Automate with the open Industrial Ethernet standard and profit now.

PROFINET

Answers for industry.
The success of your plant is crucially dependent on reliable processes, flexibility, and fast reactions. Raising productivity is always a number one priority.

The unbroken advance of globalization has resulted in ever more intense competition. To survive in this fiercely contested arena, you must be able to count on the permanent availability of your plant. Increasingly frequent product changes and shorter lifecycles call for exceptionally flexible processes as an essential precondition of prompt reactions to specific customer requirements. In the twenty-first century, future proof investments are also vitally important. The answer to these complex challenges lies in an open automation standard for flexibility, reliability, and performance: PROFINET.
Industrial communication plays a decisive role in all areas of automation technology. PROFINET, the open Industrial Ethernet standard, offers outstanding advantages that improve the response capability and reliability of your processes. Modular machine concepts and maximum flexibility when creating automation structures are the key to shorter response times. Fast baud rates and applications based on Industrial Wireless LANs help boost the performance of your plant. With an integrated diagnostics concept and a safety solution for fail-safe communication, plant availability is permanently assured.

PROFINET – oriented toward established IT standards – supports TCP / IP without any restrictions and enables direct access from the corporate management level all the way down to the field level. Vertical and horizontal integration are guaranteed.

Secure investment: simple integration of existing systems
Integrating your existing systems and networks is not a problem with PROFINET. For instance, PROFINET supports the continued use of other PROFIBUS networks or other fieldbus systems like AS-Interface that are already installed. This means maximum protection for investments in existing systems while paving the way for a gradual migration to PROFINET.

The optimum basis for PROFINET: Industrial Ethernet
Ethernet has established itself as the standard bus system in the office world. Thanks to its huge market acceptance, Ethernet development (e.g. transmission rate improvement) is continuing unabated. Siemens has been offering Industrial Ethernet as a standard based network for rough industrial environments for more than 20 years now. PROFINET utilizes this basis to interface devices from the field to the management level, thus combining industrial performance with the uniformity, continuity and transparency of corporate communication.
One solution for all requirements.

Industry-standard installation technology, real-time capability, the integration of distributed field devices, isochronous motion control applications, simple network administration and diagnostics, protection against unauthorized access, efficient, vendor-independent engineering and a high degree of machine and plant availability: all of these demands are fulfilled by PROFINET, the open, cross-vendor Industrial Ethernet standard.

**Safety Integrated**
PROFINET meets all necessary requirements for an inclusive safety concept for personnel, machines and the environment. Using PROFIsafe enables a single network for standard and fail-safe communication – all on the same cable and even wireless with Industrial Wireless LAN (IWLAN).

**IT Standards & Security**
PROFINET provides all the functions required for optimum configuration and diagnostics. All relevant data can be accessed online from anywhere, worldwide. PROFINET also fulfills the increased requirements for data and network security.

**Easy Network Installation**
PROFINET relies consistently on 100 Mbit/s switching technology and, in addition to the star topologies commonly used in Ethernet, also supports line topologies. This minimizes cabling overhead and ensures maximum flexibility. Wireless communication with IWLAN opens up new applications in industry – even wireless HMI is now possible.
PROFINET fulfills all the real-time demands relevant to the automation world, including isochronous ones. PROFINET is also well-suited for especially sophisticated applications, such as those in motion control.

Distributed field devices can be directly interfaced to Industrial Ethernet via PROFINET. This enables high-speed data exchange between the I/O and controllers and facilitates considerably improved diagnostics.

PROFINET allows you to create extremely fast, isochronous drive control systems for high performance motion control applications – while using unrestricted TCP/IP communication at the same time.
PROFINET: new possibilities with Industrial Ethernet

As a part of IEC 61158, PROFINET is based on the international Ethernet standard (IEEE 802.3) as well as Fast Ethernet (100 Mbit/s) and switching technology. Two special PROFINET features, the integrated use of real-time and TCP-based communication on one line as well as scalable real-time communication for controllers, distributed I/O and motion control facilitate short response times and continuity from the field level all the way up to the corporate management level – even wirelessly with Industrial WLAN.

PROFINET covers the entire range of automation applications and differentiates between three basic communication properties:

- Non-Real-Time such as TCP/IP and UDP/IP communication
- Real-Time (RT) and
- Isochronous Real-Time (IRT)

TCP/IP and UDP/IP communication

Non-time-critical data transmission with TCP/IP and UDP/IP constitutes the communication basis for parameterization and configuration, for example. In the IT landscape, TCP/IP is a de-facto standard.
PROFINET: a standard wins through

PROFINET is supported by PROFIBUS & PROFINET International, the largest fieldbus organization in the world with more than 1,400 members. They include leading providers of automation technology and users – from the field of both production and process engineering. The architecture of PROFINET is developed by 30 working groups whose members come from the staff of 70 different companies. More than 200 PROFINET products from around 50 companies are already on the market. Special testing laboratories have been set up for certifying the products. The global network of 32 PROFIBUS Competence Centers can also provide answers to any of your questions concerning PROFINET. Furthermore, you can get support from the Siemens Competence Centers: comdec@siemens.com PIC, USA, contact: profibus.sea@siemens.com

Successful application in China ...
Since PROFIBUS is the only fieldbus to date that meets the stringent demands of a national Chinese standard (GB / T 20540.1-2006 – GB / T 20540.6-2006), the Chinese standardization authorities have also nominated PROFINET for the status of a prestandard type GB / Z. That means PROFINET – in contrast to other Ethernet standards – holds the highest degree of standardization in China. This standardization success story serves as a firm basis for the further spread of these two technologies as general standards.

... and in the German auto industry
The Automation Initiative of German Automobile Manufacturers (AIDA) has agreed on a common procedure with regard to Industrial Ethernet: to use the PROFINET protocol standard with integrated personnel safety features. The aim is easy and uniform interfacing of the installed automation components.

Based on PROFINET with integrated safety technology and wireless communication, automakers have achieved a previously unimaginable level of integration in communications – and as a result are benefitting from a significant drop in overhead for commissioning, maintenance, diagnostics, operation and inventorying of spare parts.

Suppliers to the auto industry are relying more and more on PROFINET and Component Based Automation, since these systems speed up commissioning of a plant considerably. Another trend can be seen in wireless automation solutions based on PROFINET. They can be set up parallel to existing automation solutions in a short space of time without disturbing live plant operations.

Production lines based on PROFINET with integrated safety features meet all expectations for product quality and process safety while allowing operators to cut their costs drastically. PROFINET can considerably increase the productivity level of parts handling.

Compared to traditional solutions, PROFINET lets you save 30 to 35% on the installation and integration of system components. With PROFIsafe, you can also integrate additional safety components into the production line quickly and easily – even wirelessly.
Real-Time Communication

Real-Time (RT)
Real-Time is used for time-critical process data, i.e. for cyclical user data or event-driven interrupts. PROFINET uses an optimized real-time communication channel for the real-time requirements of automation engineering. This minimizes cycle times and results in increased performance for updating process data. The performance exceeds that of conventional fieldbuses and permits response times in the range of microseconds. At the same time, the processor performance required in the device is significantly reduced. Standard network components can be used for this solution.

SIMATIC NET switches additionally permit optimized data transfer. The data packets are prioritized according to IEEE 802.1Q for this purpose. The network components control the data flow between the devices based on these priorities. Priority 6, the second highest level, is used as the standard priority for real-time data. This ensures priority treatment compared to other applications which are assigned lower priority levels. RT is real-time communication for standard applications, and is used to connect field devices such as distributed I/Os and drives or to implement distributed automation structures with PROFINET CBA.
Isochronous Real-Time (IRT)
The hardware supported real-time communication known as Isochronous Real-Time (IRT) is suitable for particularly sophisticated motion control and high-performance applications in factory automation, for example. IRT permits cycle times of up to 250 µs with less than 1 µs jitter. To achieve this, the communications cycle is divided into a deterministic part and an open part by reserving bandwidths, then specified to the other stations in the network by a sync master. Both types of data transmission exist side by side – without mutual interference. This means that users can connect a notebook computer to any location in the plant in order to access the device data without any adverse effects on isochronous control or productive communication.

IRT is a must for motion control applications; isochronous communication on the bus is processed isochronously in the controllers and devices. IRT enables SIMATIC controllers to reliably master high-speed processes for:

- Network usage for process data and standard Ethernet data involving high data volumes (e.g. VoIP) without interfering with the process data
- Machine/plant structures with a large number of linearly connected stations and short refresh times.

Reliable processing of high-speed processes is facilitated by the fact that IRT capable devices guarantee very short throughput times – often up to 30% faster – and SIMATIC controllers with IRT support isochronous bus communication. Isochronous processing directly in the application is also in preparation.

ERTEC (Enhanced Real-Time Ethernet Controller)
The ASIC family ERTEC supports PROFINET real-time communication (RT and IRT). End-to-end system solutions with PROFINET are based on this technology. The ERTEC 400 is integrated in controllers and network components, while the ERTEC 200 is installed in simple field devices (IOs, drives). “Development Kits” and “Competence Centers” support you in developing your own devices.
PROFIBUS & PROFINET International have defined the PROFINET IO standard for directly interfacing distributed field devices to Industrial Ethernet. Field devices transmit their data cyclically to the process image of the associated control unit via this standard. PROFINET supports 1440 bytes/message frame per field device in this process, thus exceeding the data volumes transmittable via fieldbus. Furthermore, PROFINET also enables IT services such as online commissioning or network diagnostics via Simple Network Management Protocol (SNMP) to be used for field devices.

PROFINET supports a provider/consumer model for interaction between controllers and distributed I/O. The provider sends its data to the consumer without a request from the communication partner. The consumer processes the data. The assignment of providers to consumers is determined in the configuration.

In addition to star, tree and ring structures, PROFINET continues to consistently support the line structures characteristic of the established fieldbuses. Through the integration of switch functionalities into the devices such as the SIMATIC ET 200S, ET 200M or ET 200pro distributed field devices, the user can build in the usual manner line structures that are directly oriented towards the machine and system structure. This leads to savings in terms of the wiring effort and the number of components required, such as external switches, is reduced.

A wide range of SIMATIC controllers is available for connecting distributed field devices, including the classic modular controllers in the SIMATIC S7-300 and SIMATIC S7-400 series and the new PROFINET CPU for the SIMATIC ET 200S. And if you prefer embedded or PC-based automation structures, you can still profit from PROFINET’s advanced capabilities and high performance.

SIMATIC Embedded Automation products like the new SIMATIC S7 modular Embedded Controller take advantage of the openness of PC-based systems and are also extremely robust. The SIMATIC WinAC 2008 RTX is a SIMATIC PC-based controller that runs on a standard PC system.
Device description and configuration
Configuration and programming of the IO-Devices correspond to that of distributed I/O devices on the PROFIBUS DP. This is implemented in the usual manner in STEP 7. The devices are described unambiguously by General Station Description (GSD) files. These GSD files are imported into the configuration tool.

Fast start-up (FSU)
This function allows PROFINET IO-Devices connected to SIMATIC controllers to be powered up in less than a second. It optimizes the time-controlled connection of robot applications, for instance in order to speed up tool changes on body shop robots in a car factory.

Diagnostics
PROFINET IO supports a uniform diagnostics concept for efficient localization and troubleshooting of possible faults. If a fault occurs, the faulty IO-Device sends a diagnostic interrupt to the IO-Controller. This interrupt calls a corresponding program routine in the user program to initiate a reaction to the fault. Alternatively, the diagnostics information can be read directly from the field device (IO-Device) and displayed on an IO-Supervisor (PG or PC). The IO-Device also generates a diagnostic interrupt if a fault occurs on a channel. An acknowledgement mechanism ensures that sequential fault processing is possible in the IO-Controller.

Siemens’ Totally Integrated Automation concept includes the “PNIODiag” diagnostic package, which can be downloaded free of charge from the following Internet address, to simplify the diagnostic evaluation of distributed I/O modules in conjunction with SIMATIC S7: www.siemens.com/automation/service&support. Diagnostic evaluations and operation are completely visualized via SIMATIC HMI.

In the context of Totally Integrated Automation, Siemens offers an integrated system solution for network technology as well: SCALANCE. Time-tested Industrial Ethernet switches are configured with STEP 7 and diagnosed in online mode like field devices. The diagnostic information is processed in the PLC user program. This integral functionality has advantages during the engineering and commissioning phases and during operation of the plant.
Topological view of the plant generates increased transparency

The Topology Editor in SIMATIC STEP 7 or SIMOTION SCOUT lets you quickly and easily map the device port connections in a graphically way for PROFINET networks. You open the Editor simply by double clicking on the PROFINET segment concerned in the HW configuration. All communicating ports are identified by means of an offline/online comparison and represented in a table or graphic. By identifying, mapping, and monitoring the physical connections between devices on PROFINET IO, the Administrator can also monitor and maintain complex networks without any problems. The Topology Editor moreover provides a detailed diagnosis of all components currently operating and supports plant documentation.

No PG or removable medium required for device replacements

The above-mentioned topology information can be used to replace a faulty device by specifying a desired topology or determining it directly online. If a failed device is exchanged, its replacement must be installed in the same position with the same port wiring. The device can then be automatically enabled for productive communication by the IO-Controller based on the available information.
Integration of fieldbuses

PROFINET supports the integration of existing PROFIBUS networks and other fieldbus systems such as AS-Interface. This allows mixed systems to be set up consisting of fieldbus-based and Ethernet-based subsystems, as well as a step-by-step conversion to PROFINET. The proxy concept simplifies the integration of existing fieldbus systems while ensuring a high degree of transparency. The proxy on the Ethernet represents one or more fieldbus devices (e.g. on the PROFIBUS). It provides transparent transfer of communication between networks (no tunneling of the protocols) and passes, for example, the cyclic data on to the fieldbus devices.

As a PROFIBUS master, the proxy coordinates data exchange between the PROFIBUS stations. At the same time, it is itself an Ethernet station with PROFINET communication. Proxies can be implemented as controllers or pure routers. The same principle is used for integrating AS-Interface systems. In addition to hardwired proxies on the Industrial Ethernet, SIMATIC NET also offers proxies with an Industrial Wireless LAN connection.

PROFINET also simplifies the integration of IO link. The innovative actuator-sensor interface is the new communication standard. The devices are connected via a master with integrated IO link ports.
This represents a unique advantage, particularly for time-critical drive applications, because PROFINET’s real-time functionalities Isochronous real-time permit isochronous data exchange at a very high speed under difficult real-time conditions. At the same time, sufficient reserves are always available for open IT communication. They can be utilized, for example, for diagnostic and maintenance functions.

The use of PROFINET facilitates the use of considerably more powerful machines which feature maximum performance, an increasing number of drives, and the shortest response times.

PROFINET is the only open Ethernet technology for industrial automation that is capable of assuring powerful real time simultaneously with unrestricted IT communication in a single network. In other words, only PROFINET can synchronize decentralized and distributed automation systems in real time without having to install a second network.
Deterministics of motion control
To assure the necessary deterministics in communication for motion control applications, the setpoints and actual values must be exchanged at fixed intervals (isochronously), so that dynamic control loops are closed via the bus. High-quality isochronous communication is only possible if all the stations in a network, including the network nodes, are exactly synchronized – especially if a large number of components are cascaded. PROFINET’s IRT mechanism achieves this by measuring all the time parameters in the controlled system precisely, so that all switches are absolutely synchronous with the start of the cycle – and jitter is reduced to less than a microsecond.

Added flexibility through modular and mechatronic machine concepts
The idea behind modular machine concepts is as simple as it is efficient: to use just a small number of standardized modules that can be adapted to specific requirements with minimal overhead. Taking these modules as a basis, you can then create a whole series of customized machine versions. This has the advantage that the machines can be commissioned much faster, while the plant as a whole is more flexible. In contrast to rigid mechanical components, mechatronic concepts enable machines to be upgraded simply by reparameterizing the software – without having to modify or replace the mechanics. Distributed motion controllers are increasingly integrated in powerful networks.

Isochronous communication cycle – PROFINET with IRT
When making an electronic shaft, for instance, it is necessary to synchronize a large number of servo drives. PROFINET with IRT splits the communication cycle into several chronologically arranged intervals. Part of the cycle is reserved for isochronous real-time communication (IRT). The IRT telegrams are implicitly determined and the corresponding configuration data generated when the application is designed. The optimal chronological order of the individual telegrams is calculated for each network section using a special algorithm. This information is used to specify which telegram must be received by which station and when – as well as the station to which it must be forwarded separately – for each switch. Each telegram is transmitted without a delay thanks to this optimized cut-through method.
Packed with ingenious details – ready to handle any challenge.

Maximum flexibility regardless of the topology
Flexible topologies that allow optimal adaptation to a particular plant or machine are created by the switch technology. This technology also permits switching between different media.

Universal for all automation concepts
In modular plants, communication between the motion controllers can likewise take place isochronously using PROFINET. This allows applications with distributed synchronization to be easily implemented. PROFINET is universally suitable for all automation structures. In addition to distributed automation solutions with modular automation components, it also supports decentralized, drive based motion control concepts as well as central architectures with a central controller.

Maximum performance – regardless of automation architecture
Once again, PROFINET clearly exceeds the already high capacities of PROFIBUS. In principle, the number of stations is not limited. A PROFINET message frame can transport up to 1440 bytes of process data. Data sets can even have a size of up to 4 GB, for example to transfer images of products to be processed to an image processing system, which then calculates the cam disc for the motion based on the product contour. For the foreseeable future, PROFINET performance reserves with IRT are more than adequate. The following example provides compelling proof:

- Cycle times of 250 µs can be achieved for controlling hydraulic axes – without limiting the openness for IT communication

Whether the automation architecture is distributed or centralized: PROFINET enables a significant increase in performance.
One drive profile – several application categories
Drive integratability in automation solutions depends to a large extent on the drive task. To enable the complete spectrum of drive applications – from simple frequency converters to highly dynamic, synchronized, multi-axis systems – to be included in a single profile, PROFIdrive defines six application categories covering the majority of potential uses: they range from the connection of standard drives for pumps, fans, and compressors, for example, to motion controllers with decentralized motion control intelligence that is integrated directly in the drives.

PROFIdrive: the proven drive interface
The functional interface between the controller and the drives in PROFINET and PROFIBUS is defined by the PROFIdrive profile from PROFIBUS and PROFINET International (PI). PROFIdrive was specified by PI and laid down as a future proof standard in IEC 61800-7. PROFINET users already operating drives on PROFIBUS benefit since the user program need not be changed when migrating from PROFIBUS to PROFINET.

PROFIdrive defines the device responses and the method used to access the internal device data by electric drives with PROFIBUS and PROFINET – from simple frequency converters to powerful servo controllers.
Distributed intelligence

PROFIBUS & PROFINET International have defined a standard for implementing modular plant structures: PROFINET CBA (Component Based Automation). Positive experiences have already been made in machine and plant engineering: parts that are needed more often are prefabricated and can be easily assembled into an individual unit upon receipt of an order. PROFINET CBA enables modularization to be expanded to the plant’s automation technology with the help of software components. The standardized engineering model differentiates between programming the controller logic of the individual intelligent modules, generating components and configuring the entire plant by interconnecting the components.

Flexible software components
Software components consist of encapsulated, reusable software functions. This can include technological functions such as controllers just as well as the user program of an entire machine. Like modules, they may be flexibly combined and easily reused, independent of how they are programmed internally. Software components communicate exclusively via component interfaces. Only the variables required to interact with other components are accessible externally on these interfaces.

Configuring communications between machines from different vendors through graphical interconnection.
Component interconnection with SIMATIC iMap

The generated PROFINET components are connected into an application using SIMATIC iMap by means of simple graphic configuration. Thus, complex programming of communication links is a thing of the past. SIMATIC iMap combines the distributed applications throughout the plant, and interconnects PROFINET components from any vendors. The communication links between components are established in this manner. Detailed knowledge concerning integration and execution of communication functions in the device is not required.

Integration of fieldbus applications

PROFINET CBA enables a complete fieldbus application to be mapped as a PROFINET component. This is always important if an existing plant is to be expanded by PROFINET. It is irrelevant which fieldbus was used to automate the subsystem. To permit communication between the existing plant and PROFINET, the master of the fieldbus application to be integrated must be PROFINET-capable. Existing SIMATIC S7-300, S7-400 or SINUMERIK 840D solution line controllers can be expanded with the PROFINET functionality using communications processors. Therefore, the existing fieldbus mechanisms (e.g. PROFIBUS DP) are used within the components – and outside the PROFINET mechanisms. This migration facility protects the investments made in existing plants to a high degree.

Programming the control logic and component generation

Mechanical or plant engineers generate the components, and they use the relevant vendor-specific tool to program and configure the device, which is STEP 7 in the SIMATIC world. Then the user software is packaged in the form of a PROFINET component. The software must have the associated function for this. This is applicable in STEP 7. During the “packaging,” a PROFINET Component Description (PCD) is generated and imported into the library of the interconnection editor. With SIMATIC iMap, Siemens has launched the first vendor-independent interconnection editor for PROFINET CBA on the market.

Clear arguments in favor of Component Based Automation:

- Shortened commissioning phase – initial start-up of various technological units can take place simultaneously
- Reliable planning – brief commissioning that can be planned creates reliability for the next operating phase
- Increased flexibility – easy adaptation and expansion of plants
- Easy configuration of machine-to-machine communication

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Network installation

The international standard ISO/IEC 11801 as well as its European equivalent EN 50173 define an application-independent, standard IT network for the office world. Since the requirements for a network in an industrial environment are higher than in the office world, the PROFINET guideline “Cabling and Interconnection Technology” specifies the passive infrastructure within and between automation cells for Fast Ethernet with PROFINET:

- Plugs and cables for copper and fiber-optic data networks
- Plugs for 24 V power supply
- Plugs for 400 V power supply

It also specifies the corresponding test and examination conditions for the individual components.

Set specifications for all passive components required for a PROFINET network make it possible to ensure perfect interaction between the individual passive components.

Switching technology

PROFINET is based on 100 Mbit/s switching technology. In contrast to other processes, switching technology allows all stations to transmit at any time. There is always an open point-to-point link to the next switch. This is even possible in both directions (sending and receiving) simultaneously, and therefore it has a bandwidth of 200 Mbit/s. The advantage: stations or network areas which do not need the message frame do not receive it, resulting in reduced load.

Network topologies

Network topologies are configured according to the requirements of the equipment to be networked. The most frequent structures include star, linear, tree and ring topologies. A plant usually includes mixed structures. They can be implemented using copper or fiber-optic (FO) cables.

Glass-fiber FO cables are used for long distances. Plastic fiber-optic cables such as polymer optic fibers (POF) or polymer cladded fibers (PCF) are an easy, do-it-yourself alternative for short distances. Passive and active network components and decentralized field devices with integrated POF/PCF interfaces are available for PROFINET. In order to ensure high availability, the cables are monitored during commissioning and ongoing operation for potential attenuations through material wear.
innovative technology include significantly greater mobility and flexibility in production. The SCALANCE W Industrial Wireless LAN products are based on the WLAN standards (IEEE 802.11). They stand out thanks to their rugged design (IP30 or IP65), Data Reservation and Rapid Roaming features as well as integrated security functions. In addition, SCALANCE W offers functions with which field devices can be linked to controllers at high-performance levels.

**Data Reservation**
The bandwidth between an access point and a defined client is reserved. This safeguards high, reliable performance for this client regardless of how many additional clients are operated at the access point.

**Rapid Roaming**
The Rapid Roaming functionality in the SCALANCE W700-RR (Rapid Roaming) makes it possible to create a radio hop which permits moving communication partners to implement high-speed transfer (Rapid Roaming) from one radio cell to the next. The transfer is so fast that even PROFINET IO communication is possible without interruptions during roaming (update times of 20 ms are possible).

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**Star**
A characteristic of the star structure is a central switch with individual connections to all data terminals in the network. Applications for star topologies include areas with high device density and short distances, for example, small production cells or a single production machine.

**Tree**
The tree structure results from the connection of several stars in one network, possibly with mixing of FO and twisted pair cabling. This structure is used when dividing complex plants into subsystems.

**Linear**
A linear structure can be implemented by a switch close to the data terminal to be connected, or by a switch integrated in the data terminal. A linear structure is preferably used in plants with an extensive configuration, for example, conveyor systems, and to connect production cells.

**Wireless communication**
In addition to the network topologies listed here, PROFINET also supports wireless communication with Industrial Wireless LAN. Thus, technologies that are naturally subject to wear may be replaced (e.g. contact conductors). Furthermore, automated guided vehicles or portable operator and maintenance devices can be used. Additional advantages of this...
Based on Industrial Ethernet, PROFINET offers not only scalable real-time communication but also standard TCP/IP communication according to IEEE 802.3 – with not even the slightest compromise. It provides the foundation for end-to-end horizontal and vertical networking, either wired or wireless. Trendsetting functions and established IT standards for network management and diagnostics, web services, security, and higher-level gigabit network connections are supported by PROFINET without any restrictions.

Network management
Compared to fieldbuses, Ethernet offers additional opportunities for network management in association with TCP/IP and UDP/IP. Components of integral network management include the network infrastructure, IP management, network diagnostics and time synchronization aspects. Using network management, the administration and management of Ethernet is simplified by using standard protocols from the IT world.
The result is a wide array of advantages and possibilities. However, this also means that production networks are exposed to the same hazards as office networks – namely failed accesses (internal) or malicious attack (external). Even a brief failure or a minor malfunction could bring production to a halt and cause massive damage.

The automation technology therefore requires a security concept that can reliably protect production networks and automation components – and is perfectly tailored to their specific needs. The PROFINET Security Guideline issued by PROFIBUS & PROFINET International (www.profinet.com) outlines requirements and solution concepts for data and access protection in an industrial environment. These concepts include:

- Access protection for automation cells (cell protection concept)
- Protection from espionage and manipulation
- Secure remote access over unsafe networks.

These security goals can be achieved with PROFINET Security components such as SCALANCE S. Industrial Security meets all the requirements of IEEE 802.11i regarding wireless communications.

Therefore, these components can be used anywhere high security requirements are called for. This applies to both standard and fail-safe communications via PROFIsafe profile.

Gigabit networks
Whereas in the field level, short response times and small data telegrams are top priorities, the control level is characterized by a steadily growing need for high data throughputs owing to the rapid increase in the number of stations and the use of data-intensive systems such as HMI, SCADA, and VISION. As a result of this, and the progressive convergence of the corporate management level with the automation environment, gigabit networks have to be directly and transparently connected from the control level to the field level. In addition to gigabit capable network infrastructure, gigabit capable system connections for PCs and SIMATIC S7-300/400 are also available for connecting higher-level gigabit networks to PROFINET.
PROFINET uses the PROFIsafe profile for safety-related communication. PROFIsafe is the first communication standard based on the safety standard IEC 61508 which allows standard and safety-related communication on the same bus cable. The advantages include considerably lower cabling overhead and fewer parts. By using the PROFIsafe profile, which has been tried and tested with PROFIBUS, in PROFINET as well, plant expansions are easily possible.

Open standard

PROFIsafe is the first TÜV-certified profile for fail-safe communication with standard Ethernet. This even permits wireless communication in fail-safe applications with Industrial Wireless LAN.

PROFIsafe is an open solution for safety-related communication via standard fieldbuses. In the context of PROFIBUS & PROFINET International, many manufacturers of safety components and end users of safety technology participated in the creation of this open, vendor-independent standard.

As a part of Safety Integrated, PROFINET with PROFIsafe is certified according to IEC 61508 (up to SIL 3), IEC 62061 (up to SIL 3), EN 954 (up to Category 4), NFPA 79-2002, and NFPA 85 as well as for use up to SIL 3 according to EN 62061. It thus meets the extremely exacting requirements of the manufacturing and process industries.
### Protection against potential faults

PROFIsafe uses the PROFINET real-time communications (RT or IRT) for fail-safe communication. In addition to user data, status and control information is also exchanged between a fail-safe CPU and a fail-safe field device or drive. No additional hardware is required.

Various potential sources of error exist when transmitting messages, such as invalid addresses, loss, delay, etc. PROFIsafe counteracts these with four special measures:

- Continuous consecutive numbering of PROFIsafe data
- Time monitoring
- Authenticity monitoring using passwords
- Optimized Cyclic Redundancy Check (CRC) security.

Existing solutions can be supplemented without changing the cabling.

### PROFINET offers the following possibilities for fail-safe communication:

- Communication between IO-Controllers across subnet work boundaries – for example, between fail-safe CPUs via PN/PN coupler.
- Communication between IO-Controllers and IO-Devices in the same subnetwork (even wireless) – for example, fail-safe CPU and the SIMATIC ET 200 distributed I/O with fail-safe modules.

### Network transitions enable fail-safe communication between PROFIBUS and PROFINET:

- Communication between IO-Controller and DP slave across network boundaries – for example, between fail-safe CPU and the SIMATIC ET 200 distributed I/O with fail-safe modules via IE/PB Link PN IO or IWLAN/PB Link PN IO.
- Master/slave communication between IO-Controller and intelligent DP slave across network boundaries – for example, between fail-safe CPUs via IE/PB Link PN IO or IWLAN/PB Link PN IO.
Siemens offers an extensive range of products for PROFINET which includes the SIMATIC, SIMOTION and SINUMERIK automation systems as well as PCs and workstations. Distributed field devices from the SIMATIC ET 200 product line can be directly connected to PROFINET.

Existing PROFIBUS devices can also be integrated into a PROFINET solution. The product range is rounded off by a comprehensive range of active and passive network components, security products for the creation of secure Industrial Ethernet networks, and the option of wireless communication with Industrial Wireless LAN.
PROFIBUS
AS-Interface
Controller
Switching
HMI
Security
IO-Controller
Numerical control
Mobile Panel
Distributed IOs
Gateway
RFID
HMI
Distributed IOs
Motion Control & Drives
Robotics
Distributed IOs
Distributed IOs
Motion Control & Drives
Proximity switches
IO-Link
Distributed IOs
Distributed IOs
Distributed IOs
Industrial Ethernet
PROFINET
Wireless
Wireless
PROFIBUS
PROFIsafe
### Automation systems

#### Controller

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<thead>
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<th>PROFINET product/family</th>
<th>SIMATIC S7-300</th>
<th>SIMATIC S7-400</th>
<th>System connection for SIMATIC S7 and SINUMERIK</th>
<th>SIMATIC S7-mEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief description</td>
<td>Modular controller for system solutions in production automation for the low-end to mid-performance range.</td>
<td>Modular controller for system solutions in production and process automation for the mid- to high-end performance range.</td>
<td>Multiprotocol enabled communications processors for directly connecting SIMATIC S7-400, S7-300 and/or SINUMERIK 840D solution line to PROFINET/Industrial Ethernet. They relieve the controller CPU of communications tasks, are multiprotocol enabled, and facilitate vertical integration.</td>
<td>SIMATIC Embedded Controller with standard IOs, standard PC interfaces, and PC expansions. The controller integrates different functionalities such as control, visualization, and PC tasks in a single device.</td>
</tr>
<tr>
<td>Range</td>
<td>3 standard CPUs: • CPU 315-2 PN/DP • CPU 317-2 PN/DP • CPU 319-3 PN/DP 3 fail-safe CPUs: • CPU 315F-2 PN/DP • CPU 317F-2 PN/DP • CPU 319F-3 PN/DP</td>
<td>2 standard CPUs: • CPU 414-3 PN/DP • CPU 416-3 PN/DP 1 fail-safe CPU: • CPU 416F-3 PN/DP</td>
<td>for SIMATIC S7-300: • CP 343-1 Lean • CP 343-1 • CP 343-1 Advanced for SIMATIC S7-400: • CP 443-1 • CP 443-1 Advanced for SINUMERIK 840D solution line: • CP 343-1 • CP 343-1 Advanced</td>
<td>• SIMATIC S7-mEC RTX (optional: HMI)</td>
</tr>
</tbody>
</table>

#### Drives

<table>
<thead>
<tr>
<th>PROFINET product/family</th>
<th>SINAMICS G120/G120D</th>
<th>SINAMICS S120</th>
<th>SINAMICS G130/G150/G150/ GM150/GL150/SM150</th>
<th>SCALANCE X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief description</td>
<td>Central (IP20 – G120) or decentralized (IP65 – G120D) drive system equipped with several communication interfaces (RS485, PROFIBUS, PROFINET). Modular design with Safety Integrated functionalities. The Efficient Infeed Technology is particularly impressive – contributing significantly to energy savings and reducing the number of components.</td>
<td>Modular, flexible drive system for demanding single and multi-axis applications with vector and servo functionality, VI control, and positioning &amp; Safety Integrated functions. Connection to PROFINET via the CBE20 communication board with integrated 4-port switch (DC/AC drives).</td>
<td>Reliable, compact, and intuitive high-speed drive systems in all voltage, power, and performance classes. SINAMICS G130/G150/ GM150, and GL150 are devices for drive tasks without reverse voltage such as pumps, fans, compressors, extruders, mixers, and grinders. SINAMICS S150 and SM150 are designed for demanding drive tasks with reverse voltage such as test stands, centrifuges, hoisting gear, rolling mills, and mine winder systems.</td>
<td>SCALANCE X is the product family of Industrial Ethernet switches and media converters for copper and fiber-optic cables in IP20, IP30, and IP65 degrees of protection. Switches are active network components that support both Real-Time (RT) and Isochronous Real-Time (IRT) communication with exacting requirements. Media converters are used for optimal conversion of different transmission media in network topologies.</td>
</tr>
</tbody>
</table>
**SIMOTION D**

- Drive-based, flexible and scalable Motion Control system. Motion Control functionality is directly integrated into the control module of the SIMANICS S120 drive system. Connects the SIMOTION D4x5 to PROFINET via an optional CBE30 communication board with integrated 4-port switch.

**SIMATIC Microbox 427B/Panel PC 477B**

- Embedded rail-mounted PC or embedded panel PC (both without fans and diskless) with Windows XP Embedded preinstalled, software PLC and/or HMI.

**SIMATIC WinAC software PLC**

- SIMATIC S7 controller as a software PLC for PCs with a Windows operating system and real-time expansion.

**SIMATIC ET 200 interface modules with CPU**

- IM 151-8(F) PN/DP CPU for SIMATIC ET 200S: discretely modular, multifunctional IO system with local intelligence in IP20 degree of protection.
- IM 154-8 CPU for SIMATIC ET 200pro: Compact, multifunctional IO system with local intelligence in IP65/67 degrees of protection.

** Passive network components**

- Microbox 427B-RTX
- Microbox 427B-HMI/RTX
- Panel PC 447B-HMI
- Panel PC 447B-HMI/RTX

**Network transitions**

- CP 1616
- CP 1604
- Dev. Kit CP 16xx PN IO
- CP 1613 or CP 1623 with SOFTNET PN IO
- PN CBA OPC server

**FastConnect (FC) and optical network structures**

- A comprehensive portfolio of optical transmission media is also available in addition to the copper-based FastConnect system – featuring a wide range of industrial installation cables, outlets, plugs (RJ45, M12, and push-pull), and patch cables.

**PROFINET to PROFIBUS**

- Network gateways between Industrial Ethernet or PROFINET or Industrial WLAN and PROFIBUS via link, controllers or PC for wired and wireless connection. Configured using STEP 7.

**PROFINET to AS-Interface**

- Network gateway between Industrial Ethernet or PROFINET and AS-Interface via link, controllers or PC. Configured using STEP 7.

**PROFINET to PROFINET**

- The ”PN/PN coupler” is a module on PROFINET for cross-system, fast and deterministic IO data coupling between two PROFINET networks using simple means oriented towards the functionality of the DP/DP coupler.

**Industrial Security**

- SCALANCE S security modules specially developed for industrial automation: firewall protects from unauthorized access, VPN (Virtual Private Network) for secure authentication and encoded data transmission, remote access possible (e.g. over the Internet via DSL). The SOFTNET Security Client provides secure access for PC/notebooks to automation devices protected by SCALANCE S.

**Basic security module:**

- SCALANCE S602
- SCALANCE S612
- SCALANCE S613
- SOFTNET Security Client

**SoftConnect**

- Network gateways between Industrial Ethernet or PROFINET and AS-Interface via link, controllers or PC. Configured using STEP 7.
**SCALANCE W-740 Client Modules**

Multifunctional and highly modular IO system in IP20 degree of protection. Interface modules with copper or fiber-optic connection and integrated 2-port switch. Ready for standard and/or fail-safe communication. Integrated drive technology (motor starter and frequency converter).

**SIMOTION P**

PC-based Motion Control system. Uses operating system Windows XP Professional with a real-time add-on for SIMOTION. Connects to PROFINET via optional MCI-PN Communication Board with integrated 4-port switch with IRT.

**SIMATIC ET 200S**

Distributed I/O

1 Interface module for PROFINET:
- IM 153-4 PN

**SCALANCE W-780 Access Points**

Standard-based IWLAN access points in robust design with integrated security functions and expanded functionality (e.g. Data Reservation and Rapid Roaming) – for high-performance connection of field devices to controllers.

**SCALANCE W-784**

High climatic requirements, IP65:
- SCALANCE W-786
Without control cabinet, IP65:
- SCALANCE W-788

**SIMOTION P**

1 performance model for PROFINET:
- SIMOTION P350

**SIMOTION V**

Sensors

- SIMATIC VS120
- Sensor for reading data matrix codes:
- SIMATIC VS130-2
- Intelligent camera:
- SIMATIC VS720A

**SINUMERIK 840D sl**

- NCU 720.2 PN
- NCU 730.2 PN

**SCALANCE W-740 Client Modules**

SCALANCE W-740 Client Modules are ideal for connecting stations with a PROFINET / Industrial Ethernet port (such as ET 200pro or ET 200s), which are intended for integration into IWLAN wireless networks and a PROFINET environment.

**SIMOTION P**

1 Interface module for PROFINET:
- IM 153-4 PN

**SIMATIC ET 200pro**

Especially compact, very robust and powerful IO system in IP 65/67 degree of protection for cabinet-free solutions. Interface module with copper connection and integrated 2-port switch. Ready for standard and/or fail-safe communication. Integrated drive technology (motor starter and frequency converter).

**SIMATIC RF 170C**

SIMATIC RF 170C is a communications module for connecting RFID systems to PROFINET via the distributed I/O SIMATIC ET 200pro. The communications module RF180C enables direct connection to PROFINET. The read/write units of all RFID systems can be operated on the communication modules. They all include PROFINET onboard and an integrated 3-port switch for creating line and tree topologies.
ERTEC:
- ERTEC 200
- ERTEC 400

Development Kit DK:
- ERTEC 200 PN IO
- ERTEC 400 PN IO

Development Kit for PROFINET IO devices
Powerful Ethernet controller with integrated real-time switch for integrating PROFINET real-time communication (RT and IRT).
ERTEC 400 with integrated 4-port switch, ARM 946 RISC, and PCI interface; ERTEC 200 with integrated 2-port switch, ARM 946 RISC, and integrated phy.
Development Kits to support you in developing your own PROFINET IO devices – incl. hardware and software (ERTEC).

SIMATIC STEP 7
The most recognized and widely-used programming software for industrial automation in the world. Easy transition from PROFIBUS to PROFINET thanks to unified engineering and diagnostics.

SIMOTION SCOUT
SIMOTION SCOUT is the engineering tool for the SIMOTION Motion Control system. The PROFINET field devices are configured in the familiar way as for PROFIBUS.

SIMATIC iMap
SIMATIC iMap is the engineering tool for Component Based Automation. It unites distributed, crossvendor applications plant-wide. Simple MMI communication is also possible – communication is configured, not programmed.

SINEMA E (SIMATIC Network Manager Engineering) is a software tool for efficient planning, configuration, simulation and Site Surveys of industrial WLAN applications in compliance with Standard 802.11 al/b/g/h for use both indoors and outdoors. The planned and surveyed network can be completely documented.

SINEMA E Lean
SINEMA E Standard

ERTEC/Development Kits for ERTEC and PROFINET IO
Powerful Ethernet controller with integrated real-time switch for integrating PROFINET real-time communication (RT and IRT). ERTEC 400 with integrated 4-port switch, ARM 946 RISC, and PCI interface; ERTEC 200 with integrated 2-port switch, ARM 946 RISC, and integrated phy.
Development Kits to support you in developing your own PROFINET IO devices – incl. hardware and software (ERTEC).

ERTEC:
- ERTEC 200
- ERTEC 400

Development Kit DK:
- ERTEC 200 PN IO
- ERTEC 400 PN IO

Development Kit for PROFINET IO devices

SIMATIC Panels/ Multi Panels
Machine operation and monitoring in various performance classes, either as touch panels (TP) with a touch sensitive display or as operator panels (OP) with a membrane keyboard.
Multi Panels feature high performance, openness and expandability. They enable integration of several automation tasks on one platform.

SIMATIC Mobile Panels
The mobile panels enable HMI directly on location within sight of the process. Safety Wireless provides safety functions (emergency-off and enabling button) at any location on the machine or in the plant – wireless with Industrial WLAN.
Gebrüder Heller Maschinenfabrik GmbH –
Machine tools and production systems, Germany

Requirements
The Gebrüder Heller Maschinenfabrik GmbH company specializes in machines which are used for cutting and machining metal. For its customers in the automotive industry, this global player implements highly flexible, reliable and future-oriented solutions: systems which enable the low-cost production of an unknown range of future products and a quick response to flexible batch sizes at a high level of productivity – with low life-cycle costs. To realize these solutions, Heller relies on comprehensive networking – with PROFINET.

Solution
The Heller ModuleLineSystem (MLS) is an innovative, completely networked, flexible production system. It guarantees the free movement of workpieces and tools between the flexible processing modules by using mobile handling units. The MLS comes equipped with innovative automation features, a fail-safe SIMATIC S7, SIMATIC NET wireless communications for the central controller and SINUMERIK 840D sl in the processing machines. This enables workpieces to be completely machined from 5 sides and lets plant operators respond flexibly and cost-effectively to changes in production. Thanks to its modular layout and scalability, the MLS is much more versatile and productive, and thus better prepared for future unknowns than rigidly linked individual machines running at the limit. This flexibility is achieved by central control via PROFINET which transfers the control data, the automation signals and logistics data extremely efficiently, with integrated safety features and in real time.

Benefits
Complete processing of the workpieces reduces downtimes and the time needed for set up – increasing productivity. The centralized controller concept with PROFINET also cuts the need for a PC in the machine. Other benefits are provided by the central program and parts administration, as well as an optimally interlinked system providing high availability for every processing machine. In this way, future expansions to the MLS are facilitated. PROFIsafe provides a high safety level with Safety Category 3, without the need for safety relays, and a compact, neatly-organized control cabinet. The SINAMICS S120 drives feature low power dissipation as well as improved in-line and regenerative performance in a more compact design. All these features reduce the layout space needed by 20 % compared to similar plants. In other words: more modularity and scalability for a flexible machine concept.
Arcelor – Steel industry, France

Requirements
With 320,000 employees in over 60 countries, Arcelor Mittal is the global leader in the steel industry. The company, established in 2007 following a successful merger bid, unites the worldwide operations of two steel giants – Arcelor and Mittal Steel. Arcelor Mittal will be at the head of major global markets, including the automobile, construction, household appliance and packaging industries. Arcelor Mittal is a leader in R&D and technology and offers an impressive inventory of its own raw materials and excellent marketing networks. For one of its factories in France, Arcelor Mittal was planning the introduction of a cost-effective transport system that would feature maximum safety and reliability while contributing to a reduction in general maintenance costs. Further specifications called for fast installation and commissioning as well as a link to the MES level.

Solution
The system integrator hired to implement the project, 4IT, chose a wireless Siemens solution based on PROFINET. Two automated transport cranes as well as automated guided vehicles (AGV) are linked wirelessly to SCALANCE W components. The mobile units are equipped with SIMATIC CPU 317-2 PN/DP as IO-Controller and SIMATIC ET 200S as distributed I/O, as well as a TP 170A touchpanel for HMI on site. SCALANCE X-208 switches serve as the network infrastructure.

Benefits
The new solution is compelling in every way, offering a maximum degree of flexibility and plant availability. The extremely reliable industrial SCALANCE W WLAN components enabled fast installation and commissioning of the solution which was easy to connect to the controller and MES level due to the completely integrated use of Ethernet. Thanks to the excellent performance of the transport system, the system integrator is already working on more new projects based on the same technology: PROFINET and IWLAN.

Xuzhou – Tobacco industry, China

Requirements
The tobacco factory Xuzhou, located in the Eastern province of Jiangsu and founded in 1939, is one of the largest tobacco factories in China with plant assets totaling 1.7 billion RMB ($125,120,428) and an annual output of 0.5 million cartons of cigarettes. The cigarette manufacturer was interested in implementing an innovative automation solution which would provide greater flexibility in manufacturing a larger number of product versions. Further system requirements stipulated by the customer included easy traceability of the production processes and an overall reduction in production costs.

Solution
The customer decided to go with the modular system solution with PROFINET CBA (Component Based Automation) which offered the necessary level of flexibility in production. The solution by Siemens comprises more than 10 SIMATIC S7-400 CPUs with SIMATIC NET CP 443-1 Advanced communications processors and more than 60 SIMATIC ET 200S IO-Devices with an integrated PROFINET interface. Other equipment used includes HMI stations with WinCC, based on SIMATIC Panel PCs and CP 1616. SCALANCE X-400 industrial switches form the backbone of the system.

Benefits
By reducing production time, the new solution has cut costs considerably. The increase in system flexibility enabled by the modular design of PROFINET CBA allows the production process to adapt more quickly to market demands. Furthermore, running production processes can be recorded by the system in real time.
Hennessy – Manufacture and bottling of cognac, France

Requirements
The most important line at Hennessy’s La Vignerie bottling plant is “Line 11,” an automated bottling line for VS and VSOP cognac. The automated production of these high-quality commodities demands utmost reliability and speed when it comes to setting up the production equipment and transferring data internally. What’s more, the efficiency and availability of the machinery and the automation components has to be assured at all times.

Solution
To meet these challenging requirements, the cognac manufacturer opted for a redundant PROFINET network from Siemens with controllers selected from the SIMATIC S7-300 product line. The deterministic quality of PROFINET CBA (Component Based Automation) based on PROFINET real-time communication (RT), which connects the control systems for the production equipment to those of the conveyor belt, is the key to optimal reliability and performance. As far as speed is concerned, all the components on Line 11 interact by exchanging a maximum of 200 data words over the network with a guaranteed cycle time of 50 ms. This architecture facilitates a connection to the corporate Ethernet, enabling the integration of individual modules from the Hennessy SAP ERP management system. All the controllers on this line (SIMATIC S7-300 with CPU 315-2 PN/DP), which consists of three conveyor systems and eight production machines, are connected to the redundant PROFINET ring network by means of SCALANCE X204-2 switches. Only the first conveyor drive is additionally equipped with an X202-2IRT switch, which controls the ring redundancy and if necessary its self-restoral.

Benefits
The information exchange is very straightforward with PROFINET CBA. Developers can insert, swap, or connect software components simply by dragging and dropping them – leading to significant time savings not only during the project design phase but also afterwards when setting up communications between controllers. In short, the solution installed at Hennessy achieves the stipulated high reliability level and improves efficiency.
BMW – Automotive industry, Munich

Requirements
The Munich automotive manufacturer was under pressure to modernize its press line because the availability of certain spare parts could no longer be guaranteed. This upgrading project entailed converting the automation system for the feeder stations to SIMOTION D motion control with SINAMICS S120 drives. Standardized, integrated communication between the different machines is vital for complex production processes in the automotive industry to enable manufacturing workflows to be efficiently controlled, monitored, optimized, diagnosed, and maintained.

Solution
The modernization of the Munich press line marked the advent of PROFINET – both in the field level and for horizontal integration. The automation functions on the press line are now locally controlled – each of the installed function groups has its own controller. Cyclic communication in the field level is implemented using PROFINET with RT (real-time), which replaced the old fieldbus. The press line’s individual SIMOTION D445 CPUs are linked together by a PROFINET line with IRT (isochronous real-time) capability. This ensures first that the position control cycles of all CPUs are synchronized, and second that the feeders are coordinated using the SIMOTION “distributed synchronization” function. As a result, horizontal integration is completely seamless. Thanks to the open PROFINET standard, any non-PROFINET capable components in the press can be easily integrated with the help of interface modules.

Benefits
The solution delivered by CAMotion is a real milestone in automation since it is the first time safety and wireless have been married in one application. The contractor is also delighted with the other features of the solution. Since only one network is required for all tasks, CAMotion was able to cut costs drastically. Furthermore, the flexible, expandable and modular solution has been functioning very reliably since commissioning and is easy to service and maintain thanks to user-friendly diagnostic possibilities and efficient troubleshooting.

CAMotion Inc. – Machine building, USA

Requirements
The US systems integrator headquartered in Atlanta, Georgia, realized an innovative safety control network for large overhead crane robot systems for one of its customers – an innovative solution which allows wireless operation with standard and fail-safe communications. The contractor also hoped the new solution would be less expensive than traditional approaches, be highly robust and reliable and minimize risk. Another important aspect was that the solution should represent a safe investment, i.e. be flexible enough to expand and adapt to the latest requirements into the future.

Solution
CAMotion decided to go with – in their own words – the only available solution that could meet their high requirements: a combination of fail-safe Siemens controllers that are linked to the deployed safety components via PROFINET with a PROFIsafe profile. The following components were used: the SIMATIC CPU 315F-2 PN/DP (on the floor) as well as the fail-safe IO SIMATIC ET 200S with safety modules (on the movable crane). Wireless communications were based on the SCALANCE W-788 industrial wireless LAN access points as well as SCALANCE X-208 industrial Ethernet switches.

Benefits
The use of PROFINET in complex automation solutions, such as the BMW press line in Munich, makes the complete process more reliable, leading to optimized efficiency, enhanced productivity, and increased output. The decision by BMW, one of the world’s most innovative car manufacturers, in favor of the PROFINET standard has already given it a clear productivity and competitive lead for the future.
More information

about PROFINET:
www.siemens.com/profinet

Information on PROFINET at PROFIBUS & PROFINET International:
www.profinet.com

Information regarding PROFINET technology:
www.siemens.com/ertec

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