INNOVATIVE SOLUTIONS FOR STRIP PROCESSING LINES
Electrics and Automation
ELECTRICS AND AUTOMATION
for strip processing lines

HOLISTIC SYSTEM EXPERTISE
Central to the automation of metallurgical plants is today’s focus on high availability and ever-better quality of the final products. To meet these requirements, SMS Siemag decided many years ago to include in its range not only mechanical equipment, technological controls, and process models, but also the entire electrics, automation, and drive technology for our plants. That makes us an all-inclusive supplier, giving you engineering, construction, and commissioning of your plants – all from one source.

Even more: You can be sure all the mechanical and electrical system components mesh perfectly. Short paths, direct dialog, and everybody working toward the same goals… all this adds up to the best conditions for your success.

ALL-INCLUSIVE MODERNIZATION STRATEGIES
As an operator of metallurgical plants, you know how important it is to constantly add to and renew your production equipment so you retain your market standing with excellent product quality. It’s not enough to simply install the latest mechanical equipment. Your upgrades must also be integrated into the process, and ultimately the automation system, before they can really make a difference to the final product. SMS Siemag supplies seamless revamp solutions that support the technological improvement of your production across the board.
YOUR PROFESSIONAL PARTNER FOR STRIP PROCESSING LINES

Interdisciplinary teams of experts from electrics, automation, technology, and engineering work hand in hand to ensure everything functions smoothly. That's how we create intelligent, market-centered solutions for optimum product quality at maximum productivity. This approach is reflected directly in our technological solutions: Our entire scope of supply and services – from plant engineering to process engineering, electrics and automation, manufacturing, assembly, Plug & Work testing, commissioning, right through to after sales service – is geared to the special requirements of our products and customers.
X-PACT®
electrics and automation

SMS Siemag automation technology systems are grouped together under the name X-Pact®. That goes for all plant types, from steelworks through rolling mills to strip processing lines.

In all of these areas, including X-Pact® for strip processing lines, we focus on high cost-effectiveness and transparency of the control technology. X-Pact® covers the automation from Level 0 to Level 3.

LEVEL 3 SYSTEMS

These are the main performance criteria you expect from a Level 3-system: high throughput and productivity, compliance with delivery dates, maximum plant capacity utilization, and optimum energy utilization. Our Level 3-systems control production across all plants. How? By implementing customer orders in specific production sequences for the individual plants in a process chain. Parallel to this, operations in the plants are monitored so you can react quickly and flexibly to any disruptions.

What’s more, the Level 3-system distributes the primary data (PDI) to all Level 2 systems. Then, after completion of the order, it receives from these systems the current production data used to draw up and archive reports.

LEVEL 2 SYSTEMS

Our level 2 systems control the production process in the individual plants. Working with the primary data (PDI), they generate target values for the open and closed-loop controls in Level 1. These values are defined using tables or mathematical and physical process models. That creates all the right conditions for achieving optimum geometric and metallurgical product properties. The actual values reported back from Level 1 are applied to automatically adapt the process models, and are summarized in production reports. Furthermore, the Level 2-system feeds production data back to the Level 3-system.

LEVEL 1 SYSTEMS

Our Level 1 control systems are designed to ensure an excellent technological and functional implementation of the target values determined by Level 2. They precisely control the hydraulic and electronic setting actuators.
There are even more stand-out features built into our Level 1-systems, for example: maximum availability and a high degree of process automation coupled with effective service functions. Furthermore, our Level 1-automation ensures best dynamics and precision when it comes to controlling mechanical, drive technology, and hydraulic equipment. Our software specialists work closely with our engineering teams to develop the right program modules for each mechanical unit. We exclusively use components that comply with industry standards. Included among the latest technology applied here is real-time ethernet.

HMI SYSTEMS

When it comes to plant visualization, it’s important that all the essential parameters, even in complex processes, are shown in a clear, understandable way.

That’s exactly what our new method does. We have pooled our experience from a large number of plants in operation to devise our ergonomic, comfortable operating and visualization solution. Working at their control desks, operating and maintenance personnel can see all the relevant process and plant data in a structured way. Right from the start, in the project planning stage of a new plant or revamp, we specially tailor the visualization to your wishes and requirements. You also benefit from the modular development of the entire visualization system, because it can be upgraded and modified as needed at a later date.
MODULAR AND ENERGY-EFFICIENT

MODULAR SYSTEMS FOR STRIP PROCESSING LINES

Our electrical and automation solutions come in modular design. What does that mean for you? Not only can you implement these systems in stand-alone machines but also in complete lines and further more plus they can be seamlessly integrated into existing plants.

