Profit from engineering efficiency
Totally Integrated Automation Portal in practice

siemens.com/tia-portal
Efficient automation starts with efficient engineering

Efficiency and productivity are decisive success factors for the manufacturing industry. Engineering plays a central role in this, especially as it relates to ever more complex automation solutions. This explains why engineering in particular demands maximum efficiency as the first step toward production that is faster, smarter, and more flexible. Siemens has the answer: Totally Integrated Automation (TIA).

TIA creates real added value in all automation tasks

Integrated Engineering

Reduced time, costs, and labor input – thanks to consistent, comprehensive engineering in all phases of the production process.

Industrial Data Management

Industrial Data Management maximizes both decision-making confidence and economical plant operation, thanks to real-time access to all critical data generated during manufacturing operations.

Industrial Communication

End-to-end communication gives you maximum transparency at all levels, by using international standards shared by many different manufacturers.

Industrial Security

The rigorous use of security mechanisms in the automation process systematically minimizes the risk of attacks on machinery and plant.

Safety Integrated

Reliable, comprehensive protection for humans, machines, and the environment achieved through the seamless integration of safety into standard automation technology.
Efficient, coordinated workflow with TIA and the TIA Portal

End-to-end approach to optimizing the entire value chain

Siemens is already interlinking key parts of its product and production lifecycle. For example, powerful Product Lifecycle Management (PLM) software enables new products to be fully developed and optimized in a virtual environment. In the real world of manufacturing, the TIA concept – which has been proven in practice for about 20 years – enables all automation components to work together efficiently. And so the Totally Integrated Automation Portal (TIA Portal) can achieve significant time and cost savings beginning right in the engineering stage through:

- Simplified engineering
- Swift machine commissioning
- Reduced machine downtime

TIA Portal – saving time, money, and effort

The TIA Portal engineering framework is optimized to ensure maximum user-friendliness, integrating controllers, peripheral systems, HMI, drives, motion control, and motor management. The shared data management and smart library concept supports the use of universal functions.

The TIA Portal is the key to all the performance offered by TIA because it optimizes all operating, machinery, and process sequences. Used in conjunction with the latest-generation hardware, it will ensure that you get the most out of your system.

Highlights live

TIA Portal has proved itself in practical use by end customers and mechanical engineers. These highlights play a key role:

- Safety Integrated:
  Standard technology and security technology in a single system
- Library concept:
  Libraries enable project components to be reused
- Integrated trace:
  Real-time trace functions have been integrated
- System diagnostics:
  Integrated system diagnostics enable rapid error location
- Motion Control:
  Rapid parameterization of motion functionalities – for standard and high-end motion applications
- Team engineering:
  Share automation expertise within the team and across the company

“Competitiveness in our business is extremely important. The new system will enable us to cut production costs on a lasting basis, which in turn will play a key part in safeguarding our location for the long term.”

Michael Wolff (CEO of Pfleiderer)
TIA Portal – a software platform for industry

Software is playing an increasingly important role in industrial manufacturing. The inventions created by Ronald Lange, 46, enable project engineers to use a wealth of automation tools in a shared organizational system, the TIA Portal, and simultaneously access data with no need for conversion. With the introduction of the TIA Portal industrial software in 2010, Siemens laid a new foundation for industrial automation that made all the required tools available in a uniform development environment for the first time.

Before TIA Portal, building up a system architecture for complex plants was conditioned by a strict separation of the various tasks like control, operation and monitoring, and drive technology. A new generation of software architects, however, wanted to be able to combine industrial software into a single automation system as easily as joining Lego blocks together to form a new miniature world.

Hundreds of software developers on three continents spent several years working on this project. Lange, who studied IT at Erlangen University, joined Siemens Automation in Erlangen as a system developer immediately after graduating in 1989, and he knows the world of automation software like the back of his hand. He and his team are responsible for the system architecture.

