Proven returns for tank farms and terminals

Backed by a trusted partner for maximum safety and efficiency
Driving your tank farm storage business forward

Safely handling volatile liquids, accurately tracking inventory turnover and yield, reliably monitoring product quality and emissions, preventing spillages – running a successful tank storage business comes with many challenges. Process efficiency, flexibility, transparency, safety and availability have become the key drivers for profitability in the industry. Backed by a partner with excellent solutions, comprehensive process knowledge and industry expertise, you can address them effectively.
EFFICIENCY
Achieving maximum tank storage efficiency and flexibility while also saving costs requires integrated automation, instrumentation, control and energy management solutions covering everything from the field to the production and management levels. Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) make it happen.

TRANSPARENCY
Designing, operating and maintaining tank storage processes is a team effort involving various disciplines. Advanced digital solutions like SITAS TMS, SITAS IT, SIMATIC PCS 7, SIMIT Simulation, XHQ Operations Intelligence and COMOS Plant Management let you create a common data platform for integrated operations management – an important element of digitalization.

SAFETY
Operations safety at tank storage facilities is key for preventing human injury, equipment damage, loss of products and unauthorized access, also for fulfilling various health, safety and environmental (HSE) requirements. We offer a comprehensive range of effective safety and security solutions for every aspect of your operation.

AVAILABILITY
Given the competitive nature of markets today, real-time analysis information on energy supply, asset utilization and performance have never been more important for making good business decisions. With our energy management, plant data and lifecycle services, we can provide any kind of support you need.
Safety and security are key

Safety is of central importance for tank installations – and therefore a key lever for profitability. With this in mind, we created Safety Integrated, a unique process automation concept for the safe, efficient operation of all types of tank operations.

Safety Integrated
Our solutions portfolio for comprehensive tank installation protection, better known as Safety Integrated, fulfills all relevant health, safety, environmental and industry standards as well as legal requirements. It offers safe, facility-wide operation and automation in combination with highly reliable process instrumentation and 24/7 services for every phase of the lifecycle. Modular and flexible in design, Safety Integrated allows for various degrees of integration and implementation to suit very specific needs for executing standard control and safety functions, including interfaced, integrated and common. The fault-tolerant controller, for example, can be operated either in a single channel or redundant configuration (up to SIL 3).

Safe fieldbus communication
What’s the best way to safely connect field devices? We recommend using the proven fieldbus technology of PROFIBUS DP and the intrinsically safe remote I/Os of SIMATIC ET 200iSP for connecting safety-related I/O modules and devices. Safety-related sensors such as the pressure transmitter SITRANS P DS III can be connected via PROFIBUS PA or PROFIsafe with a SIL 2 rating. Safety Integrated fieldbus technology with PROFIsafe supports certified communication between controllers, distributed safety I/O devices and safety-related process instruments.

When the drives are combined with motor starters featuring the SIMOCODE safety motor management system or with SINAMICS frequency converters, a facility-wide safety loop can be implemented. With our Active Field Distributor intrinsic Safety AFDiS, up to 6 intrinsically safe PROFIBUS PA or FOUNDATION Fieldbus H1 field devices can be deployed in a line or ring fieldbus segment (Ex zone 0).
Easy configuration of safety applications
The likelihood of a safety-related event can be greatly reduced with the appropriate risk analysis and safety technologies, as well as by implementing a safety instrumented system (SIS). Our system comprises safety sensors, controllers as well as a cause-and-effect engineering matrix. This SIMATIC Safety Matrix is ideally suited for processes in which defined events demand specific safety responses. What’s more, safety logic configuration is very easy, convenient and fast.

Valve checks during operation
Emergency shutdown (ESD) valves used for safety instrumented functions (SIF) must work properly should a safety event occur. Our SIPART PS2 positioner features intelligent, fail-safe functions that provide comprehensive diagnostics data on valve performance. In addition, the partial stroke test conducts periodic function and safety checks by partially opening and closing the valve for a short time during operation. This is a very user-friendly solution that extends the maintenance interval for a constant SIL level, saving time and costs while simultaneously increasing asset availability.

Reliable cyber security
Connecting plants and systems via the Ethernet offers many benefits, but also leaves production processes vulnerable to cyber attacks. We offer a wide range of integrated digital solutions and services for first-rate IT network and system security. Our Defense-in-Depth approach combines security mechanisms with automation know-how to provide reliable, wide-ranging protection.

