

SIEMENS

Ingenuity for life

SIEMENS
SIMATIC
S7-1500

RUN

Fail-safe

Safety mode:
Enabled

Collective signature:
5CBE6409

Last fail-safe modification:
04/30/2012 04:44:51 PM

ESC

Engineered with TIA Portal

SIMATIC Safety Integrated – all built in

One controller, one engineering, one communication
for standard and fail-safe automation.

usa.siemens.com/safety

Integrated safety for your automation solution

Safety for people and the environment is a top priority for manufacturers. Strict regulations on the part of the government must be observed and production losses from plant downtime avoided. In order to ensure safety at all times in the production process, the corresponding protective functions are seamlessly integrated into standard automation systems with Siemens. Safety Integrated is the consistent implementation of safety solutions in terms of Totally Integrated Automation (TIA). The comprehensive portfolio covers all requirements, can be scaled flexibly as required and minimizes the work for logistics, wiring and training from the outset due to its seamless integration. In addition, the systematic reduction of types and parts results in substantially smaller cabinet designs.

In other words, the system of hardware and software offers the advantage that safety functionality is built in from the start and no other additional system is needed.

The benefits at a glance

- **Consistent integration:**
Uniform safety functions for all SIMATIC devices
- **Integrated system diagnostics:**
Fast error identification and correction
- **High availability:**
Uniform diagnostic functions for standard and safety versions help to reduce downtimes
- **More compact cabinet design:**
Less space required due to reduction in types and parts
- **Faster commissioning:**
The simpler system design accelerates the engineering for standard and fail-safe automation

Find out more: usa.siemens.com/safety

SIMATIC Safety Integrated – all built in



Engineered
with one click

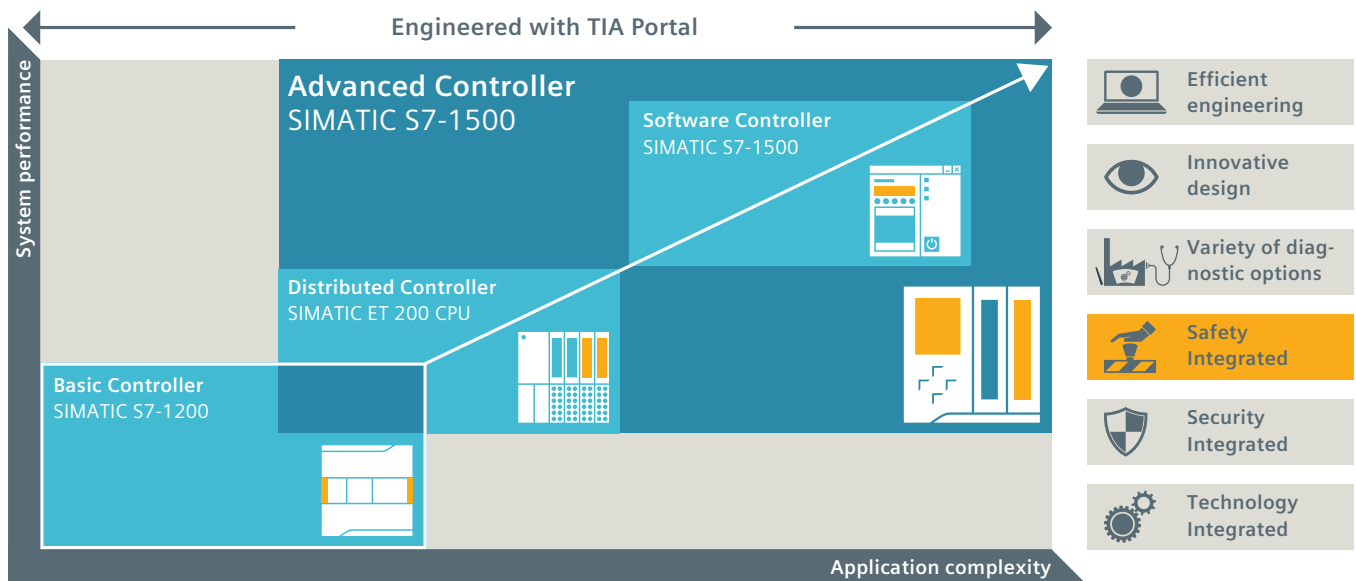
Without
additional wiring

User-friendly
diagnostics

SIMATIC Safety Integrated represents the seamless and convenient integration of safety technology into standard automation applications. This means **one controller, one engineering, one communication for standard and fail-safe automation.**