Putting it simply, Lange’s invention for the TIA Portal makes it possible to exchange, process, and reuse all data from a given automation system in different software tools – for example, applications for design, configuration, and troubleshooting.

If a project employee sets the parameters for operating the control system during the project planning stage of a new system, these can also be adopted for configuring the drive control or the operating and monitoring devices. Unlike the situation with traditional architectures, the software applications in the TIA Portal use the same modular elements for their various functions.

In addition, the data sets can be saved as “libraries” that the project engineers can draw on as required while designing a new plant. To configure the plant operation and control, the project employees switch back and forth between programs and simply upload the tried and tested settings from the library.

The structure of the TIA Portal makes it possible to both plan and operate all production processes at all levels. The TIA Portal has to allow for highly complex applications in the construction of automated industrial plants. At a later stage, clear on-screen representations can help maintenance technicians who do not work with software every day, for example, to resolve problems in production.

“That has been my biggest professional challenge to date. It is important to have a clear definition of what each program does and how the individual programs are layered, to ensure that the system remains manageable.”

Ronald Lange, Siemens
Linck Holz-verarbeitungstechnik
Linck Holzverarbeitungstechnik GmbH manufactures machines for the wood processing industry. Especially for sawmills where space is at a premium, the company developed a compact solution whose centerpiece is a novel four-sided chipper that processes the log from all sides in a single run. Linck’s engineers used the TIA Portal engineering framework for the first time in the development process, and now want to use it as standard in the future.

Requirements
For modernizing sawmills and upgrading plants, Linck developed its Compact Center, a compact four-sided chipper that satisfies the following requirements:
- Processes the log from four sides in a single run
- One turning and aligning unit can be eliminated
- Continuous tracking of the horizontal and vertical position of the feed and guide rollers
- High control unit computing power for up to 150 motor and servohydraulic drives for each CPU clock cycle
- Powerful motors to provide maximum log feed
- Only one PLC used for all control and safety functions

Solution
Developing and automating the new Compact Center and the alignment system served as a pilot project for Linck. This allowed them to explore the options offered by the TIA Portal. The engineers used the following components to achieve their goal:
- Fully integrated and team-compatible development environment using TIA Portal as an engineering framework
- SIMATIC S7 1518F, the most powerful controller currently available and therefore the only control unit needed
- SIMATIC ET 200SP as decentralized periphery
- Four 160 kW asynchronous motors on Siemens SINAMICS S120 converters

Results
- TIA Portal will enable Linck to implement new developments, customer requests, and commissioning more quickly and reliably in the future
- Control and operation of more complex machines, in particular, is more efficient and powerful
- Compact Center is shorter than traditional four-sided chippers by a full log length
- Compact size greatly increases opportunities for use
- Lean system structure

“We are working with a team-compatible, fully integrated tool landscape that gives us access to a complete portfolio of the control and drive components that we need.”

Andreas Martin, head of Electrical Engineering

For the full reference, see siemens.com/reference-linck
Käserei Altendorf, a cheese dairy in Switzerland, was looking for an automation solution for its new production plant that would be easy to operate and would increase its efficiency. The Siemens TIA Portal was able to realize in full the ideas that company boss Erich Keller had in mind. Käserei Altendorf is therefore the first plant in Switzerland to have been created using the TIA Portal engineering framework, including the drive technology.

Requirements
Käserei Altendorf wanted to introduce an ultramodern automation and visualization solution to transform it from a small craft operation to a state-of-the-art company. Company boss Erich Keller tasked local Altendorf-based company Solinaut to make it happen.

Overview of requirements:
• Fully automated and simplified cheese production
• System uniformity for drives, controls, and HMI panels
• Networking of all (plant and) machinery
• The latest technology to ensure maximum product quality and hygiene

“Everything is saved in a project folder so there is no need to jump back and forth between different versions. That makes it easy to handle.”

Florian Rüegg of Solinaut
Solution

The entire plant – from delivery, mixing, and pressing to the ripening process – was automated using the latest drive, control, and visualization components, and everything was configured centrally and comprehensively within the TIA Portal.