Here, we cover the entire range of strip treatment plants for carbon steel, Si steel, stainless steel, and aluminum:

- Continuous pickling Lines
- Pickling lines combined with tandem mills
- Push-pull pickling lines
- Annealing and pickling lines for stainless steel
- Combined pickling and galvanizing lines for hot strip
- Continuous annealing lines
- De-greasing lines
- Hot-dip galvanizing lines
- Hot strip coating lines
- Electrolytic coating lines
- Color coating lines
- Processing lines for aluminum and other nonferrous metals
- Recoiling units for hot and cold strip
- Cross-cut and slitting shears for hot and cold strip

CUTTING COSTS WITH INNOVATIVE SOLUTIONS

One of the main cost factors in production is energy. As a result of close teamwork between our engineers for electrical systems, mechanics, and metallurgical technology, we at SMS Siemag continually develop tools and process models that slash energy costs and give you a decisive competitive edge.

To ensure sustained cost reductions and meet ever tougher environmental and resource-saving standards, we supply a whole raft of technologies:

- Effective, low-loss drive systems that mesh perfectly with the mechanical equipment
- Energy-optimized plant operation
- Forward-looking production planning to optimize manufacturing in terms of energy, quality and quantity
- Process models based on decades of experience that enable energy-efficient production
- Powerful diagnostic tools that identify savings potentials

PRECISION FUNCTIONS ARE IN DEMAND

Operating a plant automated by SMS Siemag is easy because it is equipped with plain, easy-to-understand and straightforward controls. All functions are designed to make working at the control desk easier.

To achieve this level of comfort, SMS Siemag has developed an all-new, production-centered operating philosophy. This is reflected in the clear layout of the operating desks according to the latest ergonomic principles. Using the precise function designations, the operator can go straight to the relevant production step and focus on it. This approach makes the operating process much simpler, safer and more reliable.
VISUALIZATION FOR REDUCED STANDSTILL TIMES

SMS Siemag also effectively applies visualization technology for quality assurance. Here is how it works: The plant and operation-relevant data are displayed in real-time in a graphic representation of the plant. This means, for example, that in process chains, the necessary conditions for further switching are shown, or the switch-on conditions for drives and controls are visualized. Logging and evaluation of the plant states enable any problems to be quickly pinpointed.

DIAGNOSIS AND MONITORING

Crucial for increasing reliability is technological diagnostics. The production parameters detected and mapped by our diagnosis tools are the key to energy and quality-optimized running of a plant.

With our monitoring tools it is easy to rapidly locate faults, rectify them, or take appropriate maintenance and repair action.
ENERGY DISTRIBUTION and DRIVE SYSTEMS

SCOPE OF SUPPLY FOR ENERGY DISTRIBUTION AND DRIVE TECHNOLOGY

Included in our supply range for energy distribution are high and medium-voltage switchgears, distributor transformers, compensation and filter systems, emergency power generators, UPS systems, as well as low-voltage main distributors and the associated Emergency Off strategies.

We supply all controlled drives for our strip processing lines. Also available are constant drives of all power classes. You fully benefit from low investment and operating costs due to optimum layout, a smaller footprint, and low maintenance. It is an added advantage that we can select components from any manufacturer and draw up solutions in consultation with you.

ENERGY DISTRIBUTION FROM ONE SOURCE

We use a single-line scheme to design your energy distribution system. You can also rely on our support in choosing the best method of connection to the integrated network. To determine the necessary filter and compensation plants, we analyze the network. This includes identifying the reactive power requirement and the level of network harmonics. Our in-depth process know-how means we can exactly determine the diversity factors. The result? We optimally dimension all components, from overhead line feeds to mechanical control elements.

RELIABLE DRIVE SYSTEMS

It’s important to consider a whole range of parameters when designing drive systems, especially drives that are closely linked in a strip processing line. The strategies applied here depend on the type of process, the local conditions and the parameters of the supply grid. We exclusively use practice-proven
standard components from renowned manufacturers for our solutions. To maintain our quality standards, we carefully select these components, then optimize them for the intended function. So you can be sure we configure the best solution for each plant – based on our experience and know-how. Depending on the application, it’s your choice to opt for drive systems with separate infeed units and a common direct-current intermediate circuit or intermediate circuit converter. We design our systems by taking into account local conditions, and ensure that generated power can be used in normal operation as motor power.