SIMATIC Safety Integrated ensures the highest reliability and saves time and costs

- **More efficiency:**
Intuitive engineering of fail-safe automation in the Totally Integrated Automation Portal (TIA Portal)
- **More uniformity:**
Standardized diagnostic functions for standard and safety applications
- **More scalability:**
Wide range of safety-related hardware



SIMATIC Controller – full scalability with integrated safety functions

Fail-safe controllers for more flexibility

Siemens offers the right controller for the entire spectrum of automation requirements. The SIMATIC range of controllers includes Basic, Advanced, Distributed as well as Software Controllers, offering impressive scalability and functional integration.

The benefits at a glance

- **Scalability:**
The suitable controller version with Safety Integrated for extremely diverse applications
- **Individually expandable:**
Plug-in I/O modules, function and communication modules
- **More efficiency:**
The uniform operating capability of the TIA Portal enables intuitive safety function engineering
- **All built in:**
External safety solutions are not required

Find out more: usa.siemens.com/plc

SIMATIC S7-1500 Advanced Controller – increased productivity due to ultimate power for standard fail-safe automation

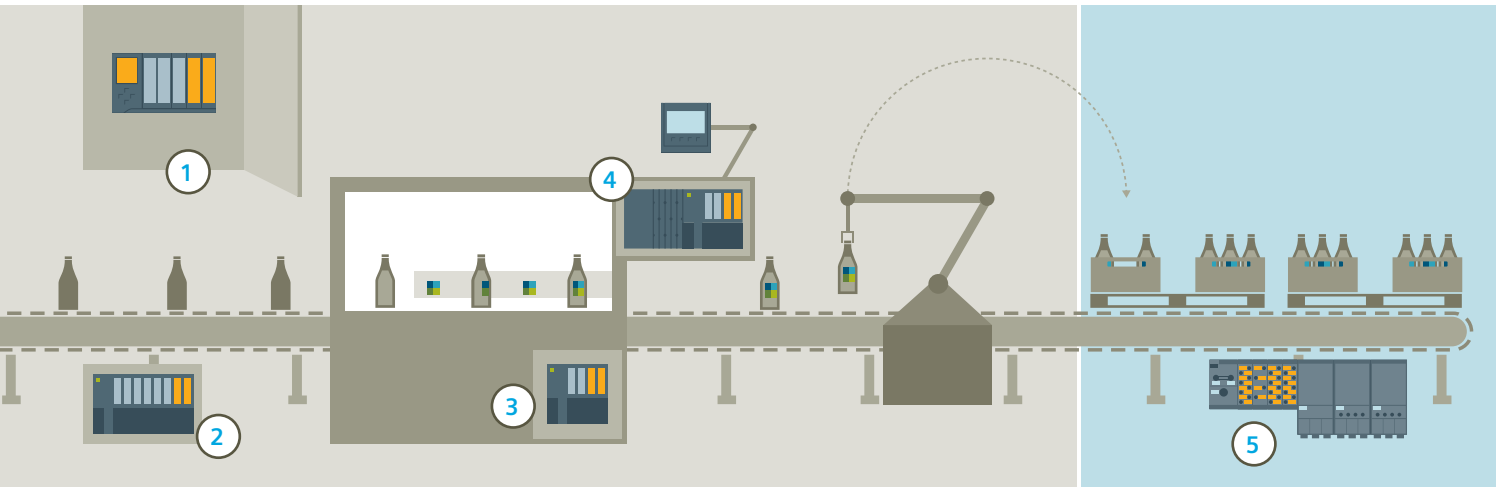
SIMATIC S7-1500 controllers are designed for use in all areas of production automation. They demonstrate their special strengths in applications for medium and high-end machines, when high performance, a wide range of technological functions, flexibility and versatile communication features are required. All fail-safe S7-1500 controllers provide safety functions and allow easy connection of PROFIsafe devices via PROFIBUS and PROFINET. The process signals (including safe signals) can be accessed either centrally via signal modules or remotely via PROFINET.