Extended process and site safety solutions
- Applications such as risk analyses and HAZOP studies
- Ex zone definitions and associated safety procedures
- Fire and gas detection
- Fire fighting
- Overflow protection
- Overfill protection to API 2350
- Vapor recovery
- Cathodic protection
- Earthing systems
- Environmental protection
- Optimization of pipeline hydraulic behavior
- Automated, wide-area video surveillance
SITAS TMS / SITAS IT – Modern tank automation and management

State-of-the-art tank automation and management means a lot more than simply monitoring and controlling liquid flows, levels, pumping performance, energy consumption or motor data. Efficiently managing the diversity of fuels, lubricants and chemical products handled today calls for intelligent solutions that allow you to quickly and flexibly adapt to changing market demands and that ensure that product quality remains high – solutions like SITAS TMS and SITAS IT.

One system for all types of installations
The SITAS TMS terminal management system is an excellent choice for small, medium and large-sized facilities alike. It consistently manages all processes according to ISA-95 level 3 standards and provides comprehensive data integration across all levels – from the field device to the enterprise resource planning (ERP).

Reacting in real time
SITAS TMS features extensive administrative functions that allow for quick response – virtually in real time. It supports optimum data transparency and accessibility at the execution level. What’s more, SITAS TMS vividly displays tank terminal operations as graphical workflows and, at the same time, effectively synchronizes, coordinates and optimizes processes throughout the entire operation.

Whether as a stand-alone system, as part of an existing infrastructure, or as a core element of an end-to-end tank farm management solution complete with skids, instrumentation and automation, SITAS TMS creates the basis for outstanding product storage and cost-efficient dispatch. It supports seamless processes and optimal data flow at all levels of the operation.

Data clarity with SITAS IT
SITAS IT complements our terminal management solutions by intelligently compiling and processing large amounts of data into meaningful reports, ensuring optimum data transparency and accessibility for the execution level. It provides an integrated manufacturing execution system (MES) with customized functionality for tank farms and terminals. What’s more, SITAS IT is based on the SIMATIC IT framework and represents therefore the optimal solution for plants with an extensive demand for complex IT applications. Combined with our automation system, you receive an integrated system architecture and centralized IT solution with powerful functions.
Maximizing operations performance
With its modular design, open software architecture and compatibility with third-party vendor systems, SITAS TMS achieves a high level of process integration while also ensuring the safe and traceable management of all relevant master data. Its tank automation module incorporates comprehensive inline and batch blending control features to support on-the-fly production of fuels, lubricants and chemical products. Further benefits include flexible formulas (both statutory and individual) that take into account raw material quantities, qualities and expenditures, enabling in overall cost savings.

Moreover, product quantity and quality can be documented and adjusted online to ensure exact compliance with standardized product specifications.

Reliable loading and unloading
Product movement is crucial for the profitability of tank storage operations. We offer mechanical, electrical and automation solutions for all types of loading and unloading infrastructures, including railcar gallery, on-spot railcar, truck, top and bottom, barge and marine tankers. They can be seamlessly integrated with SITAS TMS and existing ERP systems.

Electrical equipment suitable for ex zones, gas detection and fire fighting solutions as well as reliable systems for overflow prevention, leakage detection and vapor recovery ensure that safety standards for loading/unloading bays and operators are fully met. Even remote operation is supported, without compromising safety.

The path to better route control
Efficiently transferring fluid or gaseous media through pipeline networks from a defined source to a defined destination requires highly sophisticated algorithms. SIMATIC Route Control offers fully and semiautomated media routing for pipeline networks of any size and complexity. Operators can choose from a variety of transfer paths.
Clever inventory and sales order management

SITAS TMS offers a variety of excellent software tools for managing stock inventories, orders and reports – efficiently, flexibly, precisely and completely automatically.

Order route optimization
The order execution module translates sales order schedules into operational orders. Chronological functionalities for pre-registration, order preparation and order completion allow you to optimize the entire execution route of the order. The module also features slot, contract handling, exact billing and regulatory compliance functions. The program automatically synchronizes the order status and transaction with the business system.

Flexible inventory management – even for multiple owners
The stock management module reconciles ordered stock with physical stock, in addition to handling various accounting functions. It allows for both tank-based and/or product owner-based stock management (for local stock and stock in transition), and also factors in commitment rules for commingled stock.

Easy equipment management
Operations equipment modules (for reception, storage, handling and delivery) support smooth automatic loading and unloading processes via truck, railcar, ship or pipeline, and also for internal processes such as on-site product transfers, tank circulation or pre-blending. As a result, waiting times are greatly minimized and manual operations errors avoided.

Improved operations control and visibility for terminals
The rule-based truck logistics feature of SITAS TMS helps to improve product flow control, avoid bottlenecks and provide more overall safety. Dynamic and flexible locators enable operations tracking for better terminal visibility and historical order tracing.

