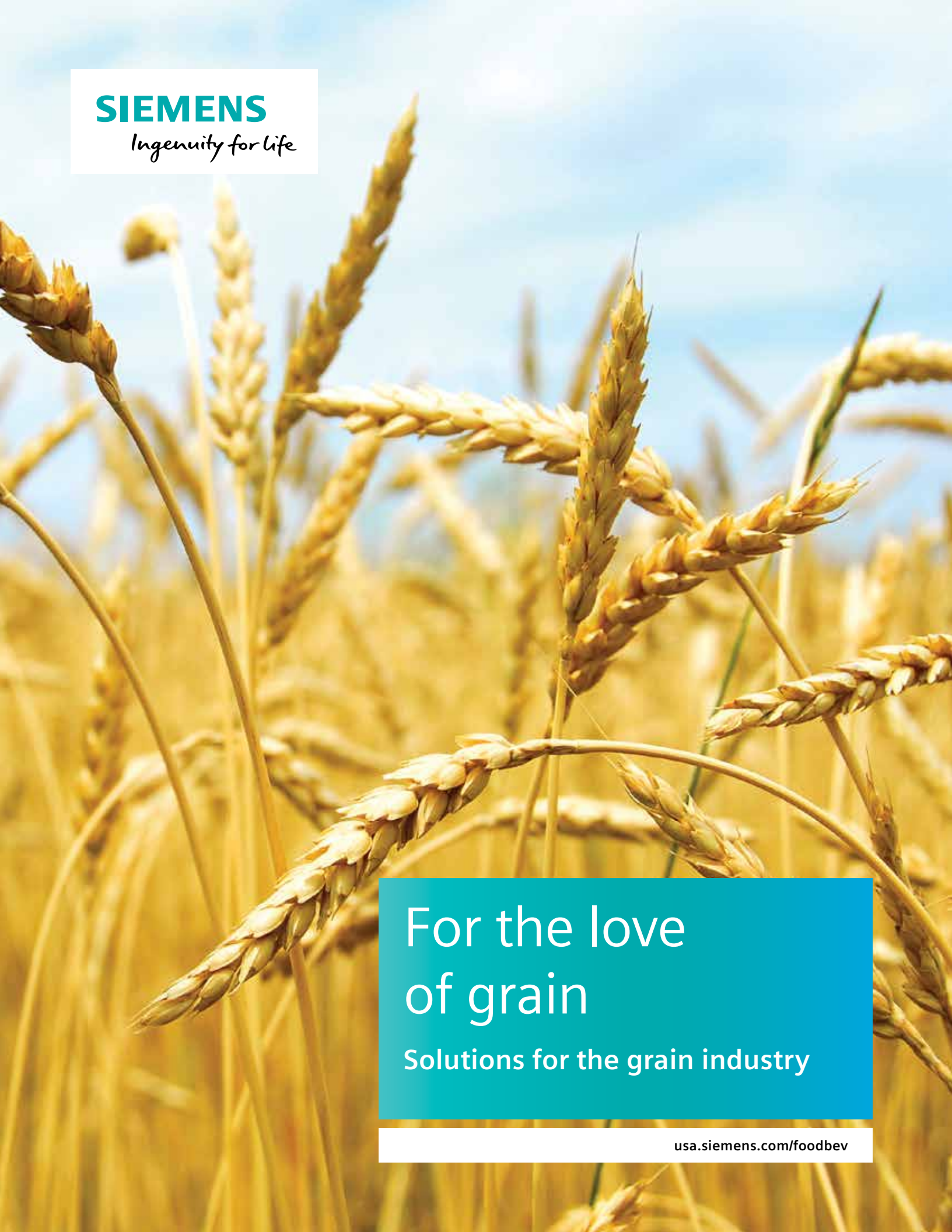
SIEMENS
Ingenuity for life
For the love of grain
Solutions for the grain industry
usa.siemens.com/foodbev

Level

Flow

Process protection

Weighing

Gas analytics

Temperature

Industrial automation & controls

Industrial communication

Power distribution

tiastar motor control centers

Mechanical drives

Motors

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Solutions for a changing landscape

A successful grain merchant during the 1840s is considering expansion in the coming years. Recent years have been fruitful, but there are rumors of a new invention on the market: a grain elevator. Claims are that this elevator is able to unload more than 1,000 bushels each hour! Compare this to current operations where workers carry sacks of grain on their backs from wagons to waiting ships. Our grain merchant has seen firsthand the hazards of this process – everything from suffocating and explosive grain dust to the daily stresses on workers' bodies. Will this new technology be able to increase the merchant's profits as well as make a safer working environment for employees?

Over a century and a half later, mechanized equipment is now an essential part of the grain industry, from planting and growing to harvesting, handling, and milling grain. Your challenges are still the same as those of nineteenth century grain operators, though – how can you improve processes and cut costs while also increasing safety?

There's no doubt about it: production inefficiencies and inventory inaccuracies caused by faulty or outdated technology are holes in your business' pockets. Maximizing profit margins are essential in the grain industry, and you cannot afford waste – whether it is raw materials, machinery, or labor. To expand and maintain your competitive advantage, you need the right tools to ensure that production is sharp and running smoothly.

An even greater concern, however, is the safety of your workers. Why not use a reliable solids level transmitter instead of routinely sending employees to the top of silos? By keeping workers out of hazardous situations altogether, you can immediately reduce the chance of accidents and the consequences to your company.

Safety and profit growth are not incompatible, and Siemens range of process instrumentation and analytical devices delivers solutions to both of these challenges in the grain industry.

When you partner with Siemens, your returns will be:

- A full portfolio of products and solutions for each process step in the value chain
- A single concept for seamless integration of the entire company to master productivity, quality, and supply challenges
- Simplified inventory – fewer different components with highly efficient maintenance
- The assurance of a world-class brand delivering leading-edge automation technology
- People who understand the grain industry's needs and can configure solutions to match your exact operating conditions

Growing trends in the grain industry

Promoting a culture of safety

Working with grain has the potential to be deadly, especially when grain is in motion. Similar to 'quicksand,' moving grain can bury a worker in seconds. The Perdue University Study reported 29 workers had been trapped in grain in 2016, a 21 percent increase from 2015. Sadly, almost half of these entrapments led to fatalities.*

Increasing automation

To prevent deadly occurrences such as these, the grain industry is increasingly taking steps to reduce grain handling and storage hazards. Improving efficiency in grain facilities through automation is becoming a growing industry trend. A concern for safety is one driver behind automating operations, as a reduction in human interactions with grain decreases the occurrence of accidents.

Another reason for the push toward automation is owners are constantly looking to increase production and reduce expenses while still producing a high quality product. Many facilities have moved to complete automation of production, termed Totally Integrated Automation (TIA).

Refining inventory management

Tracking inventory in grain silos is a significant component of a successful grain operation. Managing raw materials and finished products is essential for keeping processes efficient and optimizing inventory ordering and shipments. By knowing where materials are located, companies can use these resources more effectively, decreasing human intervention and increasing efficiency. Checking bin levels on a regular basis also requires substantial labor costs. To make inventory tracking faster and more streamlined, the industry is continually moving toward automated inventory management.

