# Advantages<sup>3</sup>

SIEMENS

Ingenuity for life

Storage and retrieval machines for a higher throughput, safety and energy efficiency

siemens.com/conveyor-technology-asrm

# Flexible and modular solutions for storage and retrieval machines

The more flexible, faster and more precise they are, the higher the competitive advantages that can be created: Storage and retrieval machines are central elements in logistics and goods handling systems. They represent a significant potential for reducing costs and shortening time. Further, they play an important role when it comes to increasing energy efficiency. Protecting and safeguarding personnel is an additional key issue, which for storage and retrieval machines is clearly defined in C Standard EN 528. As a complete supplier of components and solutions, we have answers to all of these challenges. We are more than willing to help you implement your innovative concepts for storage and retrieval machines that are fit for the future.



LLIT



Efficient storage and retrieval machines based on highly innovative features When implementing efficient storage and retrieval machines, three points are of crucial significance. Firstly, increased throughput. Secondly, a well-conceived safety concept. And thirdly, increased energy efficiency. Our solutions satisfy all three of these points.

- Increased throughput as a result of maximum acceleration and deceleration rates – as well as a system that dampens mast oscillations.
- Compliance with storage and retrieval machine standard DIN EN 528 using a library of safety-relevant blocks certified by TÜV [German Technical Inspectorate].
- Increased energy efficiency based on intelligent solutions.

V synchronous operation and load distribution	Minimized slip	Maximized acceleration
Oscillation damping	Low mechanical stress	Increased throughput
Safety	System optimization	Flexible safety concept at all levels
Warehouse without buffer zone	Reduction of mechanical buffers	More space, lower costs
Energy efficiency	Energy recovery and energy equalization	Environmental protection and lower costs
Energy storage	Energy is stored in the DC link	Reduced power rating of the electrical peripherals

From the requirements through the technical solution to the specific advantages – you benefit at all levels with our solutions for storage and retrieval machines.

## The optimum solution based on Integrated Drive Systems and Totally Integrated Automation

When it comes to implementing your storage and retrieval machines, our products perfectly interact with Totally Integrated Automation (TIA) and Integrated Drives Systems (IDS). For storage and retrieval machines, Integrated Drive Systems especially represents a comprehensive boost to efficiency. Interfaces are minimized, all components can be guickly and optimally coordinated and harmonized with one another - therefore simplifying the complete engineering process. Not only this, the complete drive train is also perfectly integrated into the automation environment. This is where the advantages of Totally Integrated Automation come into their own: Siemens industrial automation ensures that all of the automation components work efficiently with one another. The seamless integration of all of the components used starts with the fail-safe SIMATIC S7-1500 PLC, through the modular SINAMICS S120 drive system up to SIMOTICS and SIMOGEAR motors. This allows you to achieve very short commissioning times – and secure safe operation with a high degree of reliability and productivity. More information in the video: siemens.com/ conveyortechnologyasrm-od





100% COMPLIANCE WITH DIN EN 528

More information in the video: siemens.com/ conveyortechnologyasrm-si



## Higher acceleration levels, lower mechanical stress

We have the optimum solutions to increase the throughput of storage and retrieval machines. Based on these solutions, the achievable acceleration levels can be maximized while minimizing wear at the same time. Further, mast oscillation is reduced using an innovative oscillation damping system, which allows less material to be used.

#### Intelligent all-wheel drive boosts performance

For two driven wheels at the travel gear, by suitably distributing the drive torque, acceleration can be maximized – and at the same time the system prevents the drive wheels from slipping. To achieve this, our application allows the drive torque to be statically and dynamically distributed between the two drive wheels.

## Oscillation damping in the drive increases the throughput

High acceleration rates automatically lead to mast oscillation. These oscillations can be avoided using the SINAMICS Technology Extension "Vibration Extinction (VibX)" without restricting the dynamic performance. VibX prevents the natural frequency of the storage and retrieval machine from being excited when the travel axes accelerate or decelerate. Depending on the load and the position of the load handling device, the frequency can be adapted during the runtime. A sensor is not required to sense mast oscillation. As a result of the oscillation damping, the mast comes to an adequate standstill in a verifiable shorter time so that the load handling device can enter the storage rack earlier, pick up the goods, retract and the storage retrieval machine can then travel to the transfer location. This boosts the throughput by up to 10% – and at the same time increases the warehouse capacity. Design and construction costs can be reduced due to the fact that the material is subject to a lower level of mechanical stress. Further, energy usage can be reduced as a result of the lower masses to be moved.

The performance can be increased by up to 15% through the combination of oscillation damping (VibX) and the intelligent all-wheel drive.

