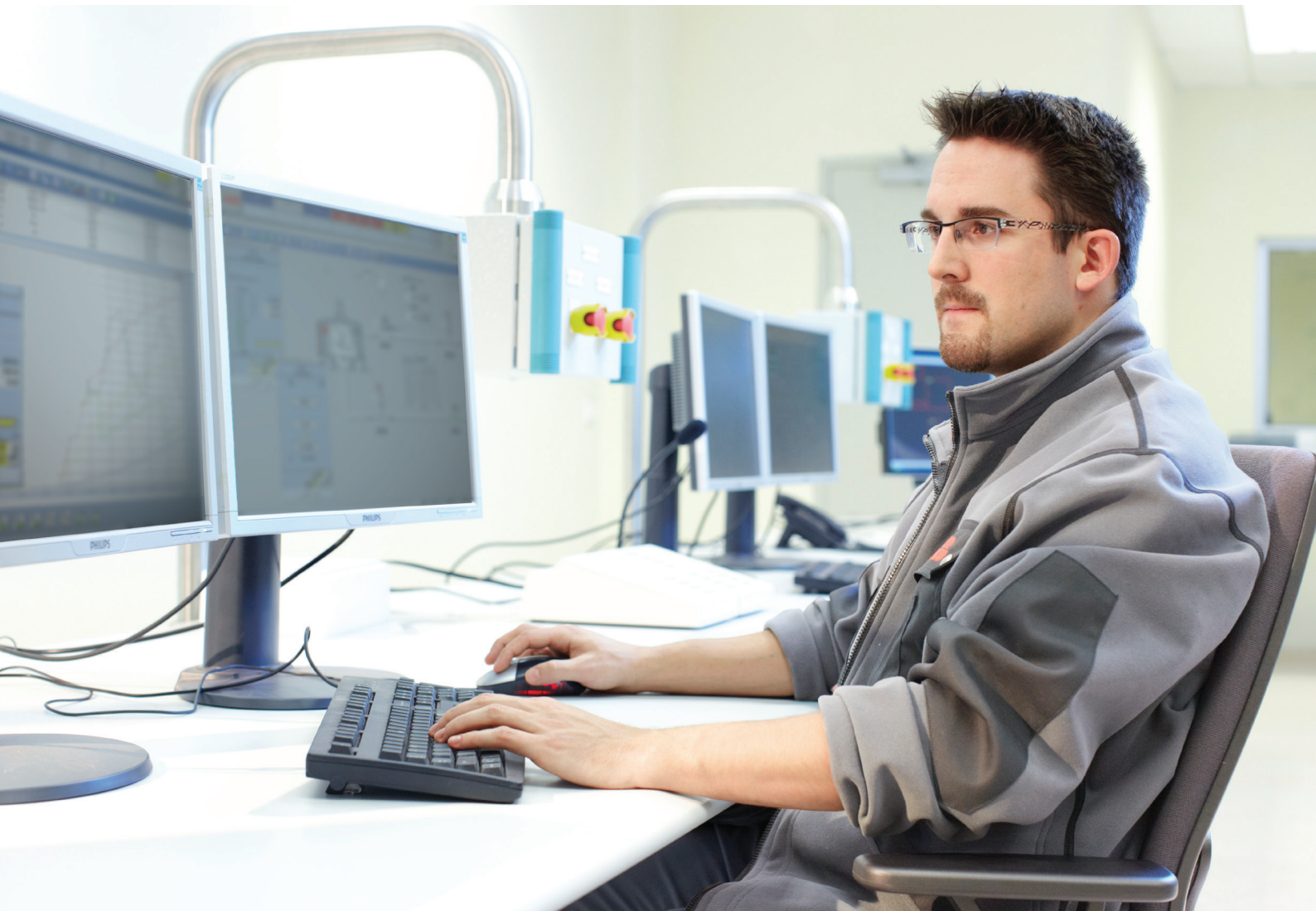
Additional functions

Cyber Security

Software Security Management
- ABB reviews, tests and validates monthly Microsoft security updates and third-party virus scanner software for compatibility with Freelance. A monthly qualification report is provided to Automation Sentinel subscribers.
- User authentication and access control
- Backup/restore function to backup changes to the application
- System hardening recommendations to increase security