* United States Occupational Safety and Health Administration, 2017

The Siemens approach

- An emphasis on user-friendly products – for safer, faultless operation
- A high degree of product safety – through maximum process transparency
- Optimal resource efficiency – through innovative platform concepts
- More flexibility – for faster and safer production changeover
- Increased productivity – with optimal solutions for the operating phase

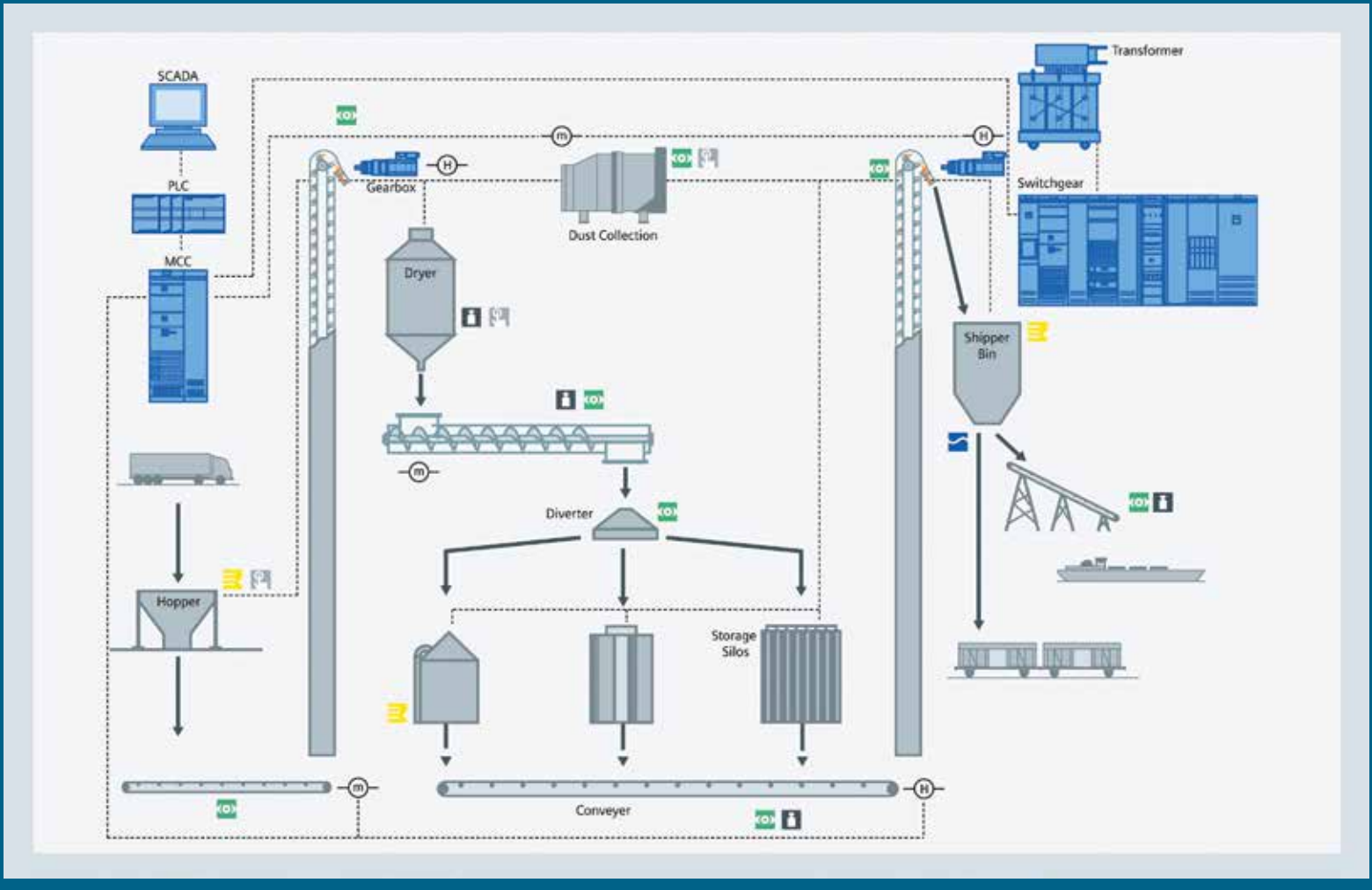
Customer benefits

- Fast commissioning, short ramp-up times
- Low total cost of ownership
- Quick return on investment
- Continuous process through innovative service and support concept
- Traceability to ensure manufacturing quality through completely integrated production
- Maximum compatibility and innovation providing you with confidence in the future

Grain handling

Process overview

From the hopper to waiting trucks or rail cars, grain makes its way through a series of processing stages in grain elevators and terminals. Siemens sensor systems and communication devices play important roles each step of the way.

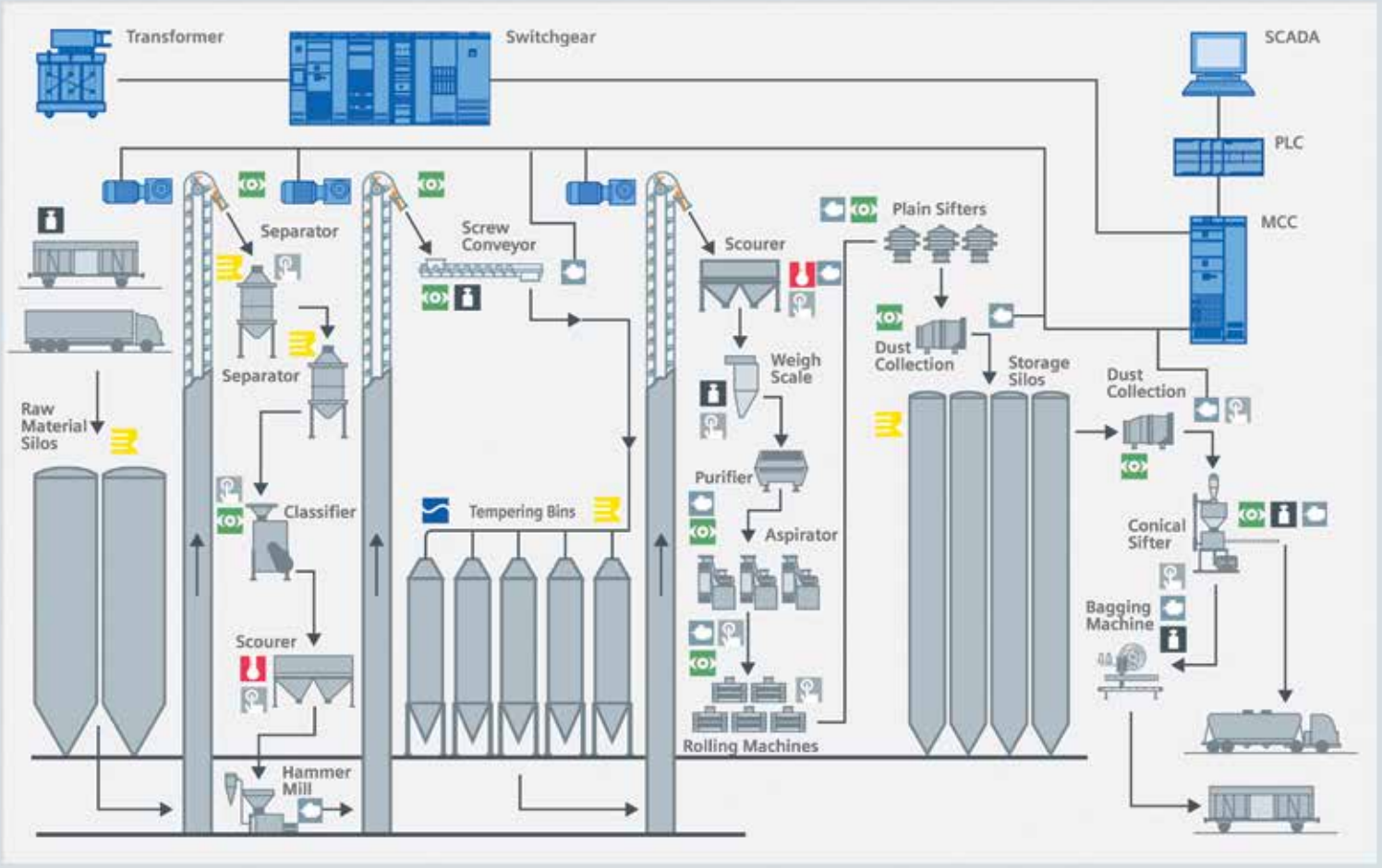


Level
Flow
Process protection
Weighing
Industrial automation and controls
Industrial communication
Power distribution
tiastar motor control centers

Milling

Process overview

Before it can be used in everything from pastries to pasta, flour is milled to separate bran and germ from the endosperm. Instruments for level, weighing, flow, and process protection – to list a few – are crucial to your milling operations.



Gas analytics

Temperature

Mechanical drives

Motors

The right ingredients for success

Grain is housed in silos through the complete value chain from the grower to the end product after the milling process. As instrumentation and the systems to collect data are now cost effective with a satisfactory payback, the industry is moving to equip the complete value chain. Knowing levels throughout the facility is a definite benefit to optimizing operations.

Grain handling

After harvest, grain is transported to grain terminals where it is stored and then later distributed. At grain terminals, trucks unload grain into receiving hoppers, and conveyors move it toward bucket elevators. These grain elevators lift grain to the 'headhouse.' Once there, machinery cleans, dries, and blends grain before it is distributed into storage bins by a diverter (or tripper).

