



SIMINE^{CIS} Winder

More productivity with maximum safety

Mining Technologies

SIEMENS

Safe, effective transport of people and materials underground is a very high priority. Here the shaft hoisting system plays a key role – or more precisely, the interoperation of drive, control and safety technology. This calls for a technically and economically effective solution – so that safety goes up and costs go down.

You can expect ...

- high throughput of your shaft hoisting system
- maximum safety for people, material, and equipment
- long life cycle of drives and motors
- high availability as a basis for economical operation
- high profitability of your investment



The challenge: Raising performance and safety



Many mines are producing at their capacity limits – a sign of booming demand for raw materials. So there’s a lot of movement in the shafts – where bottlenecks or accidents simply cannot happen.

The performance of a mine largely depends on the performance of the shaft hoisting system. And the demands placed on hoist motors and their frequency converters are enormous. For the shaft is like the eye of a needle – a place where as much as possible has to be transported as safely as possible, whether what is being conveyed is material or people. Maximizing plant availability and degree of utilization is an absolute must for the smooth and cost-effective running of a shaft hoisting plant.

In each individual cycle, skips and other conveyances are sent down to the bottom and back up again at speeds of up to 70 kilometers per hour. The 15-second acceleration phase and the gentle braking at the end of the cycle place particularly high demands on the drive, control, regulation and safety equipment. The following are vital:

- **Frequency converters** and their **power supply** must have reserves in excess of their rated capacity;
- The **drive components** must be designed in such a way that the motors are not overloaded.

Our solution: SIMINE^{CIS} Winder – maximum safety and reliability in the shaft

Output and safety in the shaft revolve around the drive system. We use our expertise to develop the exactly right solution for your mine.

The drive system we recommend is, on the one hand, adapted to the features of your supply network, but also tailored to your power converter “philosophy.” A harmonious adaptation of the performance to the individual requirements of your pit is ensured by our technological controls.

Our solutions are derived from a standardized, SIMATIC-based control and safety system (winder technological controller). This makes all conceivable versions of drive and control systems technologically possible.

The systems and components of the SIMATIC S7 world have been tried out millions of times and are used in countless applications in all branches of industry every day. Our control and safety system benefits from this, being licensed to operate in Germany under the strict technical requirements of the mining industry (Mining Regulations governing Shaft and Inclined Haulage Systems – TAS and BVOS).

Thus we have the best prerequisites for high productivity, availability, easy maintenance, and underground safety.



We provide maximum safety and increased output in the hoisting plant with innovative solutions for drive technology, performance-optimizing drive-related controls, and safety-oriented automation technology.



Good reasons for choosing SIMINE^{CIS} Winder

- Reduction of oscillations by intelligent regulation algorithms
 - Enhanced performance thanks to shorter cycle times
 - Lower maintenance costs/increased availability through less stress on mechanical components
- Optimization of travel times, thereby increasing yield, through winder technological controller
- Maximum safety guaranteed by redundant, tested safety system
- Investment protected by use of standardized industrial components

SIMINE^{CIS} Winder – individually designed, rapidly implemented



In implementing your solution you naturally want to avoid loss of time and costly coordination efforts.

SIMINE^{CIS} Winder stands for our complete package covering consulting and project management, design and calculation, project planning and equipment testing, commissioning and customer service. It also covers the centralized purchase of components by a single source up to the delivery of a turnkey shaft hoisting system, including all necessary construction work and mechanical components. In this way you can take full advantage of our many years' experience in plant construction.



SIMINE^{CIS} Winder: Optimized for a long life cycle ...

Your requirements...



Economic parameters

- Investment
- Operating costs
- Reliability/availability
- Maintenance costs

Permissible levels of system perturbation

- Reactive power
- Harmonics
- Overall efficiency
- Voltage dips

Performance requirements

- Speed
- Acceleration torque
- Rope shortening for safety equipment

Control, regulation and communication requirements

- Response to setpoint changes
- Torque quality
- Haulage cycle
- Open, standardized communication

Structural conditions

- Setup (ground/tower)
- Type of rope carrier (Koepe machine/drum-type machine)

...define the adequate solution

Your plant is subject to numerous factors out of which we configure the right combination of drive and frequency converter.

