

Lenze Intralogistics

Solutions for warehouse logistics



More than
75 years
experience in
**warehouse
logistics**



As one of the leading specialists in drive and automation technology, we always work closely with our partners to find the very best solution. With extensive know-how and a worldwide network of experts in intralogistics we are well suited to set your ideas in motion with an eye for the optimal solution. This is true whether you want to improve existing equipment or develop a completely new machine.

We partner with you in all phases of your projects in accordance with your individual goals and requirements. When you design an innovative overall concept, we are there to help you make it a reality.

With our regional subsidiaries, our experts are active in over 60 countries around the world, working with you to develop the best solution for your warehouse application. Around the globe, well-known customers from this sector partner with Lenze.

We develop innovative solutions for warehouse logistics by utilizing:

- Experienced experts who understand your requirements and goals
- Innovative hardware and software for the implementation of energy-efficient solutions
- Reliable drive systems for typical warehouse applications
- Open standards
- Global production with uniform Lenze quality standards
- Worldwide efficient logistics concepts
- A global service network and range of training courses offered



A comprehensive Lenze Automation Platform: Scalable for your machine

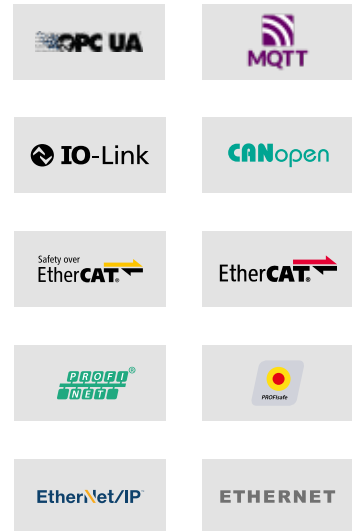
Comprehensive and open

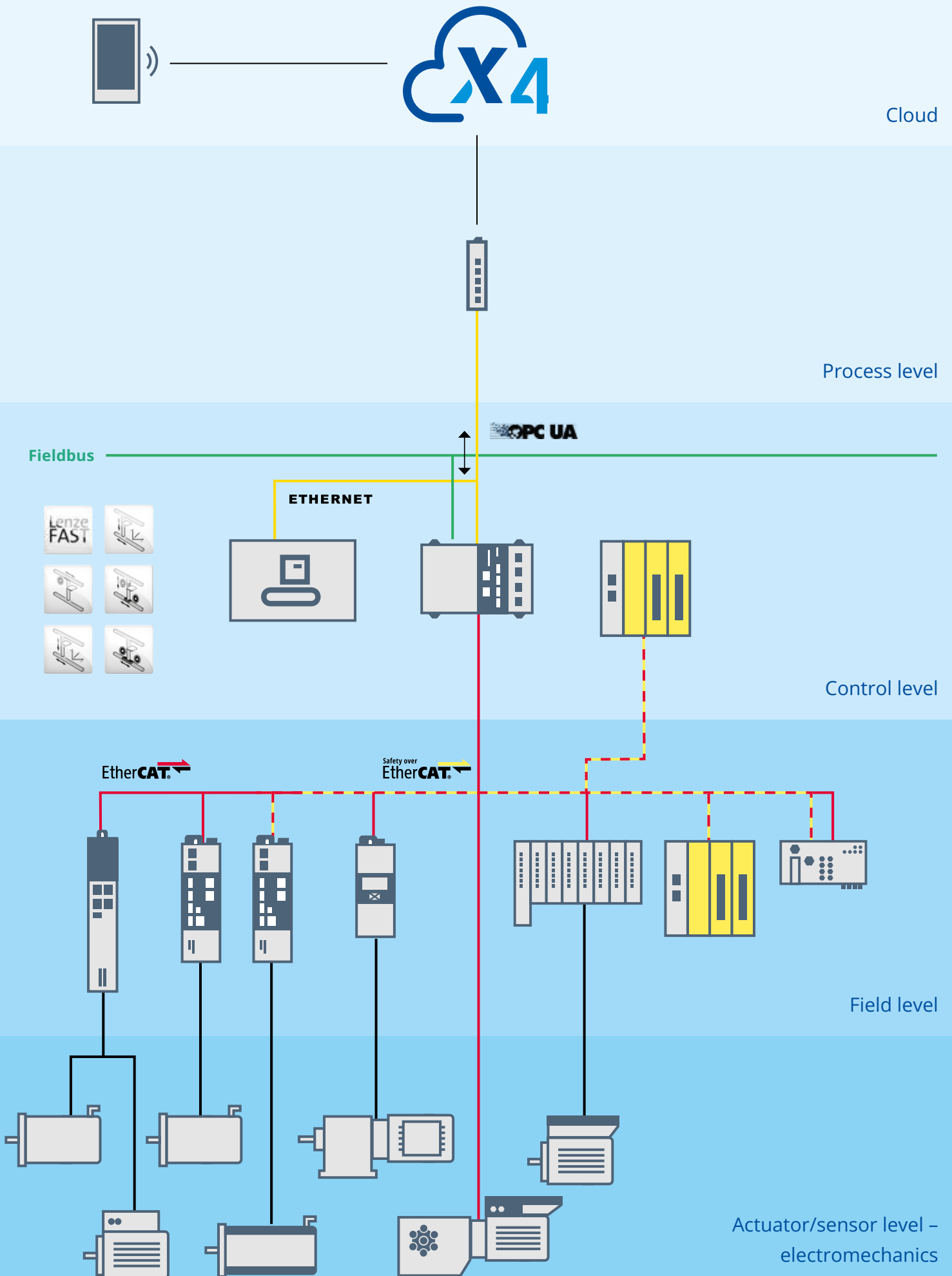
Our automation platform offers you everything from the control level to electromechanics for the implementation of a wide range of tasks. Thanks to our energy-efficient mechatronic portfolio you benefit from long-lasting quality and easy handling of all our products.