All drive-related technological functions are included in the X-Pact® electrical and automation package. The basic functions of strip travel control are standardized and adapted to suit the plant layout and processes.

There is a special reason why we use standard solutions. They make global service provision possible – both physically on site and remotely online.
LEVEL 1-AUTOMATION

Stability, simple maintenance, uncomplicated adaptation to new conditions, and high-tech solutions – these are the demands modern automation systems must meet. Our X-Pact® systems are completely modular in structure. As a result, we can easily adapt them to the different requirements of individual strip processing lines. What do our control solutions mean for you? Quite simply, excellent technology and functionality that ensure you achieve your target values by means of hydraulic and electrical control elements.

Other outstanding features of our Level 1-systems are maximum availability and a high degree of process automation coupled with effective service functions. Teaming up with the design department, our automation experts develop and practically test software modules for each mechanical unit.

CONFIGURATION OF THE CONTROL SYSTEM

The Level 1-system consists of various automation functions. Each function works independently and is linked electrically with the corresponding sensors and actors.

Here are the main functions:

- Open and closed-loop controls of the strip processing operations
- Drive controls
- Material tracking
- Process data analysis (PDA)
- Sequence and auxiliary controls
- HMI systems

OPEN AND CLOSED-LOOP CONTROLS OF THE STRIP PROCESSING OPERATIONS

The open and closed-loop controls in the process section of a strip processing line are key to the quality of the final product and the consumption of resources such as energy and raw materials. Due to an intensive dialog with our engineers and the implementation of our control systems in your plants, we provide process technology which is precisely geared to your requirements. Take for example our pickling model for an ideal pickling result and maximum productivity at minimum energy and acid consumption, or our tin-plating controls for optimum transitions upon product changeover.
**DRIVE CONTROLS**

Essential for reliable, low-wear operation of strip processing lines is a well coordinated, service-friendly, and proven strip travel control system.

As a standard, our controls come with these extras:
- S-ramps for smooth travel
- The master in master/slave drives can be pre-selected in the PLC without changing the wiring
- The drive switches to open-loop control when the speed sensor fails
- Automatic re-set of load compensation coefficients
- Scalability of strip tension measurement in the PLC
- Adjustment of roll parameters using the HMI
- Automatic recording of friction curves
- Actual thickness correction on the coiler without thickness measurement
- Slack control using laser and tension measurement

It is to your advantage that we build our control systems with standard components and add extra service functions. Why? Because you can rely on fast troubleshooting and optimum service.

**MATERIAL TRACKING**

The material and weld seam tracking feature follows the coils from entry to exit of the plant. What happens here is that it reacts for example to the weld seam by defining new tension target values or reduced rolling forces in the skin-passing mill. Furthermore, the solution generates measuring impulses for the different plant parts to deliver measured values for quality analysis along the entire length of the line.

**PROCESS DATA ANALYSIS (PDA)**

The PDA system constantly logs the measured values online. This ensures up the scope for a time-related diagnosis and analysis of the process events. Where this solution really comes into its own is during commissioning, maintenance and plant optimization.

**SEQUENCE AND AUXILIARY CONTROLS**

Crucial for the productivity of a strip processing line are the automation functions. They must be easy to control, especially in the entry and exit sections. Our automation solutions offer you maximum comfort with advanced software and user-friendly diagnosis systems.

**HMI SYSTEMS**

Our HMI systems link the plant and the operator. They map the production process including everything to do with materials and technology. Armed with the information from the process observation, the operator uses the latest graphical methods to manually influence sequences and control the machine groups, e.g. media units. In line with our operator-centered approach, our employees work closely with your operating personnel. Involving your team in the Plug & Work tests is another effective way to prepare them for their new tasks.
LEVEL 2-AUTOMATION

HIGH PRODUCTIVITY

The X-Pact® Level 2-systems are the key to increasing the efficiency of modern strip processing lines. Improving product quality as well as increasing production volume and flexibility are the main tasks of the Level 2-systems, which are based partly on mathematical and physical process models. To fulfill their role in quality assurance, process control systems must not only optimize processes but also ensure efficient product and production data capture.

Just like the elements of the other automation levels, SMS Siemag Level 2-solutions are independent of the hardware structure. They provide for distribution of the individual functions over several computers or concentration on one powerful computer. To do this, the system uses a CORBA-based abstraction level, the SMS Siemag CBS framework.