The solution uses the following components:
• TIA Portal as a central and end-to-end engineering framework for all automation tasks
• SIMATIC ET 200SP as a control system with drive connection and decentralized periphery system
• SINAMICS G120C as drive components
• SIMATIC HMI Comfort and Basic Panels as operating and monitoring devices
• PROFINET for end-to-end communication
• SIMATIC STEP 7 as central control software
• SIMATIC WinCC V7 as visualization software

Results

The TIA Portal integrates all components as part of a single system, giving Käserei Altendorf a comprehensive solution offering a wealth of benefits:
• High productivity and efficiency, thanks to mutually coordinated hardware and software technologies
• Minimized engineering costs
• Perfectly coordinated process sequences
• Intuitive, easy-to-understand operation with visualization of all processes on a central HMI panel
• Continuous data exchange with the control system to give all employees access to the latest data
• Conservation of resources and costs due to energy-efficient heat regulation, recovery, and storage
• Environmentally friendly thanks to integrated water treatment
• Increased quality as a result of optimized cleaning
• Improved working conditions
• And more time for both marketing and family

For the full reference, see siemens.com/reference-cheese-factory-altendorf
AC Schwimmbadtechnik needs flexible engineering to accommodate its diverse customer base:

- Configuration of all components by just one person
- Flexible and simple system for the customer operating the pool systems

Solution

The TIA Portal gives employees the ability to configure every aspect of the control system, drives, and HMI and therefore respond to all customer requirements:

- Easy configuration via TIA Portal
- Control using SIMATIC S7-1200 controller
- Visualization using SIMATIC HMI Basic Panels second generation
- SINAMICS V20 basic converter

Results

- Satisfied individual customer requirements
- Scalable projects with no need for additional personnel
- Siemens provided hardware and software from a single source

“In our company almost all the engineering is managed by just one person. That means we benefit especially from the positive support provided by the TIA Portal – the generation of links to exchange parameters between HMI and CPU, in particular, really is very helpful.”

Markus Achermann, Managing Director

For the full reference, see siemens.com/tia-portal
Requirements
The overhauls are intended to ensure long-term machine availability:

- Ease of operation
- Manual or automatic positioning of the profile to be sawed
- Reuse of existing periphery and drives
- Optional remote maintenance of machines

Solution
The retrofit orders were configured in the TIA Portal. Profiltec used the following components:

- Uniform configuration of SIMATIC S7-1200 and S7-1500 in the TIA Portal
- Conversion of SIMATIC STEP 5 programs for STEP 7
- Reuse of SIMATIC ET 200U with an analog output and PROFINET
- PROFINET for remote maintenance

Results

- No need for additional PCs for positioning
- Connection to production control systems
- Time savings of more than 30 percent per retrofit

“The ability to convert program elements from STEP 5, use preassembled control modules with the S7-1500, and import variables from the control program into the visualization using drag-and-drop made savings of up to 30 percent possible.”

Thierry Barrault, head of electronics department

Profiltec Spezialmaschinen GmbH is a specialist in retrofitting, bringing Kaltenbach metal saws up to date with the latest in control technology.
Dieffenbacher GmbH is a leading manufacturer of press systems and complete production systems for the wood, automobile, and supply industry. It was responsible for the construction of a complex production plant for Europe’s largest and most advanced particleboard factory for Pfleiderer, a manufacturer of wood-based materials based in Neumarkt.
Requirements

The new facilities were built under extreme time pressure and had to meet Pfleiderer’s stringent demands for efficiency and careful use of resources. Dieffenbacher, Pfleiderer, and Siemens worked closely together to achieve these goals:

- A very short implementation time (just six months)
- Switch to new automation technology
- Cut commissioning costs
- Reduce engineering costs to scale the machines
- Perform ongoing plant optimization
- Set a new standard in terms of energy consumption, efficiency, and use of resources