Even remotely operated terminals can be managed with SITAS TMS. The result? Efficient control of several stations from a central control room through centralized data management (both real-time and historical).

Online terminal monitoring and reporting
SITAS TMS reduces operations complexity by providing online functions for terminal monitoring and flexible time-based reporting per customer, product owner, product and/or tank. It also offers loading result overviews, turnaround time analyses, efficiency and performance statistics (KPIs) based on the SAP BusinessObjects reporting tool. In addition to improving overall material handling, the automatic archiving and process reporting functions also provide a high level of operations transparency.
SITAS TMS / SITAS IT benefits overview

- One control & monitoring system for all types of installations, loading and unloading infrastructures
- A high level of process integration according to ISA 95
- Safe processing of large amounts of real-time and historical data
- Automatic management of stock inventories, orders and reports
- Equipment modules for reception, storage, handling and delivery
- Comprehensive inline and batch blending control features as well as flexible online formulas
- Rule-based truck logistics for operational control and better terminal visibility
Improved performance with intelligent field instruments

Up-to-date information and accurate measurements play an extremely important role in the tank storage business. The products and solutions of our comprehensive process instrumentation, analytics and weighing portfolio deliver outstanding precision and transparency for measuring fill levels, flow, pressure and temperature, monitoring gas emissions, valve functionality and weighing loads – and much, much more.

Field instrumentation benefits overview
- Highly reliable product monitoring and process transparency
- Increased spill and overfill protection
- Accurate interface measurements
- Precise custody transfers
- Sensitive tank pressure and oxygen concentration monitoring
- Wireless communication with all instruments
Reliable tank level monitoring
We offer a wide variety of advanced level monitoring technologies, from simple to highly advanced, including radar solutions for precisely measuring the tank levels of all types of products—whether liquids, slurries, solids or low dielectric media (for example, LPGs). Our portfolio comprises solutions for all types of storage tank monitoring applications, also vertical, horizontal, cryogenic and underground tanks, including tanks containing a stilling well.

Effective spill and overfill prevention
Spills and overfilling to API 2350 can lead to major safety issues, loss of material and production, not to mention regulatory penalties. Instruments capable of detecting levels and terminating flow prior to reaching the critical high emergency response level are essential for every tank storage operation. Point level switches are one of the best available solutions for providing SIL 2/3 protection.

Best-in-class interface detection
Reliable interface detection in tanks calls for highly precise point and continuous level measurements. Our capacitance instruments SITRANS and Pointek CLS as well as our guided wave radar SITRANS LG series do just that. Whether to measure liquids, solids or interface, these devices deliver highly precise and reliable measurements every time—without interference from vapors, product buildup, dust or condensation. They are also highly resistant against toxic and aggressive materials. For interface detection in pipes, the clamp-on ultrasonic SITRANS FUH1010 flowmeter is an excellent choice. It calculates multiple variables, including sonic velocity and rate of change, and is capable of pressure and temperature compensation for reliable measurement of gasoline, crude oil and multiproduct interfaces. It is also ideally suited for other applications such as product identification, auto batching control, or for entrained water, gas and scraper (“pig”) detection.

Highly precise custody transfer
Fiscal metering and similar transactions at tank terminals and airports, such as pipeline balancing and transmix metering, require a high level of accuracy. We offer flow measurement devices for custody transfer applications at loading and offloading facilities, pipelines and refineries. Our ultrasonic SITRANS FUT1010 spool meter uses WideBeam transit-time technology to deliver highly precise measurements, and also meets the strict OIML R117 and API requirements. High-accuracy measuring performance is also what you can expect from our custody transfer certified SITRANS FC430 Coriolis flowmeter. In addition to quickly responding to flow changes, it provides a high level of immunity against process noise and a high turndown ratio of flow rates. Suitable for liquid as well as gas services, the device is easy to install, commission and maintain.

Intelligent weighing with compression load cells
Rated up to 280 tons, our compression load cells are well suited for a wide variety of applications, for example, high load container or truck scales. Almost all of them are certified for accuracy class C3 according to OIML R60. Our SIWAREX PLC-based weighing modules feature a range of weighing processors for force measurements, hopper, batching, differential batching, bagging and belt scales as well as solids flowmeters. The weighing terminals can be updated with a simple software upgrade for continuous process optimization and added investment security.
Accuracy is everything

Successful tank farm and terminal facilities are high-accuracy operations. Precise knowledge of product inventory and transfer is of immense importance.