### Increased throughput

Integrated safety technology

# Safety concepts in compliance with the applicable standards

A comprehensive and flexible safety concept is absolutely crucial when it comes to protecting man and machine, and also optimizing the complete system. Based on our safety blocks, which we can provide to you free of charge, you can implement your safety concepts according to DIN EN 528 the standard specifically for storage and retrieval machines. These blocks have been certified by the TÜV, therefore representing a true plug-and-play solution. Here, the basis is Integrated Drive Systems. Customized safety concepts can be engineered through the optimum interaction between the Safety Integrated Functions of SIMATIC S7-F PLCs and SINAMICS S120 drives. We can provide you with concepts for warehouses, either without buffers or with a reduced dimensioning of buffers, safety functions - also for systems with inherent slip - as well as monitoring functions that are typical for storage and retrieval machines (e.g. slack rope or overload identification).



Safety-relevant velocity monitoring of the complete aisle – velocity reduction at the start and end.

## Using their own energy

In hoisting applications, drives must frequently brake large masses. Here, frequency converters with energy recovery significantly reduce the energy usage. By using our line module capable of energy recovery, energy can be recovered and used by other loads. A braking resistor is not required, the envelope dimensions of electrical cabinets are reduced and the cooling concept is simplified. Energy is equalized along the common SINAMICS S120 DC link bus, resulting in the lowest total losses in the system. Further, using capacitors (ultracapacitors) we can provide you with an innovative concept for storing energy in the DC link. In addition to reducing the infeed power by up to 80%\*) even when the power fails, the drives can still be electrically braked. This minimizes brake and wheel wear – and in turn increases the degree of availability of the storage and retrieval machine.

<sup>\*)</sup> For an overall efficiency of the electromechanical system of 90%. A reduction of about 64% is obtained for an efficiency of 80%.



#### Source: 2013 (Source: Ecofys/Fraunhofer)

### Higher energy efficiency by utilizing the braking energy

Complete portfolio for storage and retrieval machines

## Efficiency through perfect interaction

#### Servo geared motors fulfill every demand

SIMOTICS S-1FG1 servo geared motors perfectly match our SINAMICS S120 inverters. The complete drive system can be simply engineered and quickly commissioned by seamlessly integrating this drive system into Totally Integrated Automation (TIA), electronic type and rating plates and connecting the motors via the Drive-CLiQ system interface.



#### Every version has a high degree of efficiency

Compact SIMOTICS S-1FG1 servo geared motors set themselves apart as a result of their high efficiency and low torsional play, resulting in high precision motion with a high dynamic performance. SIMOTICS S-1FG1 is available from shaft heights SH36 to SH100 with helical, parallel shaft, bevel and helical worm gearboxes in up to 25 different ratios. The helical gearing means that the gearboxes have high smooth running properties and generate low noise. As a result of its low diameter, the pinion inserted in the motor shaft allows a high transmission ratio to be achieved in the first gearbox stage. This means that in some instances two-stage gearboxes can be used instead of three-stage gearboxes. The availability of operating brakes is another important attribute for storage and retrieval machines. These involve brakes operated by spring force. They are optionally equipped with a manual release, and are able to handle the braking work typical for travel and hoisting gear units used on storage and retrieval machines. These brakes can be ordered with different holding torques.

#### SIMATIC PLCs, SIMATI as well as industrial of





#### SIMATIC ET 200SP dis SIRIUS acquisition sys





More information in the video: siemens.com/ conveyortechnologyasrm-ee

UP TO 80% LOWER INFEED POWER

## C HMI operating control and monitoring systems ommunication and identification systems

- SIMATIC PLCs with the highest scalability (modular, embedded and PC-based)
- SIMATIC HMI panels with a finely graduated level of performance
- Communication based on Industrial Ethernet also via WLAN, PROFINET, PROFIBUS, AS-Interface
- SIMATIC sensors to sense the material flow

## tributed I/O and

- tems
- SIRIUS acquisition systems to "safely" monitor areas of plants and systems
- SIMATIC ET 200SP I/O (central/distributed) to acquire a wide range of sensor signals, including fail-safe sensors

### SINAMICS S120 modular drive system



- To fulfill the highest requirements regarding dynamic performance
- With integrated safety functions
- To implement various infeed/regenerative feedback concepts
- With integrated, freely programmable logic

#### SIMOTICS S servomotors and SIMOGEAR geared motors



- SIMOTICS S-1FG1 servo geared motors with a high power density, electronic rating plate, safety-related encoders and operating brakes
- SIMOTICS S-1FK7 servomotors with electronic rating plate and safety-related encoders
- SIMOGEAR standard induction geared motors with operating brakes, safety-related encoders and a power range extending up to 200 kW

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.

## Find out more: siemens.com/ids

Experience how Integrated Drive Systems can boost the competitiveness of production plants and entire companies in every sector.

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advantages of Integrated Drive Systems at a glance

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