Furthermore, our platform is open for the efficient integration of components from various partners.

Compliance with market standards

We are able to network ourselves with control and drive systems at any time. This enables easy integration into higher-level line topologies. Design engineers and users can feel confident that this openness makes our platform future-proof, keeping your core expertise in-house.





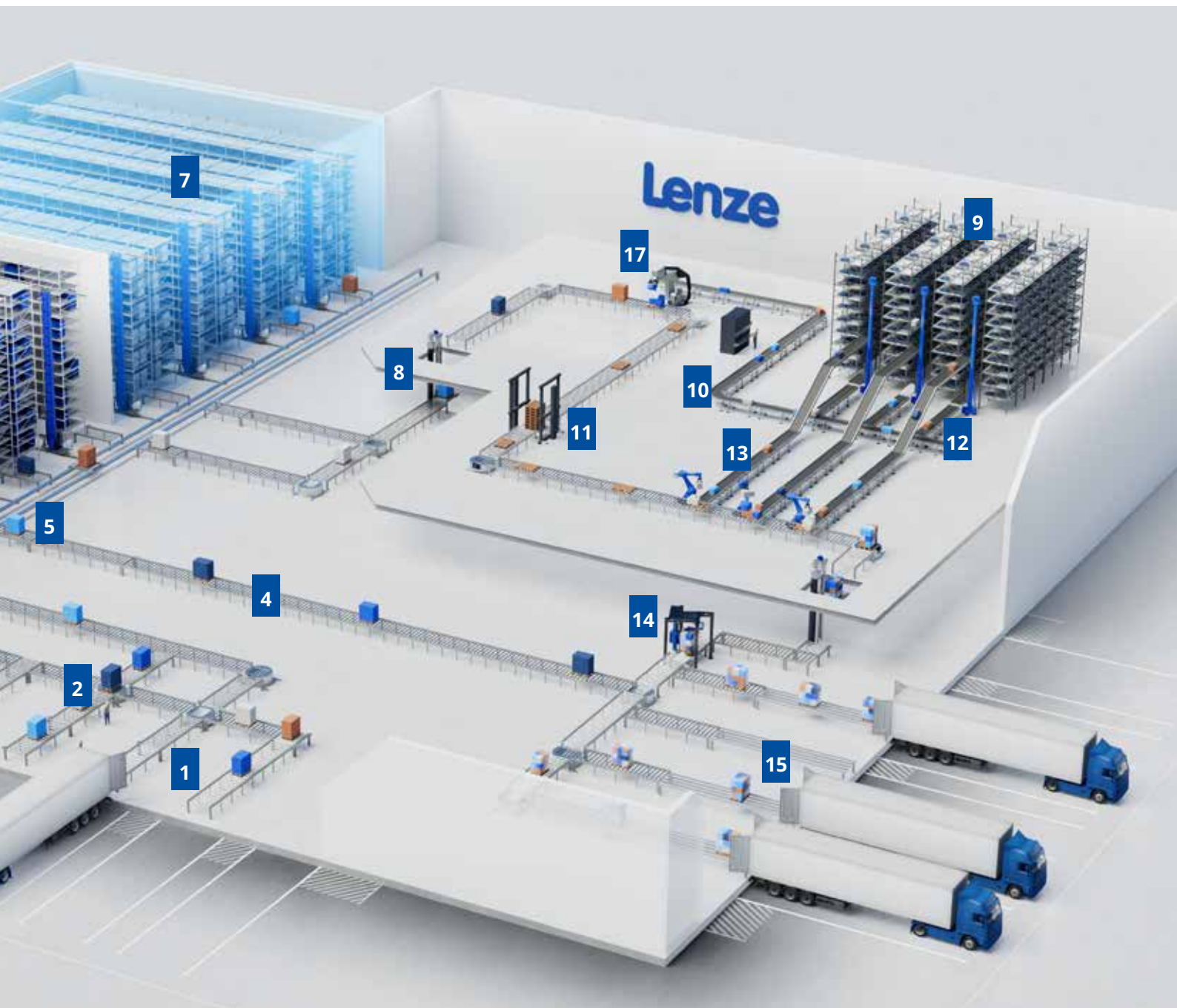
Automation and drive solutions for warehouse logistics