Improved process transparency with low engineering overhead
Thanks to their on-board maintenance and diagnostic functions, SITRANS field devices are able to translate data and alerts into timely and effective action. Many of their features cannot be directly integrated into an automation solution in accordance with established industry standards. Our SITRANS Library engineering and operation tool provides device-specific faceplates enabling easy operation and fast troubleshooting. The benefit for operators is a simpler and safer automation solution with less engineering overhead. The SITRANS Library is also designed to protect assets such as valves. The SIPART PS2 faceplate, for example, provides operators with information on:

- Valve opening and closing
- Switching from automatic to manual valve control
- Limit value settings
- Visualization of binary inputs and outputs
- Trend curves and alarm management

SIPART PS2 positioner also enables preventive and predictive maintenance and, with the partial stroke test, extends test intervals while reducing maintenance costs and downtimes.

Highly sensitive tank pressure control
Our state-of-the-art measurement instruments include sensors that immediately detect overpressure in tanks. As integrated solutions, they not only provide reliable readings and warnings. They also initiate the automatic control of the pressure, saving you valuable response time in minimizing risks. High-traffic loading stations such as those at airports require strict adherence to timetables. Thanks to our parallel pressure system, refueling schedules go smoothly without creating delays and additional costs.

Keeping a close eye on emissions
To protect against potential explosions, oxygen concentrations require continuous monitoring. Should measured values indicate the presence of critical gas compositions, preventive measures such as nitrogen purge, alarm activation or emergency shut-down must be initiated immediately. Our LDS6 in-situ continuous gas analyzer performs reliably using laser spectroscopy. It features an integrated reference cell and provides lifetime stability. What’s more, it never has to be recalibrated.

From simple monitoring to complete transparency
Our instrumentation portfolio has an appropriate solution for nearly any task, enabling fieldbus communication with HART/WirelessHART, PROFIBUS and FOUNDATION Fieldbus. The devices support advanced diagnostics and asset management. Devices for certain applications not included within our portfolio can easily be integrated from 3rd party vendors. Our SITRANS RD remote displays and monitoring solutions provide access to field instruments – anytime and anywhere, via the Web. The SIMATIC PDM process device manager is a manufacturer-independent software tool enabling the efficient operation, configuration, parameterization, maintenance and diagnosis of thousands of field instruments not only from Siemens, but also from many other manufacturers. It also gives you the option of viewing everything from one individual process variable to the complete diagnostics profile of an instrument. Extensive diagnostics features increase avail-
ability, add reliability and support advanced preventive maintenance for increased uptime.

Cable-free field device communication

Whether for remote measurement, deployment in harsh environments, temporary ad hoc measurements or for expanding and replacing field devices, our WirelessHART transmitters, the SITRANS AW210 (ex i and ex d version) and the battery-powered SITRANS AW200, are an excellent choice for the job. WirelessHART solutions offer tremendous flexibility for adding new measuring points. By intelligently balancing conventional as well as wireless technologies for tank storage solutions, they create the basis for maximum communications performance for many years to come.

Fully integrated wireless networks

The IE/WSN-PA LINK is a gateway for connecting WirelessHART networks to higher-level systems, for example, a process control system or maintenance station. Its integrated network manager allows easy configuration of WirelessHART networks while also optimizing network performance and security settings. In addition, the IE/WSN-PA LINK supports functions like wireless diagnostics, maintenance and process monitoring.

Advantages of wireless engineering and operation

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| Runtime |
| SIMATIC PCS 7 OS/MS |
| Industrial Ethernet |
| MODBUS TPC |

- 3.1 bar
- 2°C
- 5 m³/h
Solutions for special applications

When operating fueling systems, ensuring the safety of people, equipment and the environment is a constant concern. Any accident would immediately impact operations. Our broad range of solutions for special infrastructures such as airports include safety approaches and reliable energy supply.

Protecting assets with access control
Security management is an increasingly complex issue at many tank facilities. To accurately define the appropriate security level and provide the best possible solution, we first conduct a precise risk analysis. This information is then used to create an intelligent system of networked processes and technologies aimed at simplifying even the most complex surveillance tasks.

Wide-area surveillance and protection
Tank storage facilities are high-security installations that must fulfill specifically defined protection requirements, particularly with respect to perimeter surveillance and protection. We have developed various approaches and technologies for detecting and tracking unauthorized movement of people, machinery and watercraft as well as for alerting emergency services, including microwave sensors, laser scanners, infrared sensors and fiber-optical sensor cables.

SveillanceVantage lets you define security zones and virtual barriers. It combines video input from pan/tilt/zoom cameras with other sensory data to display the exact location of incidents on a screen or even a customized 2D or 3D site map. Automatic tracking of objects allows quick decision-making and incident prevention resulting in a safer environment.