Grain and seeds such as wheat, corn, rice, oats, soybeans, and sorghum are shipped from the elevators to be used directly or manufactured into countless numbers of products.

Milling

To prepare grain such as wheat for end-product manufacturing, it must make its way through the milling process.

Once grain is received at the mill, it first needs to be cleansed to remove impurities. After this, rollers grind and separate the grain, breaking it open. Finer grain is then further separated by sieves. Larger particles that don't break down can be used to feed livestock.

Once grain is milled, it is then stored in different bins to be shipped to manufacturers or end users.

Key issues for process instrumentation

Siemens process instrumentation products for the grain industry are applicable primarily in storage, conditioning and movement of raw and finished product, as well as process protection for equipment and weighing of bulk material.

Our portfolio of products offers a full range of answers to the industry trends in safety, automation, and inventory management.

Safety

- In solids level measurement – eliminating the need for constant human measurement from the top of silos by providing accurate level indication to operators on the ground.
- In process weighing – ensuring materials are flowing in the correct direction and that the right amount is being transferred to eliminate manual intervention.
- In continuous gas analysis – detecting smoldering fires in the exhausted air of wheat dry mills.

Automation

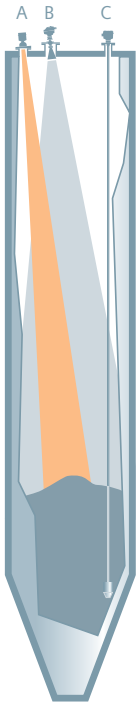
- In material flow – making sure resources are being effectively used and that truck or rail load-outs are close to target, saving on over or under loading transport.
- In process protection – determining when filters break or are too dirty, and when dust collection systems are compromised by material flow into air ducts.

Inventory management

- In level measurement – balancing and checking stock of raw materials to ensure reliable amounts of processing ingredients are present.
- In material flow – knowing that full utilization of stocking and transportation is standard operation to prevent wasted time and resources.

Level applications

Measuring the level of grain has traditionally been problematic for both contacting and non-contacting measurement technologies. Contact technologies are not ideal because of the highly abrasive nature of grain. Non-contacting technologies can have problems with the amount of dust created by grain in motion and with their installation in tall, narrow vessels with complex geometry and internal obstructions. The results can be an increased replacement frequency or costly measurement errors in the silo.



SITRANS LR560 (A) has a narrow beam when compared to other typical transmitters (B). TDR (C) signal is guided by a cable for specific measurements where the material touches the cable.

SITRANS LR560

- 78 GHz radar transmitter allows for measurement through dust within enclosed silos
- An exceptionally narrow 4-degree beam angle can cope with complicated silo geometry
- Sealed lens cavity is highly resistant to dust buildup
- Easy to install and configure with Quick Start Wizard
- Small size fits most silo nozzles
- Two measurement ranges: 131 ft and 328 ft

SITRANS LR560

SITRANS LR560, the world's first radar solids level measurement transmitter operating at 78 GHz, takes on grain industry challenges easily and effectively. Even extreme dust is no problem. SITRANS LR560's narrow 4-degree beam angle means readings in a grain silo's cone area are now possible in a non-contacting environment.

Shipper bin

When loading rail cars, trucks, or barges, the shipper bin acts as a buffer to allow for starts and stops during filling. With grain levels constantly changing, dust is a major issue and a difficult measurement.

Inventory monitoring

Maintaining accurate inventory is required to control inventory costs and ensure appropriate amounts of stock are available. The first step in automating a facility's manual processes, level measurement helps to improve safety by reducing the frequency of workers' trips to the tops of silos.

Curing headaches in malted barley measurement

A Canadian manufacturer of malted barley, wheat, oats, and rice extracts was seeking an improvement over their outdated measuring techniques in malted barley silos. Grain extracts can be used in everything from cereal, bread, biscuits, and pastries to chocolate, pet food, vinegar, chewing gum, ice cream, and, of course, beer.

For years, the company had been using a weight and cable level measurement system to measure malted barley in two outdoor silos, but these resulted in ongoing maintenance and reliability issues. With malted barley grain arriving by rail car or truck every few days, grain delivery was always a control headache, as a silo's capacity is much less than that of a rail car. With the variable delivery schedules and the expense of rail car unloading demurrage time, it is crucial to have constantly accurate inventory level measurement. Precise inventory monitoring ensures that unloading from rail cars or trucks takes place within the allotted days and without exceeding the silos' capacity, since cleanup of spilled grain is not easy.

The decision was to select the new SITRANS LR560 to provide a level measurement solution. The stainless steel housing was readily adaptable to the company's preferred way of installation on the silo inspection hatch, and its compact size made it easy to carry the transmitter to the top of the silo for the installation. The transmitter's 2-wire configuration was also instrumental in saving installation work and wiring costs. The seams of the inside of the silo did not interfere with the level readings, and reliable readings are provided all the way to the bottom of the cone area.

Since the new SITRANS LR560 has been installed, operators have noticed very stable readings from the transmitter, from completely empty to full. During filling, operators simply keep an eye on the remote display, monitor the filling cycle, and then shut the transfer system off if the level approaches the top of the silo. There has been zero maintenance on the SITRANS LR560 since its installation and no maintenance is expected.

The company is very happy with its decision. Operators know what is going on throughout the plant's process, and they no longer have any overfilled silos or inaccurate readings from old technology.

SITRANS LR560 measure the level of malted barley at United Canada Malt Ltd. The compact size of SITRANS LR560 is easy to carry to the top of the silo.

Level

Ultrasonic instruments are a cost-effective choice for monitoring and control in short- to medium-range solids or liquids applications. The world leader in ultrasonic level technology, Siemens has many ultrasonic models available, combined with strong application experience to support the grain industry's needs. Last but not least in the world of level measurement, point level technologies are ideal to indicate high or low levels for backup to a continuous measuring system.

Optimizing inventory

To optimize inventory at production plants and distribution centers, Siemens level measurement product lines provide facilities with a system that is easy to integrate and use. Many steps related to inventory monitoring in the grain industry can benefit from this array of products. From simple monitoring to complete plant integration, Siemens level measurement solutions will suit your particular needs.

For example, a level measurement system for monitoring inventory amounts could consist of a Siemens MultiRanger 100 controller – or the LUT400 – along with an Echomax XPS-15 transducer, and SITRANS RD500. This solution provides both local and internet-based remote monitoring for applications.

Siemens also offers an integrated range of products and communications options, including Wireless HART network solutions, as part of Totally Integrated Automation (TIA). With TIA, Siemens can provide an automation platform for the entire grain handling, milling, and storing life cycle.

MultiRanger 100/200 controllers

- Translate Echomax signals into level and volume readings
- Versatile short- to medium-range ultrasonic single- and dual-vessel level controllers
- 0.3 to 15 meters (1 to 50 ft), transducer and material dependent

SITRANS LUT400

- World's most accurate ultrasonic controller for level measurement
- Features Siemens patented Sonic Intelligence, which continuously evaluates and adjusts fornoise level and changing process conditions.
- Compatible with the full line of Siemens Echomax transducers and with an operating range of 0.3 to 30 meters (1 to 100 ft.)

Echomax transducer

- From the top of a silo, the Echomax transducer measures levels of stock using ultrasonic technology, sending and collecting high frequency sound pulses continuously
- Resistant to a number of substances including steam, corrosive chemicals, and methane
- Non-contacting with an active face to ensure no material buildup

SITRANS RD500 remote data manager

- Provides remote monitoring through data logging, web access, and instrumentation alarming
- Using GSM or Ethernet communications options, SITRANS RD500 sends data to any remote location
- Enables remote monitoring of inventory levels, process and environmental applications, and provides web access to most types of field instrumentation

Overfill protection and inventory management

Providing switch points triggered by material contact, point level devices are used in a number of locations throughout the grain industry. To avoid overfills of bins and silos, install point level switches at the top of containers. Switches placed at low and mid-levels assist with inventory management through set markers indicating usage trends or fill times. Siemens has a full portfolio of level switches for both solids and liquids applications in the grain industry.