The benefits at a glance

- **Onboard status display:**
Diagnostic messages available without a programming device (PG)
- **Modular, scalable station configuration:**
Requirement-based expansion with fail-safe SIMATIC S7-1500 / ET 200MP modules
- **Maximum protection against manipulation:**
Additional password protection for the fail-safe program

Find out more: usa.siemens.com/plc

SIMATIC ET 200 – the ideal I/O, even for fail-safe tasks



With SIMATIC ET 200, a wide variety of I/O systems are available for standard and fail-safe automation – for solutions in the control cabinet or without a control cabinet directly at the machine. The modular design allows you to easily scale the ET 200 systems in small steps, for example, to expand with fail-safe I/O modules. The products can be consistently integrated into the automation system using PROFIBUS and/or PROFINET via PROFIsafe. All fail-safe I/O modules can be used in applications up to PL e/SIL 3.

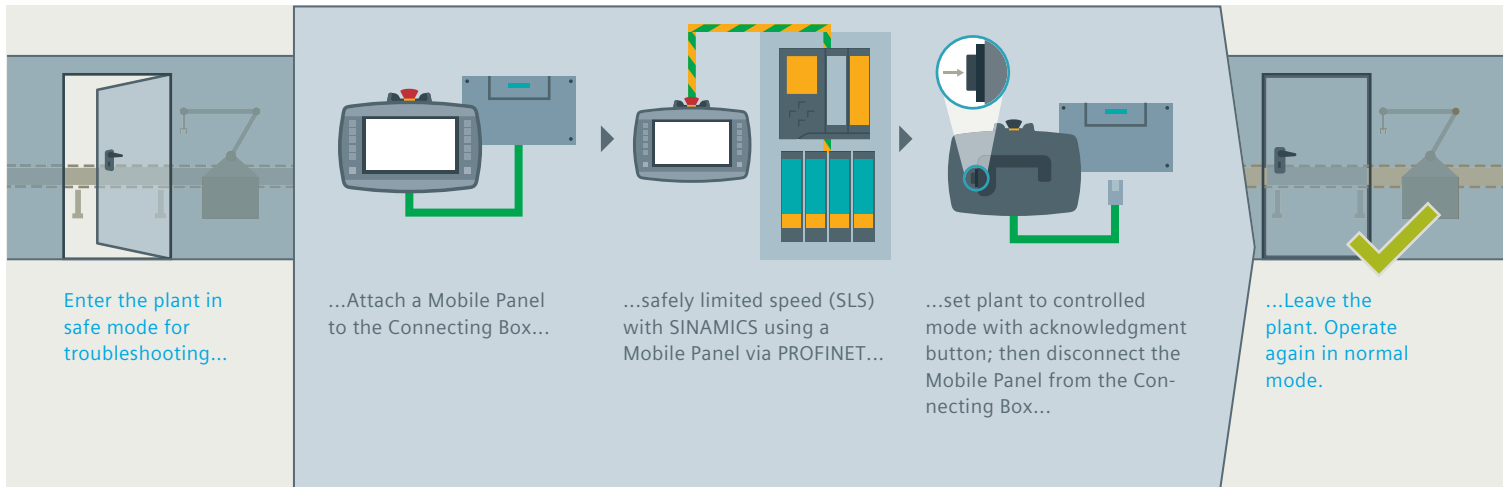
The benefits at a glance

- **No separate I/O stations required for safety:**
Fail-safe and standard modules can be combined in an I/O station
- **Fast troubleshooting with channel-specific diagnostics:**
The modules test autonomously for wire break, short circuit and cross circuit
- **Targeted response to errors:**
When an error occurs, only the affected channel is usually passivated, not the entire module
- **Reduced CPU workload:**
Fail-safe digital input modules have 2-by-2 evaluation on-board

- ① **SIMATIC S7-1500 and ET 200MP fail-safe signal modules**
Multichannel, fail-safe digital S7-1500 modules for use in the cabinet next to the controller or remotely in an ET 200MP station.
- ② **SIMATIC ET 200SP fail-safe signal modules**
In addition to fail-safe digital I/O modules, the I/O system for the compact cabinet includes a fail-safe power module for easy, block-by-block shutdown of potential groups, and a fail-safe AS-i master for reading and processing of safe AS-i signals.
- ③ **SIMATIC ET 200SP CPU**
In addition to the fail-safe I/O modules, the ET 200SP portfolio also includes fail-safe controllers
- ④ **SIMATIC ET 200SP Open Controller**
The fail-safe version of the ET 200SP Open Controller enables PC-level applications and the direct connection of an HMI for visualization.
- ⑤ **Fail-safe SIMATIC ET 200pro signal modules**
ET 200pro in degree of protection IP67 is designed for use directly on the machine. The I/O system offers numerous expansion options for the safety engineering: In addition to the F-DI and F-DI/F-DQ modules, the portfolio includes a module for the safe shutdown of a potential group and fail-safe motor starters and frequency converters.

Find out more: usa.siemens.com/et200

DRIVES and SIMATIC HMI – from fail-safe response to operator control and monitoring



SINAMICS converters with integrated safety

Integrated safety functions enable significantly more efficient safety concepts. This allows the machine to be active, while safely monitored. The resulting shorter downtimes increase productivity. SINAMICS converters are characterized by integrated safety functions, which they provide to the user as possible responses to safety-related events. All safety functions satisfy the requirements defined in Section 5-2 of the international standard IEC 61800 for variable-speed drives. The SBT (Safe Brake Test) and SP (Safe Position) functions go beyond the scope of IEC 61800-5-2. The safety functions can be flexibly integrated into the overall application.

The benefits at a glance

- **Reduced hardware requirements reduce costs:**
No additional plug-in boards required for safety functions
- **Simplified setup:**
Sensorless safety functions, such as SLS (Safely Limited Speed), require no external encoder. This results in cost and time savings
- **Flexible communication:**
Connection via PROFINET or PROFIBUS via PROFIsafe enables variable use of the integrated safety functions

Find out more: [siemens.com/drives](https://www.siemens.com/drives)

Power and safety in your hands

SIMATIC HMI Mobile Panels with connection to PROFINET increase flexibility and convenience for the user by transferring the features and performance of the SIMATIC HMI Comfort Panels to mobile operator panels. Even complex process and plant images are displayed clearly and in detail on the brilliant widescreen display. Engineering is efficient in the TIA Portal with SIMATIC WinCC. It features an innovative style editor which allows you to easily customize the user interface for your own corporate design.

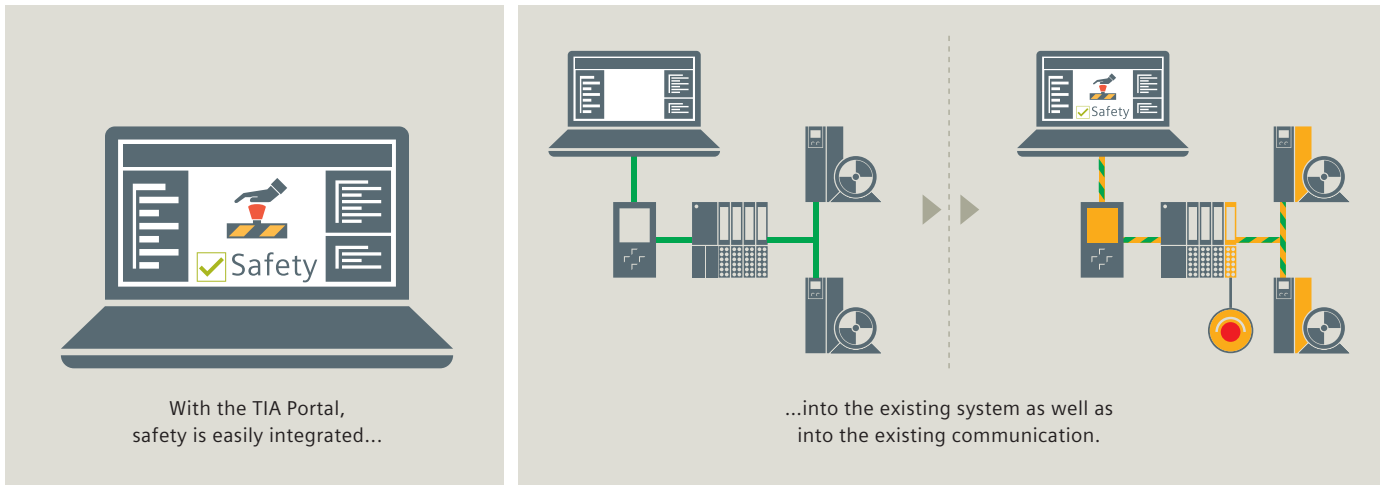
For custom integration of HMI devices in the safety architecture, SIMATIC HMI Mobile Panels provide a built-in emergency stop button and a three-stage acknowledgment button. The connection can be wired via connection boxes or wireless.