The CBS framework features its own communication function with the external systems, for example a production planning system spanning several plants, so as to maintain high connection and network flexibility.

TECHNOLOGICAL PROCESS MODELS

SMS Siemag strip processing lines cover practically the entire scope of strip treatment, further processing and quality assurance. They are modular in design, so you can choose the plants that fit your purposes exactly, also for modernizations of your existing systems.

This high degree of flexibility owes a great deal to the Level 2-process models that are perfectly geared to our plants. Working with the input data, they calculate the target values of individual plant parts and determine the right strip tensions and speeds.

That maximizes the rate of production for the desired product quality. To do their job accurately, the process models take into account the limits of the plant as well as the current plant situation, material properties, product dimensions, and temperature. The result? Low operating costs and products that stand out for their excellent tolerances and qualities and are highly in demand, for instance in the automotive industry.

The bottom line is that X-Pact® Level 2 comes in a modular design flexible enough to adjust to any requirements.
Production Report.

Structure of a strip processing line (e.g. hot-dip galvanizing line).

Entry area
- Payoff reel
- Thickness measuring equipment
- Shears
- Welding machine
- Notcher
- Pre-cleaning
- Drying

Process section
- Furnace
- Hot-dip galvanizing
- Cooling
- Intermediate looper
- Skin-passing mill
- Tension leveler
- Coating
- Coating thickness measurement

Exit area
- Inspection
- Shear
- Coiler
- Coil transport

PRODUCTION DATA CAPTURE QUALITY DATA REPORTING (QDR)

Operating and product data capture is based on the process events of the Level 1-system. What happens here is that the Level 2-system tracks all products in the entry area of the strip processing line, along with their current status.

This provides data for plausibility checks for the production sequence and the calculation of product-specific processing values. The relevant production and product data are saved in a database where they are made available for product evaluation as well as quality and product reports.

Equally flexible is Level 2 QDR. You can use it on the go, with reports accessible via secure links in any browser and on internet-capable smartphones.
It takes detailed planning of the production process to achieve the multiple goals of a large product variety, top quality, fast delivery times, and minimum energy consumption. You also need linkage with the production systems of suppliers and customers for seamless adjustment to new situations. Development here focuses on "Real Time Enterprise" (RTE), a method that checks and responds to these changes in real time.

What restricts the available options are the technical and technological limits of the plants themselves, and we have to take this into account during program planning. All this adds up to a need for comprehensive production planning systems.

BENEFITS OF X-PACT® LEVEL 3

X-Pact® Level 3 provides plant operators with all the tools they need for planning and control of the production processes in metallurgical plants, rolling mills and strip processing lines. An effective link between the commercial side of the business and the technological process automation systems, Level 3 production planning offers these benefits:

- Maximization of overall production rate
- Planning and minimization of inventories for interim products
- Analysis of energy supply conditions for reduced energy consumption
- Uniform product tracking throughout the production line
- Overall quality assurance up to final quality approval
- Increased compliance with delivery dates

LEVEL 3 – PRODUCTION PLANNING SYSTEM

You can rely on our systems to convert your orders into technically executable manufacturing projects. That means, according to your specifications, an extensive calculation model generates the manufacturing data for the product. Included here above all are the following steps:

- Definition of the necessary production steps and possible plant alternatives
- Definition of the dimensions and quality of the initial and intermediate products
- Planning of the output of every production stage to determine the necessary quantities of input material
- Definition of sample taking and test regulations
THE FACTORY MODEL

A uniform planning system covering all areas is based on a factory model. The factory model is implemented in the planning system in the form of an electronic planning table.

PRODUCTION PLANNING

It’s vital to determine the doable delivery dates for all manufacturing orders in advance. That’s where our capacity and deadline planning comes in, examining all the plants and plant alternatives available. As a result, you get a sequence plan for the individual plants as well as a plan of the available input materials for each manufacturing order.

QUALITY TRACKING

There is a data exchange between the Level 2-systems of the overall plant and the Level 3-system. That means Level 3 is informed at all times about every production step and the product quality after each step. Inspection and lab data add to the accuracy of the result. This forms the basis for quality approval of the final products before delivery.
SAFETY STRATEGY

Worldwide, the importance of machine and plant safety is growing. It’s not just plant operators themselves, but also laws and standards that demand personal and environmental protection.