<p>Motor</p> <p>The conventional variant: A synchronous motor flange-mounted to the side of the shaft of the drum.</p>	<p>Frequency converter</p> <p>Cycloconverters: High performance with low investment costs. Here the SIMOVERT D has established itself as standard – one of the most reliable cycloconverters in the world.</p>	<p>Conventional solution</p>
<p>The alternative: An integrated machine. Here the synchronous motor is attached to the drive pulley – a unique design-solution used mainly in confined engine rooms.</p>	<p>Voltage-source converters: The innovative, future-oriented solution in the field of high-performance, adjustable-speed drives. Advantages include minimum reactive power consumption and system perturbations.</p>	<p>Innovative solution</p>

Control and safety – integrated in the speed regulator

Enhancing performance, reliability and safety in an integrated manner requires an integrated solution which is also efficient and open enough to cover future requirements.

SIMINE^{CIS} Winder contains our speed regulator that integrates all regulatory, control and safety functions. The platform used is SIMATIC, the world's leading automation system, unrivalled in terms of capacity, interface optimization, flexibility, and investment protection.

On this platform special technology modules (FM458), communication modules and the decentralized I/O peripherals demonstrate their strengths. All safety-related functions are supported by redundant hardware models.

Getting there with the right drive

The choice of the best drive system for your application is subject to many factors: the investment budget, the permissible level of reactive power, and the type of rope carrier used. All this must be taken into account in the engineering and design stage so as to maximize output, availability and safety while minimizing operating and maintenance costs.

SIMINE^{CIS} Winder is an individually optimized solution that takes account of all economic and technical parameters. Our full range of products and services covers every conceivable and expedient combination of drives and frequency converters.

Always competitive – with our services throughout the entire life cycle of your system

The key questions relating to the life cycle of your shaft hoisting system are: When is the first skip to be hoisted? How much availability will you need in daily operation? How can competitiveness be secured even after five or ten years?

SIMINE^{CIS} Winder looks at the life-cycle aspect of your plant within the context of a holistic solution. This includes professional services in the operating phase: from user training through maintenance and spare parts to a round-the-clock emergency service. But it also includes a systematically planned and implemented modernization process. With the manpower of a major company on call at all times we are a reliable partner however tight the deadline.

One solution – 100 years of experience – many application areas

Siemens – this name stands for 100 years of experience with all aspects of electrical engineering of mining shafts. And throughout our entire history, we have been an expert partner for our customers. No matter of the plant you operate. And regardless of which equipment is needed in hoisting plants – loading systems, mine car handling systems, shaft signalling systems or brake controls. We provide tailored solutions, based on in-depth experience.



... including for shaft systems that have been running for 50 years or more.



How to get more out of your shaft hoisting systems



More throughput for the haulage plant

- Customer:** GMK Norilsk Nickel, Norilsk, Siberia, Russian Federation
- Requirement:** Complete modernization of both skip-hoisting engines in shaft CC of the Komsomolski mine.
- Our solution:** Conventional 4,600-kW hoisting motors, 44.1 rpm, SIMOVERT D 12-pulse cycloconverter, transformers, ventilation systems, reactive power compensation equipment, regulation, safety equipment, shaft signaling systems, surface and underground conveyor systems, digital video monitoring, handling systems.
- The result:** Improvement in the performance of the shaft hoisting machine for handling nickel ore. Reduced burden on operating personnel thanks to wide-scale automation and integration of hoisting systems in the mine's automation system.