Different sectors such as wholesale, retail, fashion, and food and beverage place varying demands on the automation of a warehouse. Maximizing throughput, energy efficiency, safety, and digitalization, while being cost conscious are concepts that are in high demand.

With Lenze, you can realize the essential advantages of an automated warehouse. As a leading drive and automation specialist, we not only provide a broad product portfolio for implementing the complex tasks in warehouse logistics, but also an international team of experts. With this, you benefit from years of industry experience and the latest know-how in the automation of intralogistics. Together, we develop individual solutions to solve your intralogistics challenges.






- 1** Chain conveyer
- 2** Turntable
- 3** Corner transfer conveyer
- 4** Roller conveyer
- 5** Palett transfer shuttle
- 6** AS/RS (paletts)








- | | |
|---|--|
| 7 AS/RS (paletts, deep freeze) | 13 Palletizer |
| 8 Lifting station | 14 Foil stretching machine |
| 9 Automatic miniloading system (boxes) | 15 Automatic loading and unloading system |
| 10 Vertical carousel module | 16 Mobile racking |
| 11 Pallet depot | 17 De-Palletizer |
| 12 Belt conveyor | |



Preferred products for horizontal conveyor technology

Lenze Smart Motor	g500-H + m300 helical geared motors	g500-S + m300 shaft-mounted helical geared motors	g500-B + m300 bevel geared motors
			
Power range	0.47 – 1.36 kW	0.47 – 1.36 kW	0.47 – 1.36 kW
Torque	4 ... 1500 Nm	6 ... 2050 Nm	6 ... 1200 Nm
Energy efficiency	IES2	IES2	IES2



Frequency inverters	i-series i500 cabinet	i-series i550 motec	i-series i550 motec Extension Box	i-series protec i550 protec Extension Box
				
Design/Mounting	Control cabinet	Wall or motor	Wall or motor	Wall
Degree of protection	IP20	IP66	IP54	IP66
Mains connection/ Power range	0.25 – 132 kW	0.37 – 45 kW	Wall mounting 0.37 – 11 kW Motor mounting 0.37 – 22 kW	0.37 – 75 kW
Market approvals	CE, UKCA, UL, CSA, CCC, UKSepro	CE, UKCA, UL, CSA, CCC, UKSepro	CE, UKCA, UL, CSA, CCC, UKSepro	CE, UKCA, UL, CSA, CCC, UKSepro, CE, cUL
Digital input/output	5/1	8 I/O expandable through IOLink	8 I/O expandable through IOLink	5/1
Communication	CANopen EtherCAT EtherNet/IP IO-Link-Slave Modbus RTU Modbus TCP Powerlink PROFIBUS PROFINET	EtherCAT EtherNet/IP Modbus TCP PROFINET IO-Link-Master	EtherCAT EtherNet/IP Modbus TCP PROFINET IO-Link-Master	CANopen EtherCAT EtherNet/IP IO-Link-Slave Modbus RTU Modbus TCP PROFINET