Essential for safe operation of our products is a coordinated approach during planning and design. Our engineering and electrics divisions work together on the main elements in our safety strategy:

- The layout of the danger zone
- The risk assessment
- The electronic-mechanical function "Safety"
- The Emergency Stop plan

The hazard area layout divides the plant into various danger zones. It indicates all the plant-related safety equipment as well as the plant limits.

The risk assessment identifies and evaluates all the possible hazards inherent in a plant, and describes the necessary precautions.

An in-depth Emergency Stop plan is drawn up for each plant.

Together with you, we work out a practical solution with safety control functions that operate independently from the machine controls. This strategy also complies with all safety laws and regulations. And it reduces the time and cost of testing, documentation, and commissioning. The safety control functions are extensively tested early on – during the Plug & Work process.
Separation of safety functions and control functions.
PLUG & WORK TEST

Our long-established Plug & Work service is increasingly popular among our customers. At the heart of Plug & Work are production simulations that mimic reality down to the smallest detail. You can benefit from our years of experience in engineering and process technology, because we know exactly how processes behave and what regulators achieve which product qualities. The simulation system we use in our Plug & Work strategy reflects this complex interplay of factors.

MODULE AND INTEGRATION TEST

Plug & Work starts with module tests that put the individual hardware and software components through isolated function checks. Next in line are integration tests that examine the fault-free interaction of the modules. The usual procedure in the industry is to end pre-testing here, then continue trials after the plant has been erected on the construction site. We go one step further. That’s because, even before delivery, we install the entire automation system in one of our test fields and link it up to a simulation system. First, the functions and the customer-specific construction models of the plant, including all the kinematic and dynamic parameters of the plant behavior and the sensors, are set up. That creates a computer-aided simulation model ideal for testing the functioning and process sequences of the plant.

To the operator, it feels like working on the real plant: All the sequences and processes are visualized in real-time. He can control production virtually, and also learn maintenance routines. Using this hands-on method, we fine-tune the automation system in advance so you benefit from smooth running and perfect operability.

The solution palpably reduces commissioning times, as well as on-site corrections. Equally beneficial, your operators appreciate the real-life training opportunity provided during testing because it’s an ideal way for them to prepare for their future work on the plant.
TRAINING

We take training of your personnel seriously. That involves intensive learning about the new, complex systems.

First comes the theory in the classroom, where our expert employees pass on their know-how to your team. We hand over detailed training material, so if necessary members of staff can look things up later.

We always plan an extra instruction session for the operation and maintenance of the measuring systems installed in our automation solutions. That makes sure your specialists know the ropes. Second, after the basics, operator training continues during the Plug & Work phase.

Only then do we follow up with on-site training at the construction location. We make a point of including your employees in plant commissioning, and as a result they get to know the systems and processes on the ground.

Each training module builds on the last so that by the end of commissioning your staff is able to operate the plant reliably and independently. If faults occur, they know how to pinpoint the cause and what to do about it.
MODERNIZATION STRATEGIES

SMS Siemag has developed a strategy that enables production to continue throughout alteration or modernization work. Compared with conventional methods, it gives you a much higher protection against failure, shorter commissioning time, steeper run-up curves, and therefore an early return on investment.

This check simultaneously determines how new sensory and measuring systems can be installed. Significant here is that the current-state analysis examines all the relevant electrical and automation system components as well as the complete technological process sequence.

The second key stage is considering and selecting interfaces to the automation systems and IT infrastructure that will stay in place. Essentially, the knowledge gained here goes into a motor and component list, a technological process description, and a documentation of the interfaces for each alteration phase.

REASONS FOR MODERNIZATION PROJECTS

- Improved product properties
- Better production/productivity
- Reduced production costs
- Increased availability
- Replacement of old systems

SMS Siemag revamp strategies utilize all aspects of modern metallurgical automation systems:

- Integration of new process technologies
- Reproducible process sequences
- Improved ergonomics and safety technology
- Replacement of obsolete systems
- Proven quality of product properties using technological values in the entire process

ADAPTATION TO THE OPERATIONAL PROCEDURES

Over time, all plants develop their own standard operational procedures. Yet it’s imperative to examine these SOPs during the current-state analysis. They are drawn up and documented on site with the operating and maintenance crews. Taking this as a basis, SMS Siemag and the people who work on the plant develop and agree on the new procedures.

PROCEDURE

These are the main steps in a revamp project: current-state analysis, adaptation to plant operating procedures, alteration work planning, plant test, switch-over plan, re-commissioning, and optimization.