Solution

To implement the project, Siemens provided Dieffenbacher and Pfleiderer with the SIMATIC S7-1500 automation system, as well as the following components:

- Future-proof control using SIMATIC S7-1500
- Time-saving engineering using the TIA Portal
- Communication via PROFINET
- Troubleshooting across the entire system using SIMATIC Field PGs and the S7-1500’s trace function
- Power optimization using energy meters in the SIMATIC ET 200SP
- Upgrading the SIMATIC S7-1500 with CPU 1516 to CPU 1518

Results

- Time saved in communication configuration
- Error-free connection configuration in the TIA Portal with the click of a mouse
- Configuration using drag-and-drop
- Faster troubleshooting saves resources
- Reduced time spent on new projects
- Major scalability using SIMATIC S7-1500 for large and small machines
- Optimization of resource use in the TIA Portal
- Increased measurement accuracy improves product quality and boosting production efficiency

“It occasionally happened that boards were transferred for no identifiable reason. Tracing showed that the error was triggered by a photoelectric barrier. Without the trace function it would have been almost impossible to eliminate this as the cause.”

Ulf Könekaemp, Engineering Manager

For the full reference, see siemens.com/reference-dieffenbacher
Centerline

Canadian company Centerline manufactures welding machines for suppliers to the automobile industry worldwide. For the European market, the branch in Breidenbach, Germany, makes the necessary adjustments while the collaboration takes place via TIA Portal.

Requirements
The company needed to use domestic control technologies to develop the "Flex Fast" welders in Canada, but Siemens technology was used in Europe:

• Rapid, high-quality adaptation to different markets around the world
• Networked collaboration with branches on-site
• Worldwide availability

Solution
Centerline needed a platform that it could use for development worldwide that would enable employees from different countries to work together:

• SIMATIC S7-1500 as a powerful control unit
• SIMATIC HMI Comfort Panels
• Communication via PROFINET
• Engineering in the TIA Portal

Results
• Plant speed increased by 25 percent thanks to SIMATIC S7-1500 and PROFINET
• Improved process quality as a result of high processing speed and control quality

• Greater engineering efficiency with IEC 61131-3 and compatibility with LAD (ladder diagram)
• Increased availability due to efficient diagnostics

“The efficient diagnostic functions made the job of commissioning easier. The list of cross-references helps when tracking the use of variables, and the network topology reveals wiring errors, making them quick to fix.”

Larry F. Koscielski, Head of Development

For the full reference, see siemens.com/tia-portal
Requirements
Faster automation, increased flexibility, and data protection were needed to guarantee that the research goal would be achieved.
- Flexibility at the different research stations
- Easy adjustment of individual incubators
- More efficient data collection and guaranteed security
- Fast and simplified engineering phase
- Reduced number of different engineering systems

Solution
The TIA Portal produced a uniform, easy-to-operate, and secure solution for the department’s research work.
- Time-saving engineering using the TIA Portal
- Operating concept using SIMATIC HMI Comfort Panels
- Automatic backup using panel system card

Results
- Engineering time was halved
- More time is available for research
- Shared library concept for adaptations to meet customer needs
- Existing modules and operating screens are reusable by other research stations
- Research data is easy to evaluate
- Guaranteed, complete backup of research results with no manual input

“The TIA Portal makes handling the technology much easier, and it saves us 50 percent on cost and effort compared with the engineering system from a different manufacturer that we used previously.”

Dr.-Ing. Jan Hansmann,
Head of the Electronic Tissue Interfaces Junior Research Group
To refurbish the Statue of Liberty in New York Harbor, the elevator specialists at Tower Elevator Systems, Inc., drew on components from Siemens and a configuration using the TIA Portal. Because the 30-year-old elevator was already operating using Siemens S7 technology, it was possible to continue using the existing code. This unique system must satisfy especially stringent demands for safety and reliability, and fail-safe CPUs were used accordingly.

Requirements
The renovation work on the elevator in the Statue of Liberty had to comply with very stringent safety requirements, and it needed to be completed as quickly as possible.