Pointek CLS100/200/300/500

- Provide accurate, repeatable point level switch performance for a large range of solids and liquid applications

SITRANS LPS200 rotary paddle switch

- Detects solids with densities as low as 15 g/l (0.94 lb/ft^3), such as those found in grains. Ideal for applications with tendencies for buildup

SITRANS LVL100 and LVL200

- Vibrating liquid level switches ideal for high, low, and demand level alarms and pump protection

LVS100 and LVS200 vibrating switches

- Detect solids with densities as low as 5 g/l (0.3 lb/ft^3), such as flour and light dusty powders

Taking stock of animal feed

A Siemens client who manages most of several European countries' bulk distribution for an animal feed manufacturer was searching to optimize feed stock inventory at the production plant and distribution centers.

The remote monitoring component of the company's silo-content measurement system was developed together with a Siemens process instrumentation team using the SITRANS RD500 remote data manager connected to an ultrasonic level measurement system. The level measurement system consists of a Siemens MultiRanger 100 controller and an Echomax XPS-15 transducer.

The Echomax transducer on top of the silo measures the level of stock using ultrasonic technology, sending and collecting high frequency sound pulses continuously. The MultiRanger translates the signals into level and volume measurement. Using wireless (cellular) communications, the SITRANS RD500 sends the data to the logistics center, which dispatches the information to the transportation carrier and the feed supplier. Orders can be placed automatically, and transport planned efficiently through the route planning system.

Farmers now always know the current inventory of feed, independent from the location. They can order in a timely manner, with order errors reduced to a minimum. Because of this, cost reductions are substantial, and a mileage reduction of 10% creates a significant decrease in fuel costs and in CO_2 emissions.

MultiRanger's versatility and reliability have made it a popular product with customers throughout the grain industry.

Flow applications

Grain handling and blending raw materials – often with additives – are flow applications common to many grain facilities. All of these activities require highly accurate flow measurement for both quality assurance and product consistency. Precise measurement is also essential to ensure compliance with environmental regulations and food safety standards.

Temper bin – water additive

After the first cleaning phase, wheat kernels are conditioned with water and allowed to rest in temper bins to toughen the bran coats of the wheat kernels and soften or mellow the endosperm. Tempering is one of the most important stages in the milling process, and great care is taken to condition the kernels appropriately prior to milling. SITRANS F M MAG 5100 W monitors water usage so operators can adjust additive water accurately.

SITRANS F M MAG 5100 W

- Coned design achieves increased low-flow accuracy, making it especially useful for leak detection
- Optimizes management and process control
- Ensures correct dosing and product quality
- No moving parts ensures long-term performance

Raw materials handling and blending

Maintaining accurate inventory is required to control costs. To track inventory accurately, the customer measures the grain as it is put into storage silos. Certain mills often blend various wheat varieties to produce branded products. Continuous flow metering with SITRANS WF100 series flowmeters, along with Siemens Milltronics SF500 flowmeter integrators, improves quality and reduces process inefficiencies such as material costs and time loss.

SITRANS WF100 series flowmeter

- High accuracy for monitoring a wide range of grain product ingredients and animal feed blending
- Compact, reliable solution for applications with limited installation space
- Stainless steel option meets USDA and FDA requirements for food processing

On track with Siemens flowmeters

As part of a facility upgrade, a North American grain elevator operator was looking to move from manual rail car load-outs to a more precise, automated system. For years, an employee was stationed above the rail car and used a dipstick to gauge when grain had reached the appropriate level. Measurements were not always accurate, and the facility owner found that inefficiencies were a regular occurrence. Overfilled rail cars are subject to enormous fines, while shipments with less grain than the amount ordered by a customer can cause problems as well.

The solution was to install SITRANS WF300 series flowmeters to measure the amount of grain being loaded into rail cars. Flowmeters are installed in gravity fed processes, measuring only the horizontal force component of dry solids material flow striking the sensing plate. The flowmeters respond to the force of the material striking the plate for consistently precise measurements. Material buildup does not affect performance as the plate only reacts to horizontal forces of impact.

The new flowmeters have automated the load-out process, allowing the operator to optimize rail car filling. Load-outs are now precisely measured so that shipments are not too full or too light, satisfying both the operator and customers.

Truck and rail load-out

When loading trucks it is important to load as close to the target weight as possible. If the truck is too heavy, material must be removed. If the truck is not loaded enough, the truck must ship without a full load or return to the loading area. SITRANS WF300 flowmeter, in combination with Siemens Milltronics SF500 flowmeter integrator, ensures that trucks receive the correct amount of grain.

Siemens Milltronics SF500 flowmeter integrator

- For use with solids flowmeters, signaling for accurate flow rate and totalized weight of bulk solids
- Can take on lower level control functions traditionally handled by other devices, and it supports popular industrial communication buses
- May be used for ratio blending and controlling additives while operating in tandem with two or more solids flowmeters or weighfeeders
- Also provides batching, load-out, and alarm functions

The season for SIWAREX load cells

A seasoning company in Europe was modernizing its weighing and dosing units for improved customized seasoning blending. After careful evaluation, the company decided in favor of Siemens SIWAREX FTA (Flexible Technology Automatic weighing instrument) weighing assembly.

SIWAREX FTA is a versatile and flexible weighing module for industrial use. It can be applied for automatic and non-automatic weighing, such as the production of mixtures, filling, loading, monitoring and bagging. It has been assigned appropriate scale approvals and is suitable for legal trade (OIML R51, R61, R76, R107). SIWAREX FTA is the ideal solution for applications that demand a high degree of accuracy and speed: it will measure at speeds of 100 measurements per second, with a resolution of 16 million increments in up to three ranges. The device comes already calibrated, which means there is no need for recalibration after components are exchanged.

The seasoning company's experience with SIWAREX FTA has been very positive. Some of the benefits include the high performance of all typically-needed weighing modes, so no separate and costly options were required. As well, the company has enjoyed this individual, customized design.

Weighing applications

Weighing is of significant importance to the grain industry. From keeping accurate grain inventory to the shipping process, operators require precision. Processes are increasingly becoming more automated to ensure compliance with the strict quality regulations of a very competitive market.

Conveyor loading

Handling grain throughout processing and shipping operations demands both speed and precise measurement. When conveyors are loaded with grain to be processed, belt scales ensure that accuracy is met at every step of the process. As well, grain facility operators use belt scales in conveyor systems to load grain from barges to storage, rail, or trucks.

Legal-for-trade

Legal-for-trade scales are used when grain products are sold by weight. Measuring equipment needs approvals and routine inspections to guarantee that amounts are within the strict accuracy figures required for trade. Belt scale measurements therefore must be exact yet also user-friendly so that operators can smoothly perform calibrations. Milltronics MSI belt scales meet these requirements.

Milltronics MSI belt scale

- Heavy-duty, high accuracy, used for process and load-out control
- Continuous in-line weighing on a variety of products in primary and secondary industries including use in legal-for-trade processes
- Patented parallelogram-style load cells result in fast reaction to vertical forces, ensuring instant response to product loading
- Outstanding accuracy and repeatability, even with uneven loading and fast belt speeds
- Minimum maintenance with only periodic calibration checks required

Milltronics BW500 integrator

- For use with both belt scales and weighfeeders
- Operates with a belt scale and a speed sensor. Belt load and speed signals are processed for accurate flow rate and totalized weight of bulk solids
- Can take on lower level control functions traditionally handled by other devices, and supports popular industrial communication buses

Bagging

One method of transporting and storing grain is by placing it in polyethylene bags. These bags are airtight and a cost-effective way of ensuring that grain is measured properly. Efficient bagging processes will fit seamlessly into automated systems. SIWAREX load cells are known for their high accuracy, and work extremely well in bagging activities.

SIWAREX WL230 shear beam load cell and FTA module

- Extremely compact especially useful in crowded conditions
- Ideal for use in large-sized platform scales, batching systems, sacking systems, or bin scales
- Use in legal-for-trade scales is possible with SIWAREX WL230's accuracy class
- Easy and quick installation with SIWAREX mounting units

Process protection

One significant piece of increasing safety in a grain operation is reliable process protection. Siemens sensors and alarms help detect system blockages and ensure that operations are working properly, helping operators identify breakdowns or failures. Process protection devices will quickly alert you of equipment malfunctions and process slowdowns so that you can immediately take action.