CURRENT-STATE ANALYSIS

The first step to successful modernization is an in-depth assessment of the current state of the automation system. That includes an examination of the sensory systems installed to find out whether they can be re-used.
SWITCHOVER PLAN

Simply switching the signals at the interfaces is the easiest way of changing plant operations over from old to new automation systems. To do this, the field signals are shifted from the old to the new automation system during the modernization standstill. We can test individual functions in advance – i.e. in the course of maintenance standstills before the upgrade. However, changeovers during standstills have a certain finality. It’s almost impossible to change back to the old plant.

What we devise, especially in the case of complex interfaces and production-critical plant parts, is a switching plan. Following this plan, we can test partial functions of the new automation system over several scheduled maintenance standstills prior to the conversion standstill itself.

Furthermore, the electronic version of the switch-over plan makes monitoring operation possible. This is how the relevant data and signals from the existing automation system are captured and analyzed by powerful monitoring systems. Plus, in highly critical cases, the switch-over technology is designed so that the entire plant can be switched over from the old to the new automation system without any major production interruption.

We cooperate closely with you to make sure the switchover plan is transparent, and you make the final decision, taking into account all the economic and technological aspects.

RE-COMMISSIONING

The steps described above reduce many of the risks inherent in alterations. Due to our many years’ experience in commissioning metallurgical plants, we can get your plant up and running again within a minimum timeframe.

The high point of the whole project is the plant run-up after the revamp. Yet, before this happens, we team up with you to carefully plan production of the material quality and dimensions you require. The data recorded during monitoring operation is applied to pre-optimize our process models, clearing the way for immediate production start with marketable product quality.

Furthermore, you can rely on comprehensive support, starting with continuous assistance during run-up, through to technology support from our development departments. Sometimes both sides recognize the potential for joint improvements and sign a cooperation agreement that might even lead to exciting innovations! There are a large number of successful projects we have carried out that confirm the effectiveness of our revamp strategies.
SERVICES

COMMISSIONING

Early on, during the Plug & Work tests, our experienced commissioning teams are on the spot in the test field. Here, they prepare for successive transfer of responsibility for the plant. As the final stage of the Plug & Work test, when the scope of supply and functioning has been confirmed, they test the automation to make sure it’s absolutely ready for commissioning.

Essentially, commissioning on site consists of the following stages:

- Cold commissioning
- Hot commissioning
- System optimization during production
- Performance tests

Cold commissioning
Included in cold commissioning are all the activities necessary for producing the first strip. The drive system is pre-optimized. Cold commissioning concludes with the first strip.

Hot commissioning
Hot commissioning starts with production of the first strip. In this phase, all the mechanical and electrical functions are tested under load to check that the open and closed-loop controls are working properly.

System optimization during production
During this phase, the parameters of all the systems are adjusted to ensure the new facility achieves the required performance.

Performance tests
Finally, a test program we run through together with you demonstrates that the plant meets the contract specifications.

AFTER SALES SERVICE

There is even more we can do for you in the form of our after sales service. This gives you continued access to our expert know-how. Specifically for X-Pact® electrics and automation, the SP/1 service portal from SMS Siemag offers you the option of rapid support in troubleshooting – 24/7.

Even during commissioning, we set up a service portal for optimal plant support. It is responsible for stable, protected communication between two networks. Via this portal, the SMS Siemag experts access your plant’s automation system to give you immediate support in the form of remote diagnosis and maintenance – worldwide and from day 1.

Benefits of the service portal
Some 70 percent of faults can be corrected immediately. Alternatively, faults are isolated. Take for instance defective parts. Our experts can usually identify them online, possibly deactivate them, and send a service technician to replace them on site.
Central, continuous administration of project documentation

We manage the entire order documentation in an Excel-based spreadsheet. It comes complete with a table of contents that gives you an easy and immediate overview of the complete documentation. All the necessary documents, such as function descriptions, circuit diagrams, and operating instructions are saved in this list at one central, structured location. Equally useful, the solution integrates all the documents generated throughout the project. Every documentation transfer gives you the full current status in electronic form.

The spreadsheet itself contains all the necessary information on each document, e.g. file format, print format, language, version, and life cycle.

You go straight to the heart of the program, so you find the document you want very quickly, and simply click on a link to open it. This is how the operator finds his operating manuals, the maintenance employee the data sheet for a sensor, and the programmer the software details for the automation.

Once the project is completed, you can continue the documentation yourself and administer new documents or document versions.
"The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have those characteristics as described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract."