

A close-up photograph of a Siemens industrial network connection. A metal rack holds a Profinet interface module with multiple ports. Several green and grey cables are plugged into the ports. The background shows a blurred industrial machine with metallic surfaces and mechanical components.

SIEMENS

PROFINET

Productivity increase thanks to the fastest, open Ethernet Standard

[siemens.com/profinet](https://www.siemens.com/profinet)

Answers for industry.

"With PROFINET, I can realize entirely new machine and plant concepts, which make us more competitive. PROFINET – this is my way."



PROFINET – for maximum freedom in structuring your machine and plant architecture

Individualized success

Globalization offers companies radically new opportunities for growth. But these chances also present new challenges: whoever offers high quality with high production speeds and can rely on maximum plant availability, will survive global competition in the long term.

Flexibility, productivity, and efficiency are also decisive parameters which determine the success of your company. PROFINET, the open Industrial Ethernet standard, meets the requirements for optimizing these parameters.

The technology driver

PROFIBUS & PROFINET International (PI), the world's largest fieldbus organization, drives technical development and promotes the standard on the international stage. It is also supporting the development of PROFIBUS into PROFINET.

Tried and tested for years

On the basis of PROFINET and PROFIBUS, technological requirements are easy to implement using profiles such as PROFI-safe, PROFI-drive and PROFI-energy. PROFI-safe supports fail-safe communication. PROFI-drive has proved itself for years as an application profile for drives. PROFI-energy permits the automatic shutdown of plant sections during breaks in production, thus saving energy costs. This innovation potential is one reason that PROFINET has become established in the fieldbus market with more than 5.8 million nodes installed worldwide.

Ready for the future

Within the Totally Integrated Automation Portal (TIA Portal), PROFINET is the communication standard for all new products, such as SIMATIC S7-1500. The TIA Portal is an engineering framework that unites all engineering tools and, together with PROFINET, forms the basis for consistent data management and maximum integrity.

Siemens relies on PROFINET for sustained customer benefits

Siemens, as a member of PROFIBUS & PROFINET International (PI), has already strongly influenced the development of PROFIBUS. The evolution of PROFIBUS to PROFINET is the logical progression

enabling companies in all industries to offer the greatest benefits at all times. That is why Siemens backs PROFINET and offers you maximum flexibility, efficiency, and performance for your application.

With PROFINET, Siemens is applying the Ethernet standard to automation. PROFINET enables high-speed and secure data exchange at all levels, thus making it possible to implement innovative machine and plant concepts. Thanks to its flexibility and openness, PROFINET offers users maximum freedom in structuring their machine and plant architectures. PROFINET's efficiency means optimal utilization of available user resources and a significant increase in plant availability. Innovative Siemens products and the performance of PROFINET provide a sustained boost to company productivity.

Your benefits at a glance

Flexibility	Efficiency	Performance
Tailor-made plant concepts	Optimal use of resources	Increased productivity
▶ Industrial Wireless LAN	▶ One cable for all purposes	▶ Speed
▶ Safety	▶ Device/network diagnostics	▶ High precision
▶ Flexible topologies	▶ Energy efficiency	▶ Large quantity structures
▶ Open standard	▶ Easy cabling	▶ High transmission rate
▶ Web tools	▶ Fast device replacement	▶ Redundancy
▶ Expandability	▶ Ruggedness/stability	▶ Fast start-up

"We have a large number of moving sections in our production plant. I need maximum flexibility for this and that's what PROFINET guarantees."



Maximum flexibility for implementing your ideas

Innovation and product lifecycles are becoming ever shorter. This applies to all sectors. That's why fast response times and optimized processes form the basis for long-term competitiveness.

With Industrial Wireless LAN, the SIMATIC Mobile Panel gives plant operators more freedom of movement. Access is always there where it is needed – without compromising safety.

PROFINET ensures maximum flexibility in plant structures and production processes and it enables you to implement innovative machine and plant concepts. Mobile devices, for example, can be integrated into inaccessible locations.



www.siemens.com/profinet-benefits

More flexibility with PROFINET

Industrial Wireless LAN (IWLAN)

IWLAN reduces maintenance costs, increases reliability and offers impressively high-performance communication. Only PROFINET allows this combination of safety and IWLAN.

Safety

Safety-related communication via PROFIsafe reliably protects personnel, the environment, and plants.

Flexible topologies

PROFINET also enables the use of star, tree and ring topologies in addition to the linear topology.

Open standard

Thanks to its openness, PROFINET creates the basis for a uniform machine/plant automation network to which programmable controllers as well as standard Ethernet devices can be connected.

Web tools

PROFINET is 100 percent Ethernet and supports TCP/IP. Among other things, this enables the use of Web technologies, such as access to the integrated Web server of the field devices.

Expandability

With PROFINET, network infrastructures can be expanded as desired, even during operation.

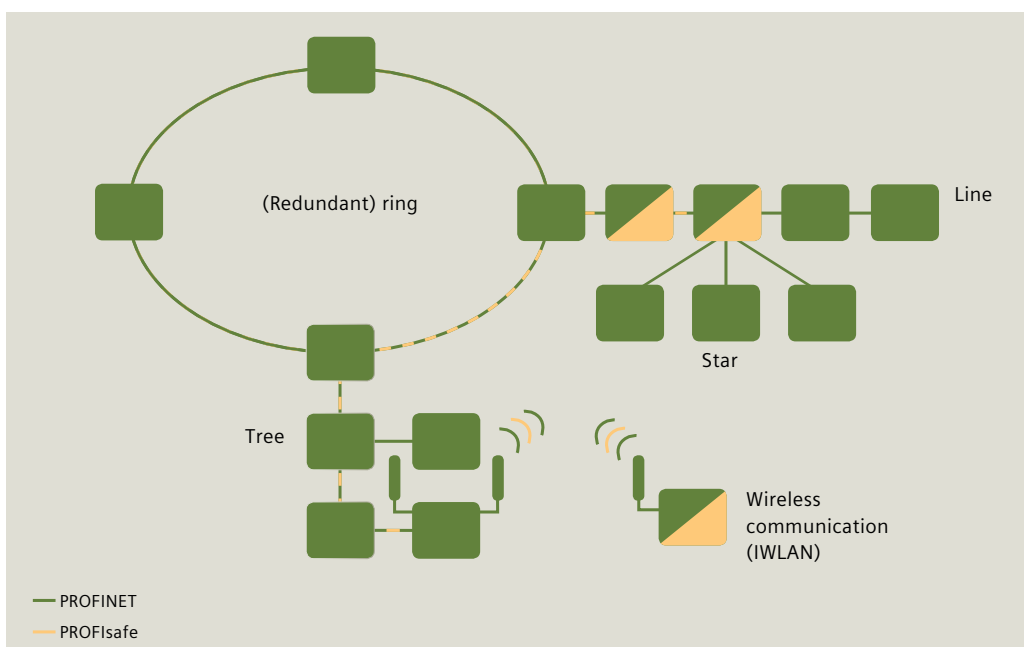
The focus is on flexible technologies

PROFINET also enables the use of star, tree and ring topologies in addition to the linear topology characterized by the established fieldbuses. This is made possible by switching technology using active components such as Industrial Ethernet switches and media converters, or by integrating switch functionality into the field devices. The result is increased flexibility in machine and plant planning, as well as savings in cabling.

The PROFINET network can be installed without specialist knowledge and meets all requirements relevant to the industrial environment. The "Cabling and Interconnection Technology" PROFINET guide provides network installation support for manufacturers and users. Symmetrical copper cables

or fiber-optic cables resistant to electromagnetic interference are used depending on the application. Devices from different manufacturers are easily connected via standardized and rugged plug connectors (up to IP65/IP67).

Thanks to the integration of switch functionality into the devices, linear topologies can be constructed that are based on an existing machine or plant structure. This results in lower cabling expenditure and cuts down on components such as external switches.



PROFINET supports different network topologies and thus enables a high degree of flexibility in machine and plant planning – even in combination with profiles such as PROFIsafe.

"With PROFINET,
everything runs
over one cable.
That's what I call
real efficiency."



More efficiency for your economic advantage

Continually rising raw material prices and a stream of new environmental regulations make it necessary for companies around the world to use their resources more cost-effectively and more proficiently. This applies above all to production.

PROFINET ensures greater efficiency here.

Simple engineering guarantees fast commissioning, and reliable devices ensure high availability of plants. In addition, comprehensive diagnostics and maintenance concepts help to reduce plant downtimes and keep maintenance costs to a minimum.

SIMATIC ET 200SP supports the PROFIenergy profile. This allows energy to be saved during breaks and increases plant efficiency.



www.siemens.com/profinet-benefits

More efficiency with PROFINET

One cable for all purposes

PROFINET offers a host of functions on one cable: As machine data and standard IT data converge, the resulting integration saves costs by reducing the overhead for cabling and training.

Device and network diagnostics

Extensive diagnostic data can be read out from the devices to locate faults quickly. HTML standard Web sites are used for servicing PROFINET devices, both locally and remotely.

Increased energy efficiency

PROFenergy switches off individual loads or entire production units during breaks – in a coordinated and centrally controlled manner.

Easy cabling

Fault-free establishment of industrial networks in a short time with no specialist knowledge: PROFINET makes this possible with the FastConnect system.

Quick replacement of devices

When replacing a PROFINET device, the IO Controller detects the new device and automatically assigns its name.

High degree of ruggedness

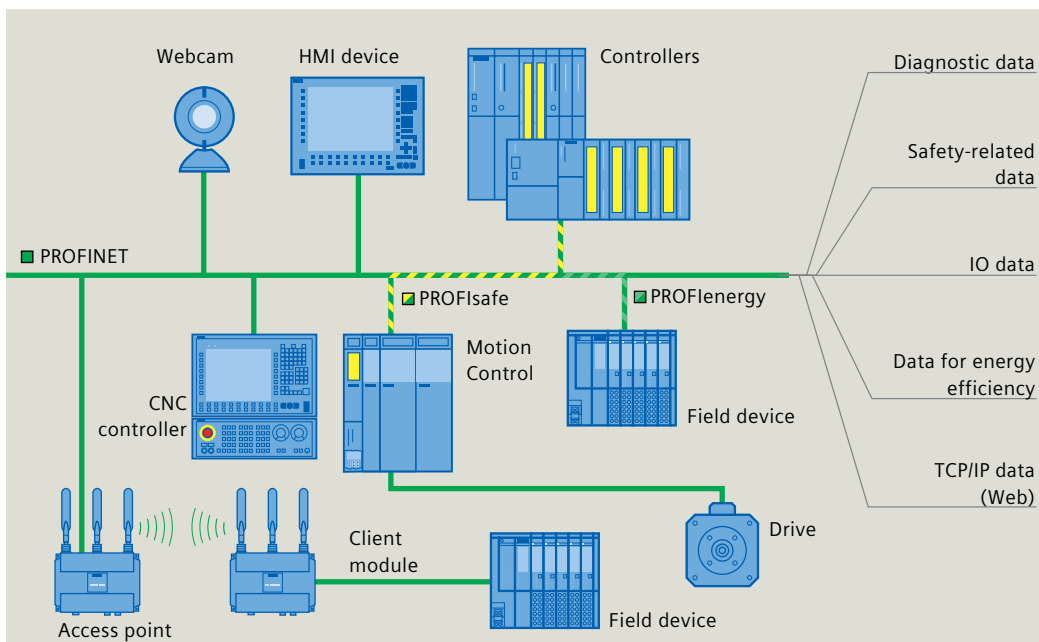
The use of switches even in field devices prevents faults in one section of the network from influencing the entire plant network. PROFINET enables the use of fiber-optic cables for areas that are particularly sensitive to EMI.

The focus is on device and network diagnostics

By retaining the field-proven PROFIBUS device model, the same diagnostic information is available with PROFINET. In addition, device diagnostics also include the read-out of module-specific and channel-specific data from the devices. This enables simple and fast location of faults. As well as the availability of device information, the top priority in network management is reliability of network operation.

Diagnostic devices such as the BANY Agent can extract PROFINET-specific variables from the network in real time without any reaction, and forward them to higher-level systems for analysis.

The Simple Network Management Protocol (SNMP) has become established in existing networks as the de-facto standard for the maintenance and monitoring of network components and their functions. PROFINET utilizes this standard and provides users with the option of servicing networks using familiar tools such as the SINEMA Server network management software. In order to facilitate the maintenance of PROFINET devices, both locally and also remotely via a secure VPN connection, application-specific Web sites in the familiar HTML standard can be created on the integral Web server of the field devices.



PROFINET enables parallel fieldbus communication and standard IT communication (TCP/IP). This real-time communication for the transmission of user/process data and diagnostic data takes place on a single cable. Profile communication (such as PROFIsafe, PROFIdrive or PROFenergy) can be integrated without additional cabling costs.

"High speed is just the beginning. PROFINET is not only fast, it can also simply do more."



High performance for boosting your productivity

Performance and precision determine market success. Precise motion control, dynamic drives, high-speed controllers, and the deterministic synchronization of devices are therefore key factors in achieving superior production.

PROFINET's performance power offers you more than enough reserves to meet today's requirements and those of the future. This makes it possible to steadily increase your productivity.

SINAMICS drive technology and PROFINET ensure the necessary speed in your machine and maximum precision in motion control applications.



www.siemens.com/profinet-benefits

More performance with PROFINET

Speed

Fast motion control applications need high-speed data exchange. PROFINET's short cycle times boost the productivity of machines and plants.

Precision

Communication via PROFINET is deterministic. Jitter of $<1\ \mu\text{s}$ results in maximum precision cycles and thus guarantees high product quality.

Redundancy

Higher plant availability can be achieved by means of a redundant installation. This can be implemented both with the help of external switches and direct via integral PROFINET interfaces.

High transmission rate

By using Ethernet, PROFINET achieves a significantly higher transmission rate than previous fieldbuses. This enables problem-free transmission of even large volumes of data without affecting I/O data transfer.

Large quantity structures

With PROFINET, up to 256 devices can be managed by a single SIMATIC controller. The number of nodes per network is practically unlimited.

Fast start-up

In modular plants, IO controllers must detect new machines or plant sections quickly. With Fast Startup, PROFINET can detect devices in up to $<500\ \text{ms}$ and connect them with the IO controller.

The focus is on speed and precision

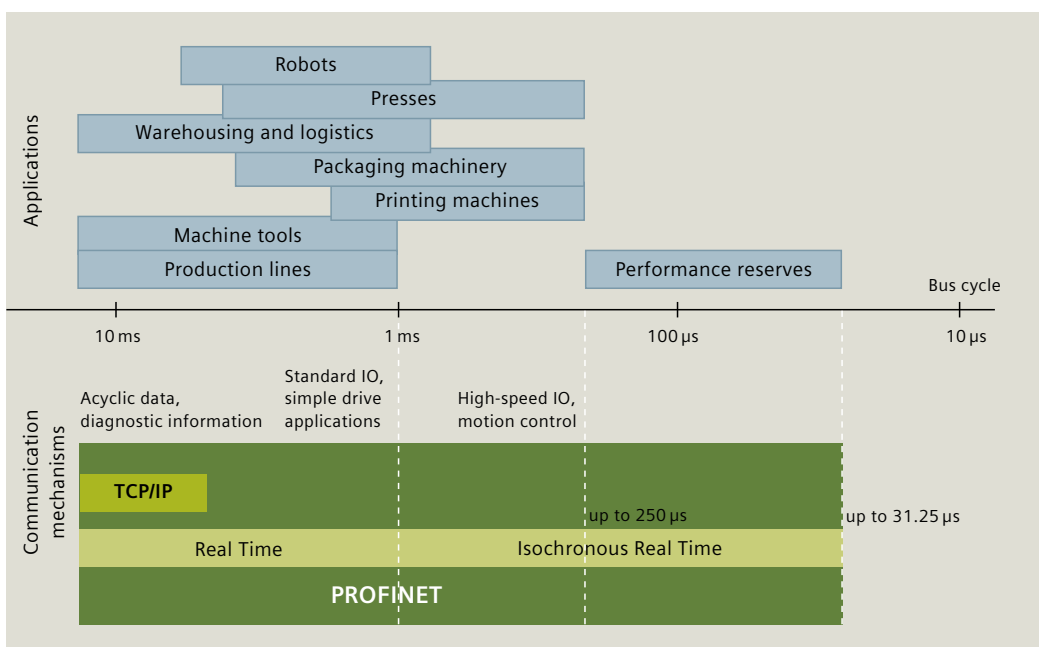
Fast motion control applications need precise and deterministic data exchange. This is implemented by means of isochronous drive controls using Isochronous Real Time (IRT). The different cycles of a system (input, network, CPU processing and output) are also synchronized in the case of parallel TCP/IP traffic.

PROFINET's short cycle times make it possible to increase the productivity of machines and plants, and to ensure product quality through the high precision of the cycle.

The standardized PROFIdrive profile enables vendor-independent communication between motion controllers and drives.



More on the
PROFINET
performance
upgrade
with $31.25\ \mu\text{s}$



PROFINET offers outstanding performance. You can implement all your applications right away with PROFINET. With cycle times of up to $31.25\ \mu\text{s}$, the PROFINET standard also offers you sufficient reserves for your future requirements.

"My PROFIBUS experience also enabled me to set up the PROFINET solution without any difficulty. In doing so, I came to discover the many benefits of PROFINET."

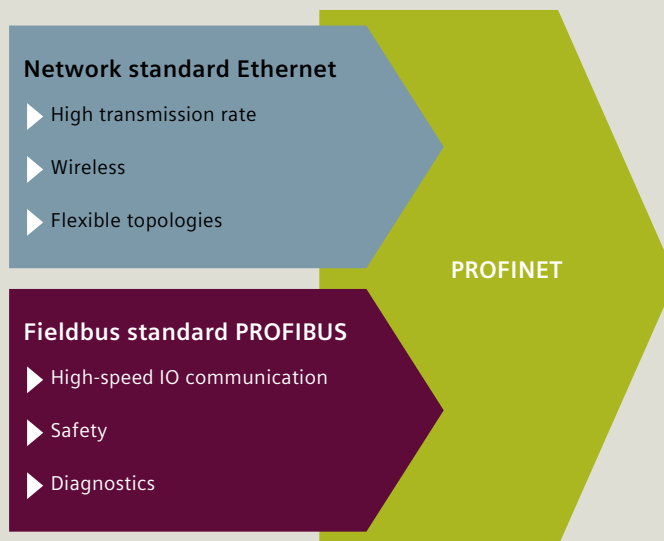
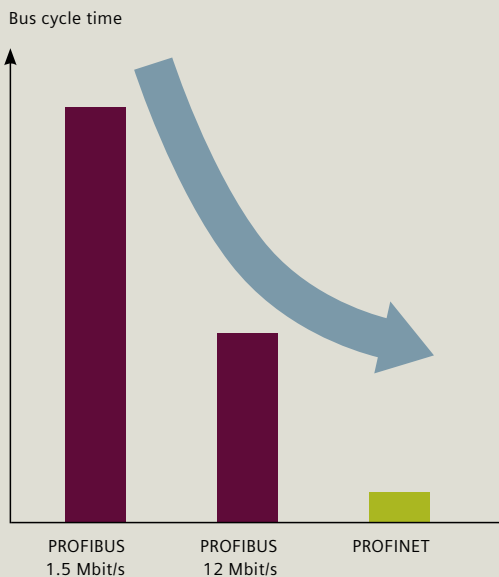


PROFIBUS or PROFINET?

PROFIBUS has been established for years as the fieldbus for machines and plants. Based on serial bus technology, it revolutionized the automation world in the 80s when it first created the foundation for the distributed concepts in common use today. During the 1990s, Ethernet spread into IT and industry. And today, manufacturing is inconceivable without these two systems. But would it not be more efficient to combine the advantages of both?

The answer to this question is PROFINET. It unites the industrial experience of PROFIBUS with the openness and flexible options of Ethernet.

www.siemens.com/PB2PN



Significant performance gains can be achieved with PROFINET.

The advantages of PROFIBUS, the leading fieldbus, combined with the versatile options of Ethernet, form the basis of PROFINET. Highlights such as Safety over Wireless become as feasible as highly dynamic, isochronous motion control applications.

Good reasons for a change

Can I continue to use my existing PROFIBUS expertise?

PROFIBUS will continue to play an important role in the future. That's why care was taken in the development of PROFINET to enable simple and smooth integration of PROFIBUS. The engineering of PROFINET is very similar to that of PROFIBUS. You can, for example, convert a SIMATIC ET 200S station to PROFINET simply by replacing an interface module: just change the configuration, reinstall, job done!

Do I have to convert the entire plant at once, or can I make the changeover in stages?

You can connect existing plant sections to PROFINET simply via the IE/PB Link PN IO, or even wirelessly via the IWLAN/PB Link PN IO. The huge diversity of field devices on PROFIBUS can therefore be integrated without any problems into new PROFINET systems, and you can structure the changeover individually and in stages.

Is the transition complicated?

You already know the basic techniques: simple integration of distributed IO such as PROFIBUS DP, assignment of addresses and names as with a PC. This makes the changeover easy and enables you to utilize the advantages of PROFINET immediately. Test it out and see how easy it is to configure a familiar and frequently-used PROFIBUS application

with PROFINET. You'll be impressed by the simple handling and the results.

How will I benefit from the migration?

The multiple benefits that PROFINET offers in implementing automation tasks mean the changeover is always worthwhile: Flexible topologies, one cable for all applications, wireless with safety, and significantly enhanced system performance thanks to scalable mechanisms. These features speak for themselves.

When is the right time for me?

With 5.8 million nodes already installed, PROFINET is the world's leading Ethernet standard for automation. More than 12,000 of our customers already depend on PROFINET today. The wide range of available devices with PROFINET connection is being extended continuously, so devices are available for just about all application areas and sectors. You can therefore take advantage of all those functions which PROFINET uses to implement automation solutions more flexibly, more efficiently, and more powerfully.

Who will support me if I have questions?

When you make the change, Siemens will support you with extensive services, ranging from training courses and direct on-site consultation, through to the acceptance of your networks.

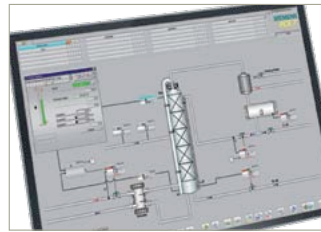
PROFINET – this is my way.

The integrated PROFINET portfolio – Products and services from Siemens

Configuration/engineering



Totally Integrated Automation Portal V12



SIMATIC PCS 7 process control system

Controllers



SIMATIC S7-1500



SIMATIC S7-1200

Motion control systems



SIMOTION D



SIMOTION C



SIMOTION P

CNC systems



SINUMERIK 840D sl

PC-based Automation



SIMATIC PC-based Automation with SIMATIC WinAC



System connections for PG/PC/software

Drives



SINAMICS G120 / G120 C / G120 D / G120 P



SINAMICS S110

Industrial Ethernet Switches



SCALANCE X and Compact Switch Modules CSM

Cabling technology



FastConnect for electrical and optical networks

Network transitions



to PROFIBUS, AS-Interface, PROFINET

Industrial Security



SCALANCE S and communication modules

Identification systems



SIMATIC RFID systems



Code reading systems

Power supply



SITOP UPS1600 for uninterruptible 24 V DC

Power monitoring devices



SENTRON PAC



SIMATIC S7-300 /
SIMATIC S7-400



System connection for
SIMATIC S7



SIMATIC ET 200 interface
modules with CPU



SIMATIC HMI Panels

Human machine interface

Distributed IO



SIMATIC ET 200SP



SIMATIC ET 200MP



SIMATIC ET 200eco PN



SIMATIC ET 200pro



SINAMICS S120



SINAMICS G130/G150/S150/
GM150/GL150/SM150



SINAMICS DCM



SIRIUS M200D motor starter

Industrial Wireless LAN



SCALANCE W-780
Access Points



SCALANCE W-740
Client Modules



Wireless devices



Radiating cables

Switching devices



SIMOCODE Pro V PN

Technology components



ERTEC 200P /
development packages

www.siemens.com/profinet-products

Our customers report on the flexibility, efficiency and performance of PROFINET



Hirata, Japan

The global Hirata corporation based in Tokyo has been a supplier of automation and production systems for more than 50 years. One factor that helps Hirata to achieve its objective – of offering its customers in the automotive industry the best possible performance and quality at all times – is the use of PROFINET. By using the industrial Ethernet standard, the company has already been able to deliver numerous production lines for smaller and diversified drive trains. These are characterized by reliability, fast delivery and low costs.

Hirata considers the particular advantage of using PROFINET to be that all functions are contained in a single Ethernet cable – combined with flexible cabling systems and practical diagnostic options.



Hirata
report –
access
movie here.



Prism Systems, USA

Established in 1989, this company's developments include IT solutions for the production and processing industry. In order to implement simple connection of the automation system in the production area to the networks in the office area for its customers, Prism Systems relies on PROFINET. This means that data can be transferred securely from the production plant into the MES or ERP system – simultaneously raising the level of transparency of both the production and operational processes. On the basis of their own Ethernet knowledge, Prism Systems customers can use PROFINET to develop and implement their own solutions, thereby integrating standard technologies such as IWLAN or safety functions. Using PROFINET, Prism Systems realizes tailor-made solutions for production plants that are more cost-effective and less complex than in other industrial networks.

Prism Systems customers appreciate PROFINET because it offers them a complete automation solution from a single source.



Prism
Systems
report –
access
movie here.

Throughout the world, automation and IT companies appreciate the flexibility and saving potential of the industrial PROFINET Ethernet standard.

Discover more success stories concerning our customers' PROFINET applications around the world.

www.siemens.com/profinet-references

The world speaks PROFINET



"Due to the great flexibility and reliability of PROFINET, we were able to achieve top satisfaction levels among our customers."

Yuichi Ichihara
Hirata, Japan



"Thanks to PROFINET, we can work with just one network for IRT, Safety, HMI and IO communication."

Rolf Themann
Sklostroj, Czech Republic

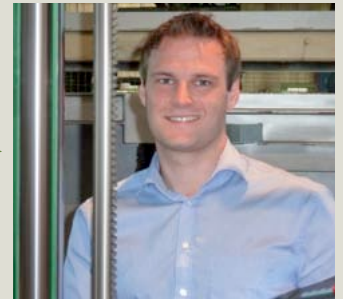
"PROFINET is easier to use than any other communication network for configuration, commissioning and maintenance."

Todd Hassel
Prism Systems, USA



"Thanks to PROFINET with IWLAN, a mobile, secure and precise positioning on the train body is possible."

Christoph Wittig
J.A. Becker & Söhne,
Germany



"With the efficiency of PROFINET we have reduced the energy costs at our site by 30%."

Andrew Beath
Racing Victoria,
Australia



"PROFINET – one network for all tasks: flexible, powerful and simple."

Markus Eisele
Baljer & Zembrod,
Germany

"PROFINET – one standardized network for automation devices and standard Ethernet devices."

Andreas Kist
Breyer, Germany



"I use PROFINET because I am able to use existing IT infrastructure, therefore avoiding expensive new installations."

Beat Kriech
Bischofszell Foods,
Switzerland



"With PROFINET we have cut commissioning times by at least 30%."

Herbert Brandstätter
MiCROTEC, Austria



"Safety is particularly important for us, so we have installed a solution using PROFINET and PROFIsafe for the first time."

Michael Mack
Europa-Park,
Germany

Find out more:

www.siemens.com/profinet

Get the full PROFINET experience:

- The benefits for you – presented as 3D computer graphic animation
- PROFINET in use – current reference films

PROFINET –
take a look!



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Siemens offers automation and drives products with industrial security functions that support safe operation of plants and machines. They are an important component for a holistic industrial security concept. The products are continuously developed with this aspect in mind. You are recommended to seek regular information about product updates. You can find the relevant information and newsletters at:
<http://support.automation.siemens.com>

For the secure operation of a plant/machine, it is also necessary to take suitable protective measures (e.g. cell protection concept), and to integrate the automation and drives components into a holistic, state-of-the-art industrial security concept for the entire plant/machine. Products from other manufacturers should also be taken into account here. Further information can be found at:
<http://www.siemens.com/industrialsecurity>

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