The benefits at a glance

- **Flexible and convenient safe operator control:**
All the required operations can be executed on-site – even wirelessly if necessary, and safety is always included.
- **Clearly recognizable state of the emergency stop function:**
Emergency stop lights up and always clearly indicates whether the function is available at the moment. Additional organizational measures are unnecessary

Find out more: usa.siemens.com/hmi

Efficient engineering in the TIA Portal – standard and safety technology in a single system



Central engineering environment

The world of automation is changing. Processes are becoming faster, tasks more complex, requirements more digital. Only a comprehensive approach can lead to lasting competitiveness. Today, the TIA Portal is more than an engineering framework.

The digital workflow with the TIA Portal means open, virtual and interconnected work with flexible cloud-based solutions, scalable simulations with a “Digital Twin” and open interfaces for greater connectivity.

The TIA Portal makes the integration of safety technology into your automation solution easier and more efficient than ever before. All configuration and programming tools required for the realization of a fail-safe program are integrated into the SIMATIC STEP 7 user interface and use a common project structure.

Having a common user interface for both exclusively safety-related tasks as well as standard and safety-related tasks with the fail-safe controller substantially shortens training periods.

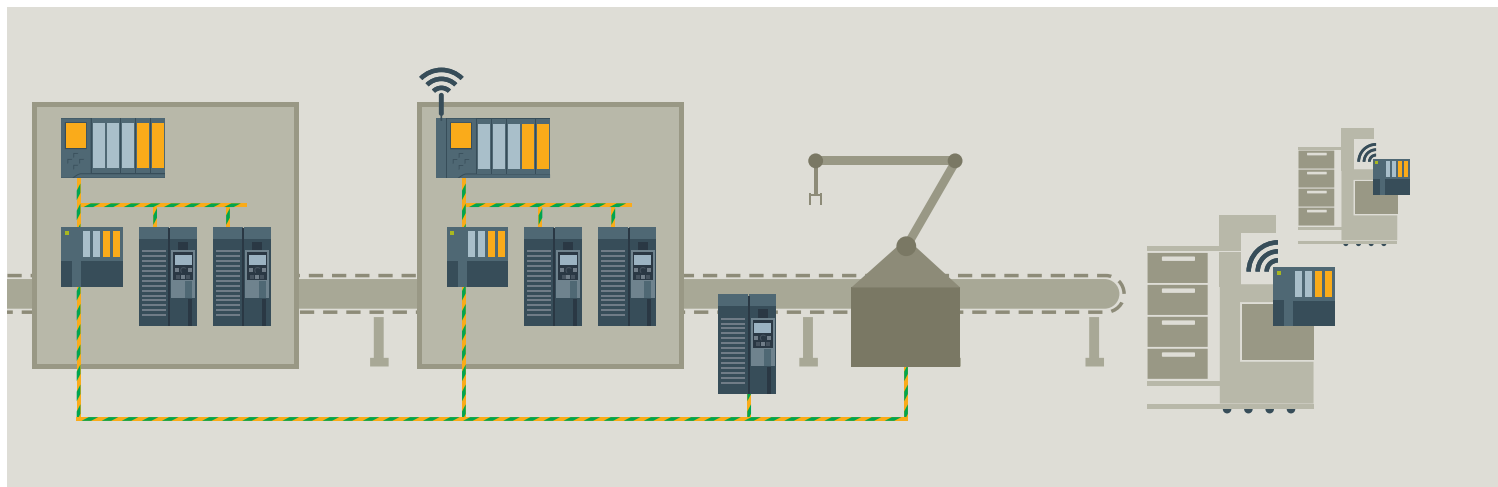
The SIMATIC STEP 7 Safety Advanced or SIMATIC STEP 7 Safety Basic add-on packages can be used to create safety programs in fail-safe LAD and FBD. Tests are possible with PLCSIM even without existing hardware.