Batch Management

Freelance Formulation
Freelance Formulation is the essential recipe management component for Freelance for single product or multi-grade product process cells.
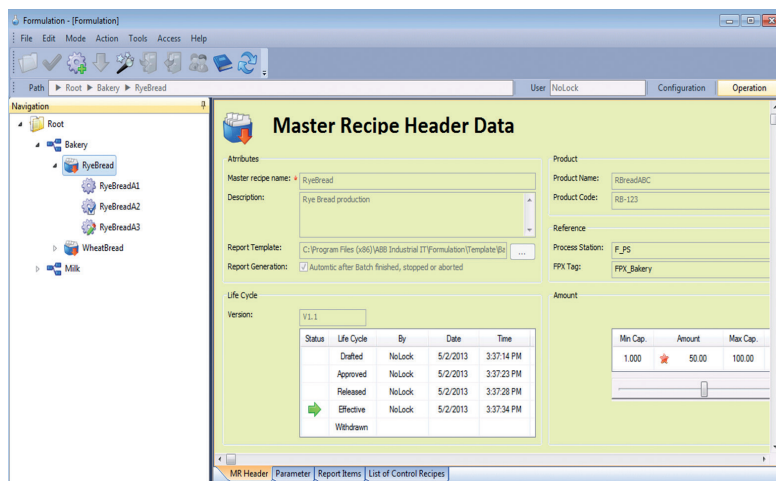
- The user has one tool to configure recipes, organize parameters and start control recipes. It provides all the information the operator needs to manage batches in one simple application, including Excel based batch reports
- Little or no knowledge of a batch manager software is required to use the Formulation tool – less time learning a tool, more time to focus on the process.
- Ideal for procedures where multiple formulations apply to one Master Procedure (SFC).

Extended Automation Batch Management
- Scheduling, monitoring and controlling batches and campaigns
- Recipe control and operation
- Resource management
- Redundancy
- Reporting, material tracking and history
- Traceability of actions, the process, and deviations of the process
- ISA 88.01 compliant

Information Management

Freelance Historian and Information

Today, Freelance comes with a historian included with the basic software licence. It is possible to view trends, signal sequence logs and Excel reports, all with the standard Freelance Operations software. An optional Historian package offers enhanced visualization and reports, giving operators an even more powerful information management system along with a server redundancy option.
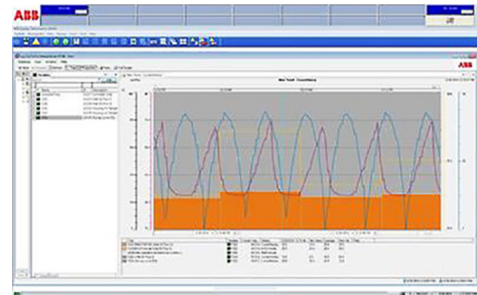
Asset Management

If you want to keep your production plant up and running in the long term, you need information about the availability and degree of wear and tear of your equipment. All of the information necessary for this is available; integrated and included in the basic software package of Freelance. As a result, you can avoid making investments that appeared essential but were in fact unnecessary. Freelance allows the use of modern asset management methods for efficient maintenance and optimization – helping to make optimum use of plant capacity.

A comprehensive customer service

Service means a profitable investment in continually maximizing and optimizing the availability, performance, quality and security of a plant. ABB's support covers the following areas:
• Customer Support Services
• Training
• Spare Parts & Logistics, Repair Shops
• Process, Application & Consulting Services
• Service agreements
• Extensions, upgrades and retrofits
• Advanced Services
• Software maintenance and upgrades

Through the resulting specialization of our employees, we guarantee maximum competence for each task we perform. Whether it's more traditional service support such as commissioning and maintenance or individual consulting services – the result is measurable customer benefits.