Bucket elevator slip detection

One concern of grain elevator operators is bucket elevator belt slippage. Measurement is needed to prevent damage to the belt due to heat buildup and the possibility of explosion. Siemens motion control products measure the number of buckets passing the probe over time. When a slowdown is detected, alarms are provided, and if the slowdown continues, the elevator is shut down. With sensing ranges of up to 100 mm (4”) and rugged industrial design, these motion probes are proven to endure the abuse of industrial applications.

Milltronics MFA motion failure alarm controller and MSP probes

- Highly sensitive, used with Milltronics MSP and XPP probes
- Detects changes in the motion and speed of rotating, reciprocating or conveying equipment. Warns of equipment malfunction and signals through contacts to shut down machinery in case of a slowdown or failure
- Suits most industrial applications, and can be used on tail pulley shafts, driven pulleys, motor shaft sensing, belt or drag conveyors, screw conveyor flights, bucket elevators, fans, and pumps
- Adjustable 0 to 60 second time delay allows the monitored device to accelerate to normal running speed before monitoring begins

Screw conveyor

Feed mills require an indication of when the flights of a screw conveyor slow or stop. Since a broken shaft weld could allow the shaft to rotate without turning the flights, flight sensing is often required SITRANS WM100 is able to detect passing flights, with a range of 100 mm (4”), through the non-ferrous shaft housing.

SITRANS WM100 alarm switch

- Heavy-duty, providing cost-effective equipment protection even in the harshest conditions
- Impervious to dust, dirt, buildup, and moisture and is ideal for such harsh industries as mining, aggregate, and cement
- Non-contacting design eliminates the need for lubricating, cleaning, and part replacement
- Reduces downtime and cleanup expenses associated with conveying equipment failure. It alarms to minimize spillage, prevent extensive damage or even fire caused by belt slippage at the head pulley, and warns against conveyor malfunction
- Built-in selectable start delays and 1 Form C relay contact. With an aluminum body, it operates from -40 to 60 °C (-40 to 140 °F)

Route verification

When receiving various types of grains, there are dedicated bins for each type. Material can accidently route to the wrong bin due to a failed diverter valve. This leads to cross grain contamination, and results in scrapped raw material. The SITRANS AS100 is installed externally to duct work or pipes and will indicate material flow presence to confirm routing to the appropriate silo.

Air filtration

Filtration in grain facilities is essential for maintaining a safe environment for workers. Also, clean filters ensure that enough airflow is present to keep grain moving smoothly through the handling and milling process. The SITRANS AS100 will alarm if filters become torn or inefficient and allow exhaust dust particles.

Safety application

Chlorine gas is added as a disinfectant to finished flour. As long as flour is moving down the chute, chlorine gas is injected and mixed with flour safely. Once a blockage occurs, chlorine gas builds up in an empty chute creating an unsafe condition. SITRANS CU02, working with SITRANS AS100, detects the blockage and determines when it is safe to add chlorine gas.

SITRANS AS100 acoustic sensor

- Used for solids flow detection, detecting changes in high-frequency sound waves from equipment and materials in motion
- Detects and reacts instantly to changes in solids flow to warn of blockages, product absence, or equipment failure such as burst filter bags
- Common applications include pellets, powders, and most bulk solids in pipes, chutes, vibratory feeders, pneumatic conveyors, or aerated gravity flow systems
- Operating with a SITRANS CU02 control unit, the system detects conditions of high flow, low flow or no flow

SITRANS CU02 alarm control unit

- Readily configured for set points indicating such conditions as high flow, low flow or no flow
- Two fully programmable relays to operate an alarm or control device. Readings are also displayed locally by the SITRANS CU02 on its LCD
- May be mounted up to 500 meters (1500 ft) from the sensor
- Receives a 0 to 10 V DC input signal from the SITRANS AS100 sensor, providing relay and analog outputs for interface into a process

Continuous process gas analytics

Keeping you and your employees safe, Siemens provides the ideal gas analyzer for any grain application. Our portfolio of gas analyzers can measure concentrations of combustible gases in grain silos, or track grain spoilage by measuring CO_2 levels in grain elevators.

Wheat dry mills

Fast detection of any kind of smoldering fire in wheat dry mills is essential to ensure safety in your facility. By measuring amounts of carbon monoxide traces (range 0 to 10 ppm) in the wheat dry mill's exhausted air, gas analyzers quickly and accurately detect any smoldering fires that may occur. The main cause of smoldering fires is sparking from the mechanical friction of the rotating roller mills. This typically occurs at the final process stage if there is interrupted flour flow into the roller mill where the finest wheat flour is pulverized.

Spoilage detection

Currently many facilities measure grain spoilage using temperature probes, as the grain begins to rot, the temperature will rise. Grain elevators have multiple temperature probes at different levels looking for hot spots. Interestingly, prior to these temperature increases, the grain emits CO_2 gas. Measuring CO_2 levels with Siemens Ultramat 23 can provide earlier detection than measuring for rising temperatures.

Ultramat 23

- With its multi-component design with NDIR technology for the measurement of up to three IR active constituents, the Ultramat 23 is extremely economical.
- The integrated automatic calibration function using ambient air is a unique advantage. Calibration check is only necessary once a year.
- Menu-guided operation with plain text allows users and service personnel to operate the device immediately.
- Multi-layer detectors guarantee high selectivity and reduced water vapor interference. Measuring cells are robust and resistant and can easily be cleaned in case of faults pollution, induced by errors in the sample preparation leading to soiling. Sample cell is robust and can be easily cleaned.

Process instrumentation and analytics product range

Siemens offers the most comprehensive product range for the grain industry and has a solution for even the most difficult measurements.

Continuous level measurement

Radar

Liquids level measurement

SITRANS LR200 and SITRANS LR250 offer continuous monitoring of liquids and slurries in storage/ process vessels.

Solids level measurement

SITRANS LR460 and SITRANS LR560 offer continuous monitoring of solids a variety of silos or storage bins.

SITRANS LG250/LG260

2-wire, guided wave radar transmitter for short- to medium-range level, level/interface, and volume measurement of liquids and solids.

Ultrasonic

SITRANS Probe LU

2-wire, loop powered ultrasonic transmitter for level, volume, and flow monitoring of liquids in storage vessels, simple process vessels, and open channels.

Level controllers and transducers

The LUT400 and MultiRanger 200 can be used in a variety of applications in combination with Echomax transducers.

Flow measurement

Electromagnetic flowmeters

Siemens full series of flowmeters for liquids and slurries gives a wide range of customer-specified process connections.

Weighing

SITRANS solids flowmeters

Accurate measurement and control of flow rates of product so that quality and plant efficiency are consistently maintained. Dust-tight, ensuring a healthier work environment, especially during hazardous substance monitoring.

Milltronics belt scales

Heavy-duty, high accuracy single idler belt scales used for process and load-out control. Milltronics belt scales provide continuous in-line weighing for monitoring such products as flour, grain, or sugar.

SITRANS weighfeeders

Control and monitor feed rates and blending in cereals, seeds or minerals; easy belt removal for replacement or cleaning, fast installation, easy to clean and maintain.

SIWAREX weighing systems

Provide optimum integration into the automation structure of the process. Ideal for users familiar the SIMATIC PCS 7 process control system and components.

Point level

Point level switches

Pointek CLS, SITRANS LPS200, SITRANS LVS100/200, SITRANS LVL100/200, ULS200 and Milltronics tilt switches offer a range of level detection options for liquids and solids applications.

Remote monitoring and displays

SITRANS RD100/200/500

SITRANS RD100/200 are remote displays for process instrumentation. SITRANS RD500 provides integrated web access, alarm event handling, and data capture.

Continuous gas analyzers

Ultramat 23

The ULTRAMAT 23 is a continuous gas analyzer designed for emission monitoring applications. The integrated automatic calibration function using ambient air is a unique advantage.

Process protection

Speed sensors

Speed sensors operate in conjunction with a conveyor belt scale, providing a signal to an integrator (Milltronics BW500/L or BW500, or SIWAREX WT241), which computes the rate of material being conveyed.

Weighing integrators

Milltronics BW500/L, BW500, and SIWAREX WT241 integrators work with single or dual strain gauge load cell-based belt scales. Milltronics SF500 operates with any solids flowmeter with up to two strain gauge load cells or LVDT sensor.