The benefits at a glance

- **Easy to get started:**
 - A common user interface for all engineering tasks
 - When you insert an F-CPU, the program structure for the safety program is created automatically
 - Easy implementation of functions such as muting or safety door monitoring with a library of pre-written communication blocks approved by the German Technical Inspectorate (TÜV).
- **Implementation of distributed structures:**
Safe communication between remote controllers can be conveniently implemented with blocks
- **Faster commissioning:**
PLCSIM is sufficient to test the programs, including the safety program. Additional control hardware is not required for this

Find out more: usa.siemens.com/tia-portal

PROFIsafe and ASIsafe – communicating safely



PROFINET and PROFIsafe

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

Using PROFINET and PROFIsafe not only reduces the amount of cabling compared to conventional wiring with safety relays – all types of safety engineering solutions can also be configured flexibly. The type or number of safety functions that can be used in a SINAMICS converter, for example, can be adapted without having to change the wiring.

Fieldbus technology provides more accurate and specific diagnostic information compared to traditional wiring technology. A wide-ranging product portfolio is available both for operation in the control cabinet as well as remotely at the machine.

Furthermore, PROFINET and PROFIsafe enable machines and plant components to safely exchange data with each other – even wirelessly.

The benefits at a glance

- **Efficient and economical:**

Everything runs through one cable. A second structure is not needed

- **Short downtimes:**

Convenient way to send specific diagnostic information

- **Flexible infrastructure:**

Even more possibilities arise through the use of secure wireless communication in combination with I/O stations or other fail-safe controllers

[Find out more: siemens.com/profinet](http://siemens.com/profinet)

ASIsafe

AS-Interface (AS-i) is an effective, high-performance bus, which easily, safely and consistently connects all sensors and actuators from the lowest field level to the higher-level controller. Safety-related components, such as emergency stop or position switches, can be connected directly to the AS-Interface network.

The benefits at a glance

- **Easy integration into PROFIsafe solutions:**

The ET 200SP AS-i master can be easily expanded to include ASIsafe by plugging in an AS-i safety module – without any additional wiring

- **Simpler configuration:**

Modular expansion – from small safety islands to comprehensive Safety Integrated architectures

[Find out more: siemens.com/as-interface](http://siemens.com/as-interface)



“The new technologies of Siemens helped us to achieve significant improvements.”

Frank Loria, Vice President
of Harry Major Machine, Michigan, USA



Harry Major Machine relies on SIMATIC Controller with Safety Integrated for its high-performance and cost-efficient robotic gantry system.

Maximum integration for optimal safety

The increasing demands on the manufacturing industry have also increased the challenges for machine builders. They have to ensure that the industry obtains flexible, highly available and economic production lines. With support from Siemens, Harry Major Machine has developed a new solution for robotic gantry system that offers the same high performance as previous systems, but even more options. They have also helped to reduce the total cost of ownership.

To achieve this, a version based on the Advanced Controller SIMATIC S7-1500 with Safety Integrated was realized instead of the previously used CNC-based technologies.

Challenges

The disadvantages of CNC-based systems are high costs for purchasing and for spare parts as well as increased costs for engineering and maintenance. Given the increasing competitive pressure and changes in the industry, Harry Major Machine sought an alternative that offered similar high performance but was more economical.

Regardless of the sector, the new hardware and software solution should not only offer high performance, but also be user-friendly, low-maintenance and resource-saving. Fast and simple engineering was as important as innovative design with integrated diagnostic and safety functions. Customers should be able to profit from significant cost savings over the short and long term.

Siemens solution

The development engineers of Harry Major Machine opted for a solution from a single source: All important Siemens products come from the same family and are equipped with integrated safety functions. The fail-safe control system allows a high degree of integration. The PLC ensures safe control of the robotic gantry system and communicates seamlessly with drives and motors. Integrated diagnostic functions enable efficient fault analysis and troubleshooting and shorten the commissioning and downtimes.

In addition to SIMATIC HMI TP 1500 Comfort Panel, a SIMATIC HMI Mobile Panel 277 is available for operation. With Safety Integrated, safety functions can be used at any location in the plant to trigger an emergency stop, for example, in critical situations.



With the integration of all components in the TIA Portal, new systems can be configured very quickly – including all the safety and motion control functions.

The simple wiring and progressive tools enable Harry Major Machine to efficiently build a new robotic gantry system and quickly put into operation – an advantage for mechanical engineers and manufacturing businesses alike.

Result

The innovative robotic gantry system with Siemens technology is less expensive and more productive than comparable solutions based on CNC with more compact dimensions and a significantly smaller footprint.