Geared motors	g500-H helical geared motors	g500-S shaft-mounted helical geared motors	g500-B bevel geared motors
			
Power range	0.12 – 55 kW	0.12 – 55 kW	0.12 – 55 kW
Torque	3 ... 14000 Nm	6 ... 19000 Nm	6 ... 20000 Nm
Energy efficiency	IE2/IE3	IE2/IE3	IE2/IE3






Preferred products for storage and retrieval systems

Controller	c520
	
CPU technology	Intel® Atom™ 1.6 GHz
Operating system	RT Linux
Retain data	1,024 kB
Interface	1x EtherCAT master 1x Ethernet 1000 Mbps 2x USB 2.0
Optional interface	PROFINET device
Communication	EtherCAT master EtherCAT slave PROFINET IO-Device Ethernet 1000 Mbps

Frequency/Servo inverters	i-series i500 cabinet	i-series i950 cabinet
		
Design/Mounting	Cabinet	Cabinet
Degree of protection	IP20	IP20
Mains connection/ Power range	0.25 – 132 kW	0.37 – 110 kW
Market approvals	CE, UKCA, UL, CSA, CCC, UKSeppo	CE, EAC RoHs, UL
Digital input/output	5/1	4/1
Analog input/output		1/0
Communication	CANopen EtherCAT EtherNet/IP IO-Link-Slave Modbus RTU Modbus TCP Powerlink PROFIBUS PROFINET	CANopen EtherCAT Ethernet EtherNet/IP PROFINET FSoE PROFIsafe Operation with safety PLC

Lenze Smart Motor	g500-H + m300 helical geared motors	g500-S + m300 shaft-mounted helical geared motors	g500-B + m300 bevel geared motors
			
Power range	0.47 – 1.36 kW	0.47 – 1.36 kW	0.47 – 1.36 kW
Torque	4 ... 1500 Nm	6 ... 2050 Nm	6 ... 1200 Nm
Energy efficiency	IES2	IES2	IES2

Geared motors	g500-H helical geared motors	g500-S shaft-mounted helical geared motors	g500-B bevel geared motors
			
Power range	0.12 – 55 kW	0.12 – 55 kW	0.12 – 55 kW
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Energy efficiency	IE2/IE3	IE2/IE3	IE2/IE3

The image shows a vast industrial storage system, likely a pallet rack system, with a central aisle. The racks are made of metal and are filled with various items. A blue control unit is visible in the center of the aisle, featuring a small screen, buttons, and a warning sign. The lighting is bright, and the overall scene is clean and organized.

Lenze FAST:
Efficient
software
engineering

Machine
solution for
**storage and
retrieval units**

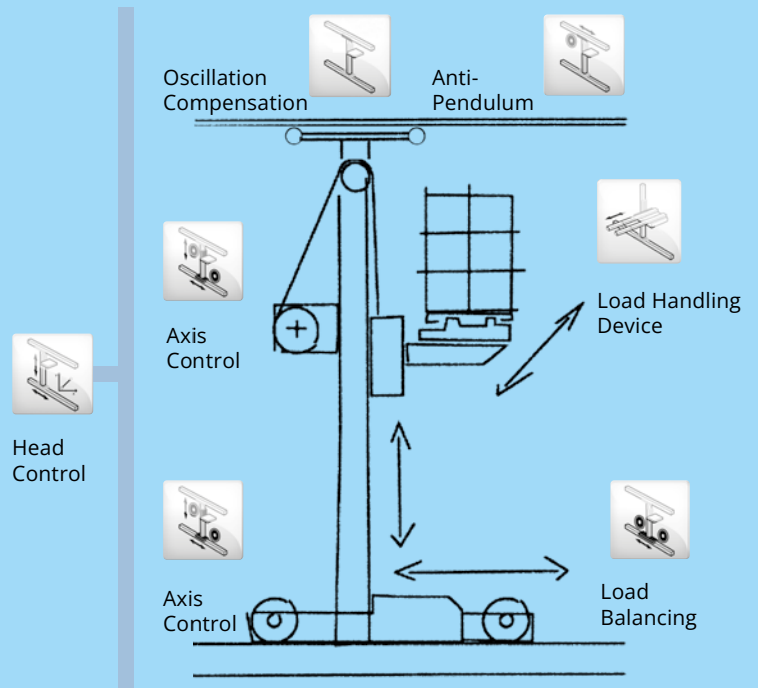
Lenze FAST is based on the experience from several thousand realized applications.