Motion sensors

Most MFA 4p motion sensing probes as well can be mounted up to 100 mm (4") from the ferrous target, reducing the chance of damage to the probe and the equipment. SITRANS WM100 zero-speed alarm switch provides equipment protection even in harsh conditions.

Acoustic monitoring

SITRANS AS100 detects changes in high-frequency sound waves resulting from particle impacts on equipment. In combination with SITRANS CU02 alarm control unit, it detects and reacts instantly to changes in solids flow.

Key issues for process automation

Siemens industrial automation products for the grain offer a full range of answers to the industry trends in safety, automation, and optimization.

Safety

- During maintenance – providing arch flash resistant solutions for Motor Control Centers remotely and Power Distribution equipment.
- Commissioning and operation – Providing tools to remote configure and diagnose smart instruments and devices without leaving the control room.
- Equipment protection – integrating Hazmon system information in real time to continuously monitor and protect your equipment.

Automation

- Eliminate islands of automation – providing easy integration of the entire automation landscape for plants, including PLCs, HMIs, networking, control components, power distribution, Hazmon systems and more.
- Reducing time to market – using a common engineering platform that promotes standardization and reusability.

Optimization

- Reduce downtime – integrated diagnostic functions with which a fault can be identified and eliminated to provide increased system availability.
- Maximize throughput – measuring KPI of your equipment and understanding how much time left is available before a shutdown.
- Efficient operation – monitoring real time energy consumption and avoiding unnecessary peak demand charges.

With so many specific systems available in today's market from many vendors, the integration to one common platform is becoming more and more challenging. Siemens has the most comprehensive product range on the market for the grain industry. Ranging from drives, gearbox, motors and switchgear, process instrumentation and analytics, the product range also includes power management systems, industrial communications networks, and building management technologies.

Reduced engineering effort

Our framework provides easy integration of the entire automation landscape for plants, including PLCs, HMIs, Networking, control components and more. Efficient software supports you over the complete lifecycle of your plant – from the planning and design stages through configuring and programming as far as commissioning, operation and upgrading.

- Decrease duplicate efforts
- Improve integrated capabilities
- Achieve highest degree of flexibility

Security

Grain elevators are the hub of rural communities. These facilities are a key component of your success and one of the earliest steps in the food defense initiative, protecting the entire food chain from field to fork.

This is why Siemens has developed a scalable security solution to manage these rural locations via a common delivery platform. Investing in these measures, reduce product recalls and costly delays while protecting your corporate image and overall financial goals.

Industrial Automation

The diagnostic capabilities of Totally Integrated Automation result in fewer faults, reduced downtimes, and shorter repair times. All SIMATIC products feature integrated diagnostic functions with which a fault can be identified and eliminated to provide increased system availability.

SIMATIC Controllers

- Common engineering platform throughout all the PLC controller lines
- Software code and libraries both re-useable, and portable
- Scalable architectures that adapt to the growth of your process

Micro Memory Card backups decrease repair times and training required.

Plants require ever-increasing operations visibility and flexibility from their supervisory systems.

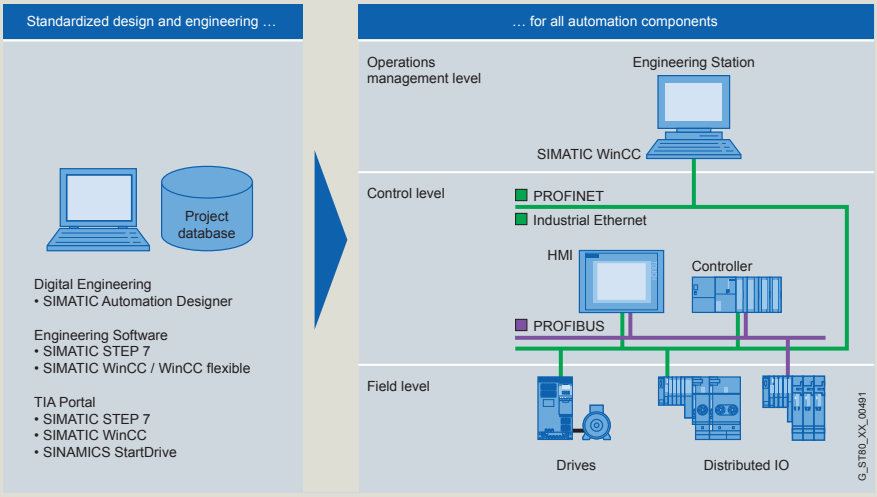
SIMATIC HMI Comfort Panels

- Simple keypad and touch panels
- Wired and wireless mobile panels
- High performance multimedia capable Comfort panels

Seamless integration into the best-in-class TIA Portal completes your visualization solution with an intuitive and efficient engineering environment.

SIMATIC WinCC SCADA

- Offers architectures characterized by their modularity, flexibility, scalability and expandability, delivering benefits throughout the operation lifecycle
- Reduced engineering development time due to the integrated SQL database
- Reduced down-time with built in diagnostics
- Graphical, Historical, Web functionality, Reporting, Messaging, Alarm, User Management are all available in the base package



Industrial Controls

NEMA contactors and starters

Our NEMA versatile line offers a motor starter for every grain application you may have. These starters are built rugged to withstand the most severe and demanding industrial and continuous duty commercial applications in the industrial and construction markets. This includes standard full NEMA sizes and motor-matched half sizes exclusive to Siemens. Starters are available as open and enclosed with electronic and bimetal overload protection, as well as a wide selection of accessories and spare parts

- Protect motors with phase unbalance, phase loss and ground fault selection.
- Rugged design, conformal coated circuit board to protect against humidity and corrosion with a wide operating temperature range.
- Interchangeable coils – Same coil is used in starters up to size 2. Dual voltage coils are used to help reduce inventory.
- Easy coil installation and removal; no tools required.
- Auxiliary contacts – Allows up to 8 auxiliary contacts on each starter. Contacts are snapped on and off without tools.
- Simple selection of any starter type (non-reversing, reversing, multi-speed and reduced voltage starters)

SIRIUS Modular IEC Controls

Our SIRIUS portfolio of modular controls includes compact devices for switching, protecting, monitoring and starting motors. This highly flexible modular system is quick to connect and communicate with other products and complies with all standards. This helps control panel designers and builders provide an efficient and cost-effective panel for their customers.

Benefits

- Highest performance-to-size ratio anywhere in the world, which saves valuable space in the control cabinet.
- Complies with current standards and fulfills the latest requirements on the market; IE3/IE4-ready
- The strength of the system lies in its modular construction across all sizes, covering all applications thanks to comprehensive accessories.
- Wiring is reduced with the clip-on function modules for AS-i and IO-Link
- Optional bundling of up to four feeders per IO-Link channel helps reduce the space requirements

Pilot devices

30mm and hazardous location

Siemens pilot device offering includes indicator lights, pushbuttons, illuminated pushbuttons, emergency-stop pushbuttons, selector switches and much more. The products are available in 22MM, and 30.5MM diameters. These devices can be installed directly on a panel or housed in enclosures.

Benefits

- The 30mm products meet NEMA Type 1, 3, 3R, 4, 4X, 12, 13. In addition, the BlackMax corrosion resistant line is able to withstand the harshest environments.
- One piece casting, stainless steel springs and designed to prevent oil, water and dust from penetrating the operator and the contact blocks
- Touch-safe design on contacts and lighting modules ensures safe installation
- Hazardous location devices are suitable for NEMA 7/9 environments

22mm

Our line of pushbuttons and indicator lights are fast and easy to assemble. Their slim design offers a sleek and modern look on the face of your panel.

Benefits

- Reduced inventory due to extended-life LED-illuminated devices
- IP69K-rated for wash/hose-down applications
- Networking capability (PROFINET, IO-Link)

Motor Control and Protection

SIMOCODE

If you want to get more monitoring functions out of your motors and prevent faults in automated processes, try a motor management and control device that is flexible and modular. SIMOCODE pro solid-state overload relay adds extensive motor data to increase your process control quality. SIMOCODE reduces or eliminates downtime of not only the motor it is protecting, but the process the motor is connected to.