Extensive safety and diagnostic functions allow quick troubleshooting, which reduces maintenance costs and downtime.

Success story Harry Major Machine

Harry Major Machine is a plant builder from Michigan, USA, with a branch in England and a large network of partners. The company produces PLC-based gantry systems for industrial material handling systems, parts washing equipment, assembly and special machines.

Challenge

- Less expensive alternative to robotic gantry system based on CNC
- Greater flexibility than previous solutions
- Compatibility to robotic technology of Harry Major Machine, for example, in automation systems and parts washing equipment

Siemens solution

- SIMATIC S7-1500 with Safety Integrated and Motion Control
- SINAMICS S120 drive systems
- SIMATIC HMI TP1500 Comfort Panel and SIMATIC Mobile Panel 277
- Engineering Framework TIA Portal

Result

- 25 percent higher plant availability
- 35 percent improved fault recovery times
- Productivity maximized, downtime and maintenance costs reduced
- Control of multiple machines possible
- Small footprint

You can find all the references at:
[siemens.com/reference-harry-major-machine](https://www.siemens.com/reference-harry-major-machine)

Central processing units

SIMATIC S7-1200 Basic Controller



	Article number
CPU 1212FC, DC/DC/DC	6ES7212-1AF40-0XB0
CPU 1212FC, DC/DC/Rly	6ES7212-1HF40-0XB0
CPU 1214FC, DC/DC/DC	6ES7214-1AF40-0XB0*
CPU 1214FC, DC/DC/Rly	6ES7214-1HF40-0XB0*
CPU 1215FC, DC/DC/DC	6ES7215-1AF40-0XB0
CPU 1215FC, DC/DC/Rly	6ES7215-1HF40-0XB0

SIMATIC S7-1500 Advanced Controller



	Article number
CPU 1511F-1 PN	6ES7511-1FK01-0AB0*
CPU 1513F-1 PN	6ES7513-1FL01-0AB0*
CPU 1515F-2 PN	6ES7515-2FM01-0AB0
CPU 1516F-3 PN/DP	6ES7516-3FN01-0AB0*
CPU 1517F-3 PN/DP	6ES7517-3FP00-0AB0
CPU 1518F-4 PN/DP	6ES7518-4FP00-0AB0*
CPU 1517T F-3 PN/DP	6ES7517-3UP00-0AB0

SIMATIC ET 200 Distributed Controller



	Article number
CPU 1510SP F-1 PN	6ES7510-1SJ01-0AB0*
CPU 1512SP F-1 PN	6ES7512-1SK01-0AB0*
CPU 1516pro F-2 PN	6ES7516-2GN00-0AB0
CPU 1515SP PC F	6ES7677-2FAxx-0xx0

SIMATIC Software Controller



	Article number
CPU 1507S F V2.0, delivery on DVD	6ES7672-7FC01-0YA0
CPU 1507S F V2.0, delivery via download	6ES7672-7FC01-0YG0

Signal modules

SIMATIC S7-1200 fail-safe signal modules



	Article number
SM 1226, F-DI 16X 24VDC	6ES7226-6BA32 0XB0*
SM 1226, F-DQ 4X 24VDC	6ES7226-6DA32 0XB0*
SM 1226, F-DQ 2X RELAY	6ES7226-6RA32 0XB0*

SIMATIC S7-1500 / ET 200MP fail-safe signal modules



	Article number
ET 200MP, F-DI 16X 24VDC	6ES7526-1BH00-0AB0
ET 200MP, F-DQ 8X 24VDC 2A PPM	6ES7526-2BF00-0AB0

SIMATIC S7-300 / ET 200M fail-safe signal modules



	Article number
SM 326, 8 DE; DC 24V, NAMUR	6ES7326-1RF01-0AB0*
SM 326, 16 F-DI 24 X 24VDC	6ES7326-1BK02-0AB0*
SM 326, F-DO 10 X 24VDC/2A PP	6ES7326-2BF10-0AB0*
SM 326, F-DO 8 X 24VDC/2A PM	6ES7326-2BF41-0AB0*
SM 336, 6 AI; 15 BIT; Hart	6ES7336-4GE00-0AB0*

* These products are also available in a SIPLUS extreme version. For more information, see: siemens.com/siplus-extreme