Our comprehensive Life Cycle Services enable us to increase the value of your plant over its entire lifetime. The conventional, reactive service can reduce production downtimes, while the use of new technologies offers an increased number of capabilities for preventive service measures to identify and avoid cost-intensive faults at an early stage. Proactive services such as asset management or ongoing modernization increase the value of your plant and give you a distinct competitive edge.
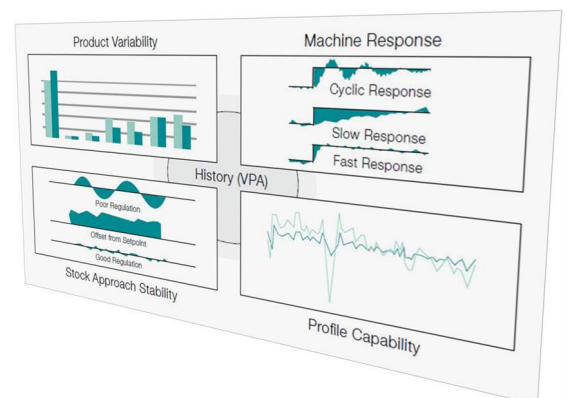
Freelance is proven in many applications

ABB's Freelance DCS has helped thousands of customers from diverse industries across the globe. This compilation of success stories, ranging from simple process operations to highly complex industrial applications, is a demonstration of Freelance's ability to meet challenging requirements in terms of robustness, scale and reliability.

Case study 1: Oil and gas industry
– A gas plant in the United States wanted to upgrade their pneumatic controls with minimum downtime during switch-over.

Results: Freelance provided the ability to quickly turn the control of the DCS over to the plant personnel for modifications and additional enhancements after initial commissioning.

Case study 2: Chemicals industry
– A major Chinese chemicals company wanted to expand their melamine production.

Results: The plant was able to increase its melamine production by 30,000 tons to 100,000 tons p.a. and add new nodes to expand the installation.

Case study 3: Wastewater industry
– A wastewater treatment plant in Thailand wanted to evolve its wastewater treatment process from manual to fully automated.

Results: They saw increased efficiency in the filtration and backwashing operations due to improved control and monitoring processes with the Freelance DCS. The fully redundant system continues even in case of system failure.

Case study 4: F & B industry
– One of the country's largest sugar factories in Poland modernized the pneumatic control system for its diffusion, evaporators, raw juice filtration and boilers.

Results: This technological advancement using the Freelance DCS enabled the sugar manufacturer to increase capacity by up to 70%, or 12,200 tons/day.
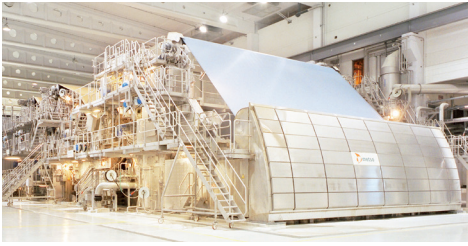
Case study 5: Pulp & paper industry
– A Brazilian pulp and paper company wanted to improve productivity with entry-level solutions, and without a huge capital outlay.

Results: With Freelance controlling the mixing pump, the number of paper breaks in the paper machine was greatly reduced, thereby generating savings and profitability.

Case study 6: Power industry
– The 120 MW power plant in Germany/Switzerland upgraded their Contronic P control system using a multiphase migration strategy.

Results: The plant now has unmanned operations, integration of remote alarm functionality, ease of spare parts procurement, while cost-effectively migrating a Contronic P to a Freelance DCS.

Case study 7: Cement industry
– The Chinese customer wanted latest control technology that supports Ethernet, TCP/IP, standard fieldbus, and integrates transmitters and sensors from different vendors.

Results: Even though there were nine Freelance controllers, the system variables and tag values from the different process segments can still be shared across the system. A Chinese version of the system software was also available, including engineering tool, operator interface, help function, and user manuals.

Case study 8: Glass industry
– A leading German packaging manufacturer produces approximately 25 billion containers annually. They wanted to upgrade the batch control system for their glass making processes.

Results: The customer found Freelance Engineering easy, using just one tool for configuration. The customer was also able to retain I/O channels, including having visualization and intervention capabilities.

Case study 9: Boiler manufacturing
– A Swedish manufacturer of high-performance boilers for hot water and steam wanted a system to control their fully automated solid fuel boiler.

Results: The customer found that Freelance is very user-friendly and reliable. Furthermore, it supports easy and quick modifications to meet all product specifications.

Case study 10: Mining industry
– A South-Africa-based mining company wanted to replace the PLC that controlled the direct motor starters of conveyors that extract platinum from ore.

Results: With intelligent speed control from Freelance, the customer was able to realize up to 50% in energy savings, as well as increased productivity.

ABB

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