Benefits

- Network communications reduces wiring from the controller to the PLC or DCS
- Provides motor machine diagnostics for preventative and predictive maintenance
- Allows remote monitoring so operator can manage it remotely to verify the plant is operating properly-decentralized monitoring and managing of the facility

Motor control centers

Siemens tiastar Smart Motor Control Center (MCC) delivers the highest performance intelligent MCC available today. It offers state-of-the-art motor control technology components and features optimal motor control, protection, power- monitoring, communications, and automation integration. Siemens MCC is also ARC-resistant where required.

Benefits

- Smart technology – Featuring fieldbus and Ethernet-based communications within the motor control centers in order to simplify your connections to process control systems and controllers.
- Smart components – SIMOCODE pro Smart motor controller, SIRIUS 3RW44 soft starters, and SINAMICS G120 drives provide the best combination of performance and information to the customer.
- Flexibility – As your needs grow, available expansion modules offer new functionality.
- Troubleshooting – User-friendly diagnostics tools enable quicker fault identification for easier troubleshooting of problems.

Industrial communications

SIMATIC creates the foundations for unlimited integration in communication for maximum transparency on all levels, from the field and control level to the operations management level all the way up to the corporate management level.

Maximum data transparency

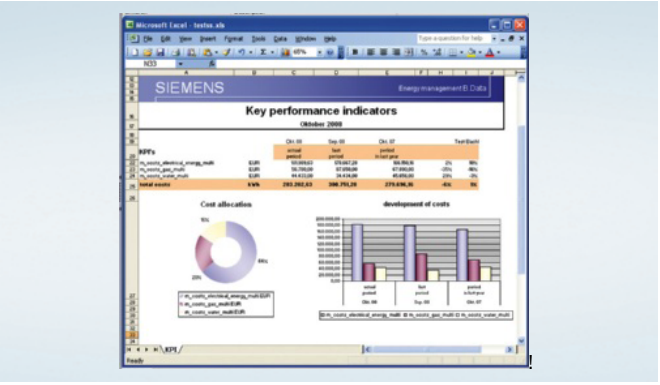
- Greater flexibility – SIMATIC relies on cross-vendor standards
- Reduce the number of gateways required
- PROFINET, the leading Industrial Ethernet standard
- PROFIBUS, the global No. 1 fieldbus.

PROFINET/Industrial Ethernet	
Industrial Ethernet (IEEE 802.3)	– The industrial standard based on the international Ethernet standard
PROFINET (IEC 61 158/61784)	– the open Industrial Ethernet standard for automation
Industrial WIreless LAN (IEEE 802.11)	– the industrial sltandard for wireless communication based on the internation standard
PROFIBUS	
PROFIBUS (IEC- 61 158/61784)	– the internation standard for the field level in the global market leader among fieldbus systems
AS-interface	
AS-interfacce (IEL 6206-2/EN 50295)	– the internation standard which, as an economical alternative to the cable harness, links sensors and actuators by means of a two-wire line
IO-Link	
IO-Link	– the standard for intelligntly connecting sensors and actuators from the field level to the MES level

Energy management and preventive maintenance

The connection of the automation system with Smart Motor Control Center and Power Infrastructure via field networks provides:

- Centralized visibility to energy consumption and quality for efficient and successful energy management.
- Access to equipment KPI to support your Predictive maintenance programs.



SIMATIC PDM (Process Device Manager)

Increase the safety of your operators by limiting their exposure to hazardous locations (top of silos, electrical room) by remotely accessing and parameterizing your smart devices.

- Universal, manufacturer-independent tool for configuration, parameter assignment, commissioning, diagnostics and maintenance of intelligent process devices and automation components.
- Diagnose, manage and assign parameters to a wide range of field devices from different manufactures using a single program with a uniform user interface.

Power distribution

What could be more important than protecting the safety of our most valuable assets, our people? Protecting our personnel from dangerous conditions must be a priority consideration, especially when it comes to electrical distribution equipment and low voltage switchgear.

Siemens Type WL low voltage switchgear is designed, tested and constructed to provide superior power distribution, power monitoring and control, while reducing the exposure to dangerous situations.

Arc Resistant Switchgear

Arc resistant metal-enclosed low voltage switchgear is an optional product offering that contains and channels internal arcing fault energy. This new switchgear construction provides an additional degree of protection to the personnel performing normal operating duties in close proximity to the equipment while the equipment is operating under normal conditions.

Dynamic Arc Sentry

One of the trip units available for the Siemens WL Family of breakers is the ETU 776. It offers dual parameter sets that enable the trip unit to automatically lower the instantaneous setting and thereby lower the available energy in a fault condition.

WL low voltage switchgear

Remote monitoring

Remote operation and monitoring

Remote Monitoring is an effective way to maintain separation between personnel and energized electrical equipment. Maintenance personnel and engineers can now view real-time electrical parameters, operating conditions and open and close breakers remotely.

- Remote Monitoring for temperature, metering and maintenance data
- Remote Racking feature
- Remote Operation for opening and closing via local hand held pendant station
- Monitoring and control through Internet, MODBUS, or PROFIBUS communications
- Totally Integrated Power and Totally Integrated Automation integration

WL breaker ETU 776

Switchboard

Maximum Flexibility, Minimum Cost

From 240V AC, 400A 600V AC, 6000 A, Siemens switchboards are designed to:

- Improve layout convenience
- Reduce installation costs
- Minimize the impact and cost of system changes

WL front-connected switchboard

Siemens tiastar™ motor control centers

It is well known that the grain business relies on the smooth and efficient operation of their motors. Conveyors, elevators, fans they all require maximum availability. Siemens tiastar motor control centers deliver detailed diagnostics and control by communicating with the starter units via PLC to deliver detailed motor management data at speeds previously unheard of.

Maintenance made easy

Gone are the days when a motor control center obtained its data through hardwired feedback and controls. The tiastar motor control center eliminates the hardwiring, and thus the need for additional items like transducers and analog input modules. Of course, with elimination of the hardwiring requirement, the commissioning time is reduced as well.

Arc-flash resistant

Siemens is the first manufacturer to test to IEEE C37.20.7 Compliant arc-resistant motor control centers, with testing witnessed by the Underwriters Laboratories. Decrease the risk of exposure to explosive arcflash incident energy to better protect your most valuable asset - your personnel.

Flexibility
Siemens tiastar motor control centers are packed with components and features to offer optimal motor control, communications, monitoring, protection, and automation interfacing.

tiastar motor control center

1 Siemens magnetic trip-circuit breakers

2 Door mounted, operator panel for SIMOCODE pro

3 PROFIBUS, Modbus, PROFINET, or Ethernet IP communication connected to each intelligent device

4 Variable-frequency drives (VFDs) with communication

5 AS-Interface slimline module

6 FVNR starter installed with SIMOCODE pro V

7 Reduced-voltage electronic soft starters

8 Door-mounted keypads for variable-frequency drive controls

Motor protection

When motor protection, monitoring, diagnostics and energy savings are part of your agenda, the tiastar Motor Control Center can provide an integrated solution to meet your requirements.

WL Circuit Breaker

- Provides real-time data on power consumption and a wide variety of power quality and condition measurements.
- Integrated communications over PROFIBUS-DP.

PAC3200 / 4200

- Avoids peak demand charges by providing real time.
- Detailed power monitoring with PROFIBUS to efficiently implement energy management programs.
- Installed typically at the incoming power supply to the tiastar Motor Control Center.

SIRIUS® 3RW44

- Electronic soft starters in sizes ranging from fractional to 800HP.
- Reduced voltage operation for low speed operation mode for conveyor / elevator maintenance.
- Remote parameterization, control and diagnostics.

G120 and MM4 variable frequency drives

- Saves energy at the motor by operating at the optimal speed for the current conditions.
- Space savings by integrating into motor control center.
- Available up through 250HP for constant torque loads.
- Remote access status of the system, as well as control speed and other process parameters.

SIMOCODE Pro

- Provides motor protection and control functions, determine operational, diagnostic and statistical data.
- Detailed diagnostics (i.e. runtime hours, number of starts, number of trips) and advanced warning capability from the starter units allow for redictive maintenance of motors, thus avoiding unexpected downtime.
- Gain access to power monitoring information (Amperes, Voltage, Power Factor (cos phi), Active Power) directly from each connected motor that can be coordinated with the control logic for loss of load tripping.
- Operational data like Time to Trip is being used by operations to maximize the throughput while keeping your assets protected.