The Lenze FAST machine solution for storage and retrieval units is a ready-made PLC project for automation technology from Lenze, into which all ready-made drive concepts have already been integrated. Selection of the required components and adjustments is performed via simple parameterization.

Auto tuning allows for further simplification during commissioning by automatically calibrating all drive parameters, leading to optimum, dynamic control performance. This applies to all components in the carriage and lifting unit.

We made it possible to execute the most important control commands independently of the higher-level controller by means of a graphical user interface which simplifies the commissioning. The open IEC 61131 environment also makes it possible to integrate your specific know-how or additional functions.

FAST Technology Modules



Energy efficiency:

How over-dimensioning has a massive effect in drive design

Safety is good, but there is such a thing as too much of it. Analyses of countless discussions between our industry experts, machine builders, and plant operators have shown that there is often an unnecessary amount of safety buffer built into the dimensioning of plants. This is because everyone involved wants to play it safe when it comes to drive dimensioning. This adds up and has a significant negative impact on the efficiency of the entire plant.



Startup at full load, as it occurs after a blockage or jam, is often the „worst case“ on which the load specifications for horizontal conveyor technology are based. Safety buffers of $\geq 20\%$ are not

uncommon here. During the design phase, additional safety buffers of $\geq 20\%$ are added, which, in the overall consideration of the plant, over-dimension it by $\geq 44\%$. If this maximum requirement is applied in the system design without exploiting the overload capacity of the drives, this significantly reduces the efficiency of the overall system!

In normal operation, material handling applications always run in the partial load range of the drive train. It is clear that the

motor efficiency of an asynchronous three-phase motor decreases the further it is operated at partial load. However, what is often not sufficiently taken into account is the fact that the overall efficiency of a drive system results from the multiplied efficiencies of the individual components. In the low part-load range, even highly efficient gear units with a nominal efficiency of $>95\%$ thus become extremely inefficient. Efficiency data always refers to nominal efficiency.

A 1,000 Nm gear unit with a nominal efficiency of 95% in nominally point, for example, generates a loss of 5% or 50Nm.

In high-efficiency gear units, such as helical and helical-bevel gear boxes, these losses can be divided



into 60% speed-dependent losses (e.g. splash losses from the oil, friction from the shaft seal, ...) and 40% load-dependent losses (e.g. friction losses from the gearing, ball bearings, ...). The speed-dependent losses of the gear unit – unlike the load-dependent losses – remain constant, regardless of whether a fully loaded or an empty pallet is conveyed on the conveyor.

Let's return to our example: if the gear unit with a nominal value of 1,000 Nm and 95% efficiency is only loaded with 100Nm on average during operation, the speed-dependent losses are constant at 30Nm (60% of 50Nm). In contrast, the load-dependent losses decrease from 20Nm (40% of 50 Nm) to 2Nm



$$\eta_{Total} = \frac{P_{ab}}{P_{zu}} = \eta_{Inverter} * \eta_{Motor} * \eta_{Gear} * \eta_{Reduction\ gearing}$$

(100 Nm/1000 Nm*20 Nm). The gear unit therefore has 32Nm loss in this load profile, which corresponds to an effective efficiency of only 75%. Thus, the highly efficient gear unit is no longer as efficient as initially assumed.

Similar effects on the efficiency can be observed when using primary reduction gearing (belt & pulley), which in practice usually work with a safety factor and has load-independent churning losses of the belt. The asynchronous three-phase motor driving the gearbox or the primary reduction gearing has a nominal efficiency of >85, and can quickly reduce to 60% in the partial load operation.