Minimum conversion time, maximum effect

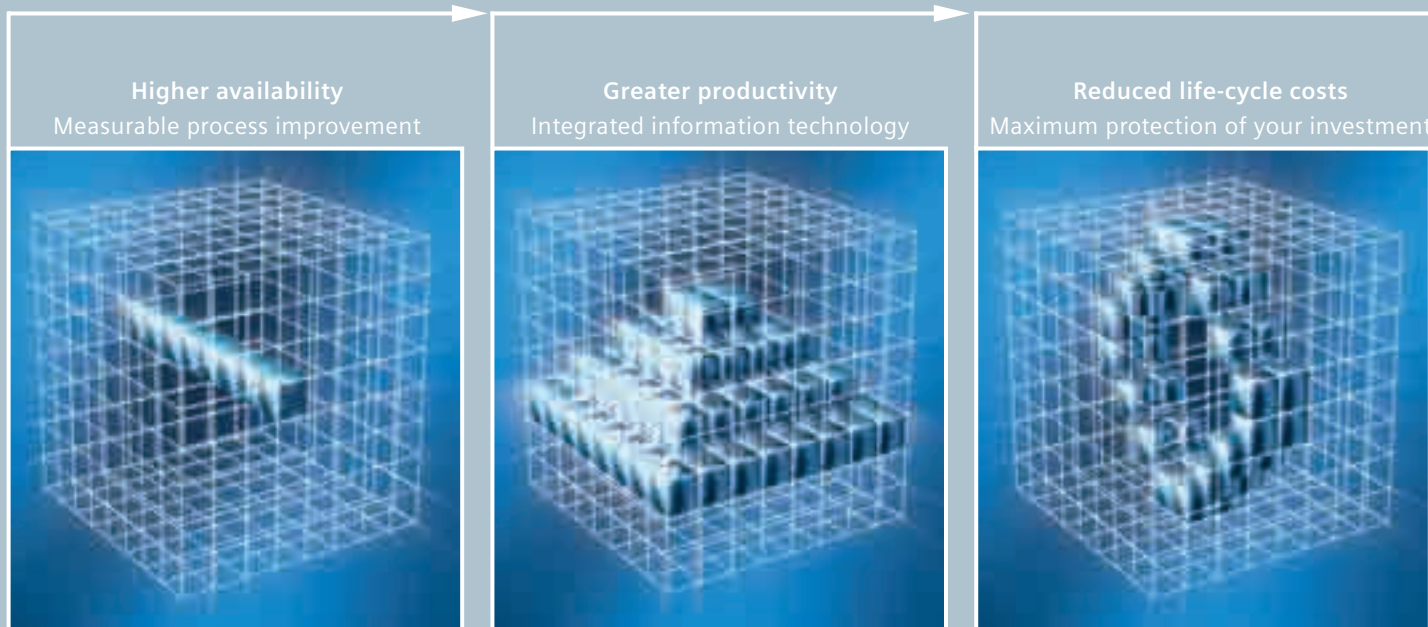
- Customer:** Kali und Salz, Kali GmbH, Hattorf plant, Philippsthal, Germany
- Requirement:** Complete modernization of production machine in the shortest possible conversion time during the summer break in 2006.
- Our solution:** Single-rope driving pulley with integrated 3,000-kW motor, 44.1 rpm, SIMOVERT D 12-pulse cycloconverter, transformers, refrigerating plants, medium-voltage switchgear, reactive power compensation equipment, regulation, safety equipment, shaft signaling systems, and new, feedback-controlled brakes.
- The result:** The solution with our integrated hoisting motor can be implemented with minimum interruption of production time, because the hoisting machine is completely preassembled and only needs to be mounted on the base. The modernization provides a solid basis for the Werra plant's potash production with enhanced availability – both today and for the future.

Securing the power supply

- Customer:** Lu'an Mining Group Co. Ltd., Shanxi Province, China
- Requirement:** Complete delivery and setting up of two high-performance skip-hoisting machines in the main shaft of the Tunliu mine with an annual output of 6 million tons.
- Our solution:** Two 4,000 kW hoisting motors with SINAMICS SM 150 voltage-source converters, transformers, medium-voltage switchgear, automation, safety system, and shaft signaling system.
- The result:** The SINAMICS SM 150 voltage-source converter is the ideal solution for pits with relatively weak supply networks. Compensation and filter systems are thus rendered superfluous. In general the system will help to cover the rising energy needs of today's China.

Completely Integrated Solutions with SIMINE^{CIS}

Integrated offerings for increased plant performance



End-to-end process optimization

We create the foundation for optimized processes with our engineering services and with leading automation, drive and energy supply products for all steps in the process – from extraction to material logistics to final processing.

At their core, these products are built on proven Siemens standards. We use this basis to set the benchmarks for efficiency and ergonomics through continuous innovation and new technologies. Examples range from the world's first gearless dragline (SIMINE^{CIS} DRAG) and our ring motors for processing plants (SIMINE^{CIS} Mill GD) to completely new processes for pelletizing plants (SIMINE^{CIS} Pellet).

Further solutions round out our portfolio for everything from water and sewage needs to power supply and other infrastructure projects, including all aspects of security for your mine.

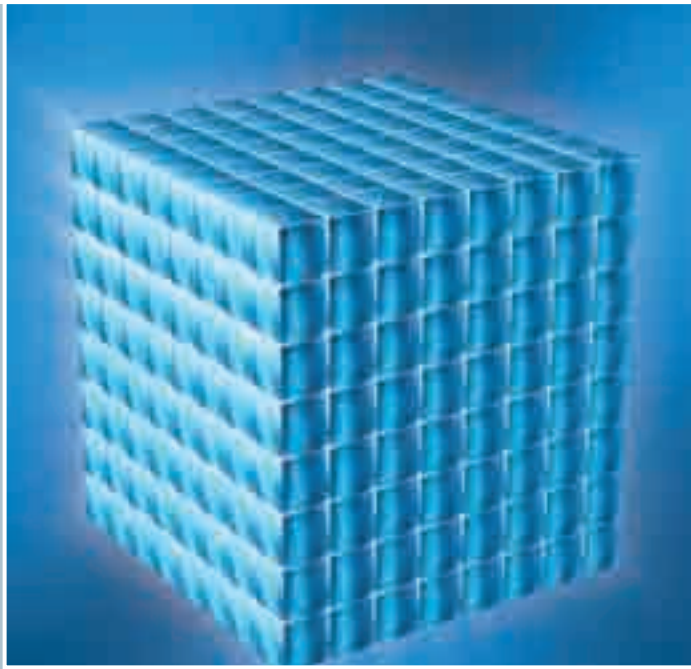
Efficient process control

Competitive processes also hinge on the quality of information processing. Data from various process steps must be condensed and compared against planning data to ensure an optimal process flow. Siemens solutions in the areas of IT and MES (manufacturing execution systems) lead the field for the mining industry, providing full transparency from the process to the planning and management level. Patented solutions enable systematic quality assurance, efficient logistics, flexible production and schedule planning, as well as end-to-end tracking and tracing from extraction to the processed material and back – such as SIMINE^{CIS} MAQ for creating the optimal quality mix.

Maximized life-cycle return

Siemens services help your mine achieve high profitability throughout its entire life cycle. We start in the planning, approval and financing phase, setting the course for a rapid, on-time start-up of operations. Efficient service measures and a reliable supply chain for spare parts ensure high availability of your equipment during active operation.

Last but not least, we ensure timely modernization so that your mine remains competitive while complying with strict environmental regulations. Every product in the SIMINE^{CIS} portfolio is equipped for a smooth hardware and software migration – so you benefit from current innovations while protecting the value of your investment.



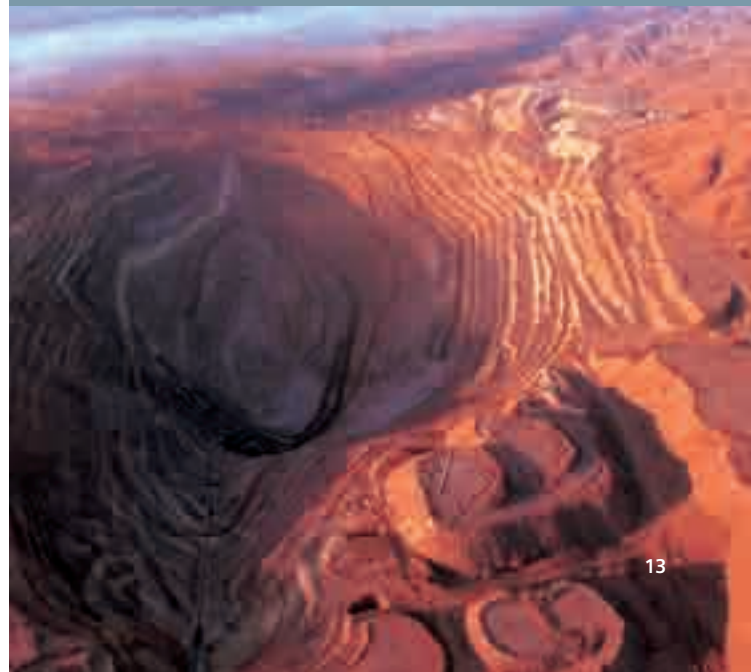
Perfect integration of every aspect

**Completely Integrated Solutions from Siemens –
how you benefit from an integrated concept:**

- Reduction of energy and maintenance costs, increase in productivity – for individual units and across the entire process chain
- Flexible response to real-life market and process situations through IT and MES solutions developed especially for the mining industry
- Systematic reduction of life-cycle costs through optimization of all cost factors
- Strong and sustainable competitiveness through smooth migration to new technology versions
- Reliable protection of your investment through integrated planning and anticipation of future demands

There are three primary aspects to increasing productivity and minimizing costs in the mining industry: raising the potential in each individual process step – optimizing the entire process chain to fully exploit synergies – and ensuring competitive performance throughout the entire life-cycle.

Our “Completely Integrated Solutions” cover all these aspects. The name SIMINE^{CIS} stands for a coordinated spectrum of products, services and expertise. From engineering to the implementation of leading electrical technology, from IT solutions for optimized process control to equipment modernization – SIMINE^{CIS} is your single source for optimizing production and logistics processes.



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