Fire safety with clever detection
Optimal fire protection is doubly important in tank areas, where the protection of personnel, assets and the environment is always a critical issue. Our fire detection systems combine technologies with products, networks and in-depth services offering a high level of safety.
Committed to supporting your success

Partnering with Siemens means partnering with an experienced tank storage and terminal solutions provider that is ever committed to supporting your success. Our extensive industry experience and thorough understanding of the business enables us to offer solutions precisely tailored to your needs – solutions that fully meet local and international standards, including API, ASTM, NFPA, joint inspection and group guidelines as well as highest quality standards.

**Smooth project implementation**
Whether as your Main Automation Vendor (MAV), Main Motors and Drives Contractor (MMDC), Main Instrumentation Vendor (MIV) and/or Main Electrical Vendor (MEV), we make certain that your project is completed within the agreed time frame as well as technological and budgetary parameters. We view excellent project management (PM) as an integral part of the quality assurance we offer. What’s more, you benefit from maximum process safety and efficiency, reduced project management expenditures and greater investment security. We can provide support for the design phase, the engineering (device selection, commissioning and integration of essential technologies and 3rd party products) and maintenance – to help ensure optimal operation from day one.

**Value-add services for a lifetime**
Our tailored services aim to maximize the availability, efficiency and safety of your tank operation over the entire lifecycle. These can include everything from financial engineering to feasibility studies, preventive maintenance, performance enhancements as well as service level agreements and trainings.

**Support around the world**
As a global service network with offices in 190 countries, one of our local process engineers and automation experts is never far away to assist you. Our well-organized teams can provide both on-site and remote support, including spare parts and 24-hour after-sales service for all applications. With many end users, engineering companies and original equipment manufacturers, we are committed to building partnerships based on trust, mutual understanding and awareness in achieving outstanding results.
A track record of excellence

For decades, we have demonstrated our exceptional industry expertise at numerous tank storage sites around the world – with tailored solutions, exemplary support and genuine commitment. Here are two examples.

SEA-Tank Terminals
Antwerp, Belgium
Turnkey electrical and instrumentation solution for the construction of new tank terminals.

Scope of supply
- Earthing network
- Medium and low-voltage switchgear
- Full electrical equipment and construction
- Energy distribution
- Basic and detailed engineering
- Process instruments
- SINAMICS frequency converters, pump motors
- SIMATIC PCS 7 process control, including a safety integrated concept for shutdown and emergency systems
- Fire and lightning safety systems

Žitnjak Terminal – Zagreb, Croatia
Reconstruction of a tank farm and truck loading facility.

Scope of supply
- Electrical power installation
- Low-voltage power distribution
- Electrical installation for truck loading facilities, pump stations, diesel generators, valves and other installations
- Complete instrumentation, including installation, parameterization, commissioning and start-up
- Distributed control system (DCS) and terminal management system (TMS)
- Complete hardware and software for automated control and supervision of truck loading facility and tank management system, commissioning and start-up
Power supply and energy-efficient systems

Electrical components and systems such as transformers, medium and low-voltage switchgears (SIVACON) as well as IEC- and NEMA-certified motors (SIMOTICS, CHEMSTAR) form an integral part of our Totally Integrated Power (TIP) portfolio for reliable power supply and increased energy efficiency. We also offer variable-speed drives (SINAMICS) capable of providing energy savings in pumping operations as well as motor management systems designed for improved asset utilization. SIMATIC PCS 7 PowerControl integrates the data from these systems with the automation environment to provide advanced motor and energy management functions as basis for significant savings.

Airport & special infrastructure benefits overview

- Intelligent asset and access security
- Persistent wide-area surveillance
- High-level fire protection
- Efficient power supply, energy management
- Reliable tank to plane fuel tracking

Accurate energy performance data and long-term reports enable precise consumption evaluation and implementation of targeted measures to improve energy efficiency. Our SENTRON PAC monitoring devices record and display all electrical consumption values. The SIMATIC powerrate software package collects, calculates and stores all energy-related data for targeted consumption optimization. Our B.Data energy management system helps to optimize entire workflows by automating all energy supply-related processes.

Smooth airport process management

Dedicated SITAS TMS automation management functions along with integrated safety systems enable smooth and efficient process monitoring and control at airports. Our tailored inventory management solutions reliably trace fuel transports from tank to plane, including loading/unloading control, pipeline receipt, terminal management administration and energy-efficient systems for pumps. There are also functions to document fuel quality. Our into-plane solutions help increase service quality by reducing turnaround times.
SITAS TMS is based on Microsoft .NET® framework, Microsoft SQL® database and SIEMENS SIMATIC PCS 7.

Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.