All this has a serious impact on the system efficiency, since the efficiency is now included in the calculation with the multiplier 0.75 instead of 0.95, or 0.6 instead of 0.85.



however, achieve much higher increases in the efficiency.

Ultimately, it is the combination of expert knowledge of the application, the correct dimensioning of the plant, and the selection of precisely fitting products that creates added value for both sides: the machine builder reduces his costs by purchasing precisely fitting products, and the end user operates his plant more sustainably and cost-efficiently.



This results in a system efficiency far below 50% – despite highly efficient components in the drive train. The use of the latest high-efficiency drive components can still make sense for the efficiency of the system. However, the focus should not be on the individual components, but on the overall system. By using motors that are one or two efficiency classes higher, it may be possible to achieve a 5% improvement in efficiency. Optimal dimensioning and demand-oriented design,

“The combination of expert knowledge of the application, the correct dimensioning of the plant, and the selection of precisely fitting products that creates added value for both sides.”

We implement
your ideas with
enthusiasm
in motion



Reduced engineering costs

Shorter innovation cycles, higher customer requirements, a growing demand for tailored products and services as well as short time-to-market are challenges faced by every machine builder. Efficient engineering is essential:

- An engineering tool chain that ensures system continuity is the basis of engineering logic, visualization, safety, security, and motion
- Predefined and tested modules that provide basic functions reduce engineering costs and market introduction time.
- Modularization and scalability in software and hardware for flexibility and adaptation of the machine design

Future-proof system

For new, upcoming challenges, you require an open and highly modern system:

- Standard interfaces such as OPC UA for horizontal and vertical integration
- Simple integration of intelligent sensors
- Industry-standard interfaces for integrating third party products
- Open operating systems for the use of third-party software
- Simple and popular programming options
- Web-based visualization for use with standard browsers

**Smart factory support**

Support for connectivity, digitization and efficiency:

- Machine-to-machine communication
- Artificial intelligence with closed control loop for the machine parameters
- Access control and security mechanisms for an open yet secure solution
- Vertical integration into MES, ERP or cloud solutions
- Data collection and informative aggregation
- Big data analytics for performance assessments
- OEE improvement via error and state analysis
- Predictive maintenance and remote machine monitoring

Safe and smart machines

An integrated safety solution offers multiple advantages:

- Reduced space requirements for the machines when the shortest response times for ensuring constant operation are ensured
- Easy expandability and less wiring through the use of a safety bus system
- Lower system costs by reducing the space requirements and wiring complexity.
- Intelligent responses, e.g. reduced speed instead of machine shut down
- Better fault diagnostics thanks to more detailed error descriptions

Rapid and cost-efficient diagnostics and maintenance

Emergencies — how your customers receive rapid and efficient assistance in the event of an unplanned machine stop:

- Clear diagnostics data allowing rapid identification of the cause
- Easy access via remote login with full access to the visualization and the control system
- Automatic download of parameters and firmware when hardware is replaced
- Predictive maintenance for avoiding emergency scenarios
- Use of sensors and data analysis



Worldwide Services

You can rely on every aspect of our high quality standards.

Our service is designed to ensure the reliability of your machine and to guarantee its availability.

With proactive solutions that rule out any contingencies, as far as possible and structured procedures, the fast and smooth restoration of the machines' functions in an emergency is ensured.

A large number of our services can be used online at any time. You can of course also get personal support and advice from our specialists.



24/7 Lenze expert helpline

Online support

You can directly request support and repairs for specific Lenze products or order spare parts and call up technical data and documentation.

Simply enter the material number or scan the type plate with our integrated scan function. All support information is immediately available to you at a glance.

Replacement requirement

Are you using Lenze equipment and need to replace a complete device or some parts? We send you a corresponding quote quickly with our online service.

Original repairs from Lenze

In some cases, repairing a Lenze drive instead of replacing it could be a better alternative in terms of quality and cost-savings. This helps you minimize costly downtimes in cases of emergency and means that you don't have to keep large stocks of spare parts.

Maintenance with a plan

To ensure maximum machine availability, our maintenance package includes additional services that proactively safeguard your operations. We analyze your requirements together and customize your plan based on our many years of expertise in this field.



Original repair

Lenze

engineered to win

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