** Find out more about the SIDOOR automatic door management system: siemens.com/sidoor

Signal modules

SIMATIC ET 200SP fail-safe signal modules



	Article number
EL-MOD., 8 F-DI, 24VDC	6ES7136-6BA00-0CA0*
EL-MOD., 4 F-DQ, 24VDC/2A	6ES7136-6DB00-0CA0*
POWERMOD. F-PM-E PPM, 24VDC	6ES7136-6PA00-0BC0*
F-RQ 1X24VDC/24...230VAC/5A ST	6ES7136-6RA00-0BF0
F-CM AS-I SAFETY ST	3RK7136-6SC00-0BC1

SIMATIC ET 200PRO fail-safe signal modules



	Article number
EM148 8/16 F-DI 24VDC PROFISAFE	6ES7148-4FA00-0AB0
EM148 4/8 F-DI/4 F-DO 24VDC/2A PROFISAFE	6ES7148-4FC00-0AB0
EM148 F-SWITCH PROFISAFE	6ES7148-4FS00-0AB0

Operator control and monitoring

SIMATIC Mobile Panel



	Article number
KTP400F Mobile	6AV2125-2DB23-0AX0
KTP700F Mobile	6AV2125-2GB23-0AX0
KTP900F Mobile	6AV2125-2JB23-0AX0

Automatic door management system

SIDOOR** with integrated safety functions



	Article number
SIDOOR ATD401W Relay	6FB1141-1AT11-3WE2
SIDOOR ATD410W with USS	6FB1141-4AT10-3WE2
SIDOOR ATD420W with PROFIBUS	6FB1141-2AT10-3WE2
SIDOOR ATD430W with PROFINET	6FB1141-3AT10-3WE2

Totally Integrated Automation Portal (TIA Portal)

SIMATIC STEP 7 Safety Advanced



	Article number	DVD	Download
STEP 7 Safety Advanced V14	6ES7833-1FA14	-0YA5	-0YH5
STEP 7 Safety Advanced V14 TRIAL	6ES7833-1FA14	-0YA8	
Upgrade STEP 7 Safety Advanced V11...V13 -> V14	6ES7833-1FA14	-0YE5	-0YK5
Upgrade Distributed Safety V5.4 SP5 -> STEP 7 Safety Advanced V14	6ES7833-1FA14	-0YF5	-0YY5
UCL STEP 7 Safety Advanced V14	6ES7833-1FA14	-2YA0	
UCL Upgrade Distributed Safety V5.4 -> STEP 7 Safety Advanced V14 UCL	6ES7833-1FA14	-2YE0	
SUS STEP 7 Safety Advanced – Standard	6ES7833-1FC00	-0YX2	
SUS STEP 7 Safety Advanced – Compact	6ES7833-1FC00	-0YM2	
SUS STEP 7 Safety Advanced – Download	6ES7833-1FC00		-0YY0

SIMATIC STEP 7 Safety Basic

	Article number	DVD	Download
STEP 7 Safety Basic V14	6ES7833-1FB14	-0YA5	-0YH5
Upgrade STEP 7 Safety Basic V13 -> V14	6ES7833-1FB14	-0YE5	-0YK5
STEP 7 Safety Basic V14 -> STEP 7 Safety Advanced V14 Powerpack	6ES7833-1FA14	-0YC5	-0YJ5
SUS STEP 7 Safety Basic – Standard	6ES7833-1FD00	-0YX2	
SUS STEP 7 Safety Basic – Compact	6ES7833-1FD00	-0YM2	
SUS STEP 7 Safety Basic – Download	6ES7833-1FD00		-0YN2

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Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines, and networks. In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement (and continuously maintain) a comprehensive, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines, and networks. Systems, machines and components should only be connected to the enterprise network or the Internet if and only to the extent necessary and with appropriate protective measures (e.g. use of firewalls and network segmentation) in place. In addition, you should pay attention to Siemens' recommendations on appropriate protective measures. You can find more information about Industrial Security by visiting

<http://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens expressly recommends that updates are carried out as soon as they become available – and that only the current product version is always used. The use of obsolete versions or versions that are no longer supported can increase the risk of cyber threats.

To ensure that you are always informed about product updates, subscribe to the Siemens Industrial Security RSS feed at

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Opt for integrated added value:

- Maximum integration through comprehensive, consistent portfolio
- Maximum efficiency through uniform engineering
- Maximum consistency through standardized diagnostic functions

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