WL Circuit Breakers

PAC3200 Power Meter

AS-Interface Slimline Modules

SIRIUS 3RW44 Reduced Voltage Starters

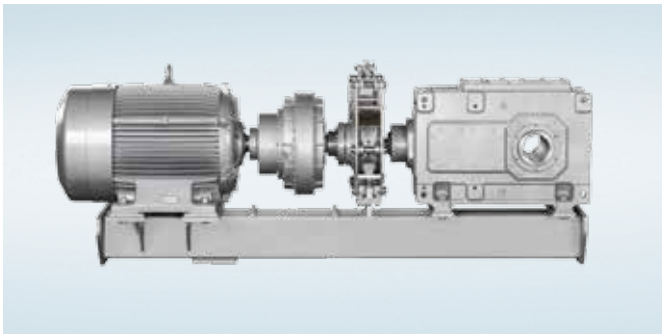
MM4 and 6SE70 Variable Frequency Drives

SIMOCODE Pro V

Mechanical drives

Standard automation and drive solutions are increasingly becoming center stage in importance. With Siemens as your single source solution, you can integrate the
complete portfolio package:

- Automation
- Drives and motor controls
- Motors
- Flender Couplings
- Flender Gear Unit
- Flender Swingbase and torque arm



In addition, Siemens is a single service partner providing support where and when you need us, with a network of service engineers and technical professionals on call, on-site and on line around the clock.

Robust competitive advantages include:

- Inching drive available for both maintenance and loaded actuation
  - For safe, slow speed actuation
  - Includes backstop and overrunning clutch
- Split housing available in all sizes for easier on-site maintenance
- Fluid couplings available for soft-start
- Output shaft types available: Flanged, solid, hollow and hollow with shrink disk- Flanged output shaft option to facilitate assembly in confined spaces
- Motor mounting flange, swing base and torque arm included in standard offering
- Allowable inclination:
  - Longitudinal ≤ ± 5°
  - Lateral ≤ ± 2°
- Option for backstop mounted on first intermediate shaft
  - Torque-limiting backstops available for load sharing when multiple drives on one elevator

The power of 2%

Our SIMOGEAR two-stage helical bevel unit, with its plug-in pinion, gives you higher ratios in the first unit gear stage than traditional designs. All told, the unit averages 2% higher efficiency than three-stage units. For any continuous duty application, that translates to substantial energy savings over the long term.

SIMOGEAR

The new SIMOGEAR® geared motor series encompasses an intricately stepped line of geared motors, which is optimally designed for conveyor applications. SIMOGEAR geared motors smoothly integrate with other Siemens components. You benefit from this high level of innovation, quality and expertise.

- Compact and highly efficient geared motors
- Long-term, single-source service

SIMOGEAR extends the portfolio and expertise of the only automation supplier in the world able to deliver end-to-end conveyor solutions.

Optimum drive for most any application

- Efficient and balanced
- Helical, parallel shaft bevel ,helical worm and worm gear unit types
- NEMA Premium® motors
- Higher ratios and the same or higher rated gear unit torques in contrast to competitive geared motors of equivalent sizes

Each model of the SIMOGEAR series can also be delivered as a gear unit with standard NEMA C-face input adapter. This robust design features two bearings and is the perfect solution for incorporating SIMOTICS motors.

SIMOTICS NEMA Motors

From cooperative elevators to global processors, millers and distillers, thousands of professionals in the grain handling and processing business depend on SIMOTICS motors from Siemens for safety, efficiency and uptime. We manufacture, stock and distribute explosion proof, severe duty, IEEE841, general purpose and definite purpose motors from small to huge right here in North America. Our extensive network of local distributors know every part of the grain business and can help you get the most out of your motor fleet investment.

SD100 for Severe Duty Environments

The SD100 is the ultimate in rugged construction, cool operation, high performance and application flexibility.

- All cast iron construction
- Super efficient NEMA Premium + when supplied with optional copper rotor
- Wide selection of options including Inpro/Seal® bearing isolators available as QuikMOD for fast delivery

> Learn more

http://www.industry.usa.siemens.com/drives/us/en/electric-motor/nema-motors/severe-duty/Pages/severe-duty.aspx

XP100 Explosion Proof for Hazardous Environments

All XP100 are supplied and nameplated standard:

- UL certified T3C for Div. 1, Class I Groups C&D and Class II Groups F&G
- UL certified inverter constant torque rating
- IP65 (dust proof)

> Learn more including new features for 2018

http://www.industry.usa.siemens.com/drives/us/en/electric-motor/nema-motors/explosion-proof/division-1-xp100/Pages/division-1-xp100.aspx

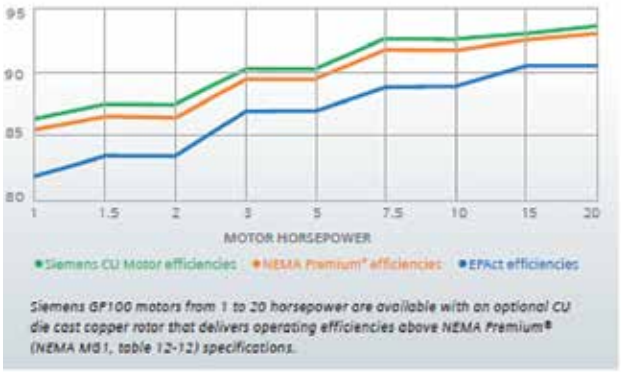
GP100 for General Purpose Environments

The GP100 goes beyond your normal general purpose motor.

- Cast iron or lighter weight aluminum construction
- TEFC, VFD duty motor up to 200HP, available foot- or flange-mount
- Super efficient NEMA Premium + when supplied with optional copper rotor

> Learn more

http://www.industry.usa.siemens.com/drives/us/en/electric-motor/nema-motors/general-purpose/Pages/general-purpose.aspx



Siemens GP100 motors from 1 to 20 horsepower are available with an optional CU die cast copper rotor that delivers operating efficiencies above NEMA Premium® (NEMA MG1, table 12-12) specifications.

NEMA Premium®

SIMOTICS AboveNEMA Motors

For over 100 years Siemens has been a leader in the induction motor business by providing quality, innovative solutions for customers challenging application needs. With over 100 patents along with being able to offer some of the most power dense machines in the industry, we leverage our innovations to help drive long lasting motors for one of the most demanding industries in the world.

Two main enclosure types used for grain applications are the TEFC and WPII enclosures and Siemens has the right value offering for these applications.

Application-matched features

We offer a wide selection of application-matched features to meet specific needs, ambient conditionas and installation requirements.

Capable of maximizing operational efficiency

Have confidence when you need to vary your application speed since Siemens motors are capable of working with Variable Speed Drives. We can also offer DOE Efficiency compliant machines.

Increased reliability

For those applications requiring additional protection, turn your TEFC motor into an IEEE 841 motor.

Environmental hazardous area? No problem.

We offer CSA certifications for Class I, Division 2, Groups BCD and Class II, Division 2, Groups FG. Consult your Siemens Sales Representative for specifics.

TEFC			
HP	Poles	Voltage	Bearings
150-1500	2-6	460, 4160	A/F & Sleeve

*other ratings available upon request

WPII			
HP	Poles	Voltage	Bearings
200-4000	2-6	460, 4160	A/F & Sleeve

*other ratings available upon request

Services and support

Our services range from consulting and engineering, connection to the control system, and comprehensive after-sales services:

- System and schedule planning
- Complete design planning and engineering of field devices
- Consultation on the selection of process instruments and analytics
- System documentation
- Installation, testing, and commissioning
- Comprehensive after-sales service

Service around the world

Plants must function reliably around the clock. Efficient and effective process instrumentation and analytics are an indispensable prerequisite to this end.

You also need to be certain of fast and competent service from your supplier.

Siemens is a global company that reacts locally. Whether you require consulting, quick delivery or installation of new devices, the Siemens network of specialists is available to you around the world, whatever your location.

Service around the clock

Our online support system offers rapid, comprehensive assistance regardless of time or location. From product support to service information, Siemens Industry Automation and Drive Technologies online support is your first choice – around the clock, 365 days a year.

www.siemens.com/automation/service&support

Siemens Industry, Inc.
100 Technology Drive
Alpharetta, GA 30005

1-800-241-4453
info.u@siemens.com

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