- Short development time
- Maximum fail-safe operation
- Permanent monitoring of all operational data
- Redundant systems
- Low maintenance costs
- In-elevator operation using touch panels

Solution
Although the rescue elevator was completely redeveloped, the engineers were able to migrate the Siemens S7 code from the old elevator and reuse it in the TIA Portal. This enabled Tower Elevator Systems, Inc. to benefit from the time-saving opportunities provided by the engineering framework. The following components were also used:

- Intuitive programming in the TIA Portal engineering framework
- SIMATIC S7 Controller with fail-safe CPU
- SIMATIC ET 200S, safety version
- User guide via SIMATIC HMI TP700 Comfort Panels
- Communication via PROFIBUS and PROFINET

Results

- Code migration shortens engineering phase by 30 to 40 percent
- Debugging phase is 20 percent shorter in the TIA Portal
- Time savings increase competitiveness
- Integrating safety within the TIA Portal meets safety requirements
- Long-lasting touch panels result in lower maintenance costs
- Overall operating costs reduced

“We took existing TESI code that was known to be good in previous elevators and adapted it to TIA Portal using the migration process, and that probably saved a good three to four weeks’ worth of time.”

Todd Grovatt, President of Tower Elevator Systems, Inc.

For the full reference, see
usa.siemens.com/tia-portal-awards
SDF GmbH in Monheim has succeeded for the first time in integrating an ink-jet printer into a machine that prints napkins. Very small runs of paper napkins can now be printed in photo quality with any desired design.

**Requirements**

The project involved integrating a Canon ink-jet printer into SDF’s printing machine and controlling them together.

- Separating the closed axis system in the printing machine
- Accommodating previously unknown disturbance variables in axis control
- Flexible solution for different sizes and materials
- Future-proof automation solution

**Solution**

The combination of control and motion control in the TIA Portal was one of the main advantages for SDF:

- Complete implementation using TIA Portal, including SIMOTION Scout 4.4
- Combination of SIMATIC S7-1500F, SIMOTION, and SINAMICS S120
- Connection between SIMATIC ET 200SP and PROFINET
- Ease of operation with SIMATIC HMI Comfort Panel TP1500 and SIMATIC HMI Key Panel KP8F

**Results**

- Efficient programming using symbols
- Long-term usability with software elements in place – even with changes at a mechanical level
- Integration of control and drive satisfies maximum requirements for synchronizing speed and angle accuracy
- Integration of security systems into the control system saves wiring and configuration effort
- Self-explanatory user interfaces reduce labor input at the operator’s end

“The fact that safety functions are integrated into the control system saves time and effort both in wiring and project planning, because the same programming language is used for standard and safety functions.”

Günther Kluge, Electrical Design Manager
Burr Oak

Michigan-based mechanical engineering company Burr Oak wanted to win new customers in the Asian market in particular, with a high-quality, low-cost laminating press.

Requirements

Unlike the high-end models used previously, the new laminating press had to be of comparable high quality but able to be offered at a much lower price.

• Stable and cost-effective machine
• Innovative solution for new target groups
• Time-saving maintenance

Solution

Engineering in the TIA Portal is a great time-saver for Burr Oak, and it also keeps quality consistently high:

• Complete configuration using the TIA Portal
• Combination of SIMATIC S7-1500 and SIMATIC HMI Comfort Panel TP1200
• Debugging with SIMATIC ET 200SP and ET 200MP

Results

• Time for engineering in the TIA Portal reduced by 30 percent
• Trace function provides efficient debugging
• Standard components mean fewer spare parts

“Together this has cut engineering time by about 30 percent. We haven’t actually brought the time for our activities to a standstill, but the TIA Portal makes everything go much faster.”

Adam Broadwater, R&D Engineer

For the full reference, see usa.siemens.com/tia-portal-awards
Visit us online to find out more about efficient engineering using the TIA Portal.

Find out more: siemens.com/tia-portal