



INDUSTRY 4.0.

**SMARTER.
MORE EFFICIENT.
MORE FLEXIBLE.**

Added value through networking –
your path to Intralogistics 4.0.

 **JUNGHEINRICH**

Dear readers,

The fourth industrial revolution is well underway. It changes everything: the way we produce, how production and logistics work together, how people are supported and less burdened thanks to data and artificial intelligence, and how business success is ensured in the long term.

This whitepaper deals with the topics of digitisation and intelligent networking of data, trucks, devices and processes in logistics in order to prepare for the challenges of today, tomorrow and beyond.

We hope you enjoy reading and wish you all the best on your path to digitisation and automation.

Jungheinrich Team

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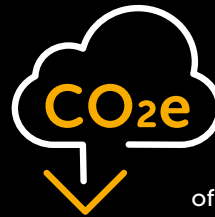
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Networking as an opportunity.



95 %

of companies in Germany see Industry 4.0 as an opportunity.
(Source: BMWK [Federal Ministry for Economic Affairs and Climate Action])



3/4

of industrial companies say that Industry 4.0 reduces CO₂ emissions.
(Source: BMWK)



According to a study by the German Logistics Association

82 %

of those surveyed expect that the use of artificial intelligence and automation technologies will increase in order to alleviate the labour shortage and skilled labour shortage in the warehouse.
(Source: BVL [German Logistics Association])



If you stored 400 trillion gigabytes of data on DVDs, the stack would be

2.6 million km

high. That's the equivalent of 63 trips around the earth or three and a half times to the moon and back. Experts estimate that this amount of data will be reached in 2030 through digital networking.

(Source: BMBF [Federal Ministry for Education and Research])



51 %

of small and medium-sized businesses expect their technology specialists to proactively suggest new digital solutions and help shape their technology strategy.

(Source: Microsoft)

Game changer 4.0.

Achieving more productivity with fewer resources – that is the goal of Industry 4.0. Digitisation and the Internet of Things are not only fundamentally changing production, but also the entire supply chain. The future is Intralogistics 4.0.

AUTOMATED PROCESSES

In the future, the industrial world will be completely interlinked. Production halls and warehouses are becoming increasingly intelligent with more and more new ways to gather and use data. Now that machines and objects are able to communicate with one another, extensively automated processes are enabling employees to work more safely and free from many monotonous and physically demanding tasks. This has long been the aim of Industry 4.0.

GENERAL FRAMEWORK

Industry 4.0 relies on communication between machines, intelligent production systems and the Internet of Things (IoT). We are already seeing very advanced digitisation, networking and automation, particularly in logistics and intralogistics. Experts refer to this as Intralogistics 4.0. But how can the necessary data be gathered, understood and applied? To achieve this, Intralogistics 4.0 creates a link between the real world and the digital world. For example, the machines in a warehouse independently report to the Warehouse Management System when they need new material. Fully networked mobile robots can carry out storage and removal processes automatically to optimise material flow, even during 24/7 operation if necessary.

DIGITAL SIMULATIONS

But it isn't just material flow that is optimised. Intralogistics 4.0 has so many other benefits. It can be used to create digital simulations, for example, when planning systems and processes. Industry 4.0 also offers advantages when forecasting and fulfilling potential order scenarios due to seasonal demand peaks, for example. Intralogistics planning departments can use simulations to change individual parameters virtually in order to accurately assess the resulting effects. This largely eliminates the need for the costly and time-consuming construction of real prototypes. The practical data required for the simulation can be taken from the fleet management systems. This includes, for example, the operating hours of the industrial trucks, the operating and maintenance costs incurred or the recorded impact events.

THE AIM

By combining all of this data, future operations or the composition of the truck fleet can be continuously adjusted and optimised. This results in more efficient processes, greater transparency and reliable material flow.

The overall aim is to reduce costs, optimise the use of energy and resources, and increase customer and staff satisfaction.



Shifting

Work instructions

Master data

FMS

Information

F1 F2 F3 F4

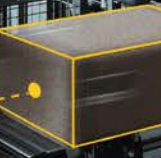
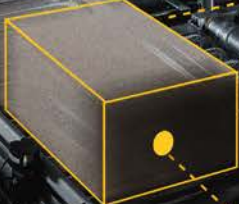
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Data is the gateway to new horizons.

**Greater efficiency and reliability
in the flow of information and goods.
Four premises for Intralogistics 4.0:**



1 | ENABLE DATA ACQUISITION

In order to gather data, your company requires comprehensive Wi-Fi coverage. Data can be acquired by networking industrial trucks (via a telematics box for smart trucks) and machines.



2 | COLLECT AND PROCESS DATA

Turn Big Data into Smart Data. To achieve this, the right software must be used for the respective application. The aim is to filter out the most relevant KPI and present the data simply and clearly.



3 | USE DATA PROFITABLY

Optimise your warehouse and material flow based on qualified data from your systems. Either process the data manually or let the system suggest courses of action using Proactive Analytics/AI. AI-supported forecasts help you manage bottlenecks in order picking or upcoming maintenance requirements, for example.



4 | RELY ON AUTOMATION FOR OPTIMISATION

Automated guided and autonomous vehicles such as mobile robots assign transport orders independently and without human intervention, and carry them out in a distance and time-optimised manner. They are able to continuously improve based on the situations and orders that arise.

In intralogistics, fleet management systems have been providing a variety of practical data for years. Warehouse management systems can also be used to record throughput times, order picking times and picking performance, for example. This data is then used to analyse and optimise warehouse processes.



Grow with demand.

Jungheinrich achieves Intralogistics 4.0 with solutions tailored precisely to the requirements of customers and systematically implemented together with the customer.



STEP 1:

ENABLE DATA ACQUISITION

- ▶ The telematics box installed in every Jungheinrich truck ensures precise digital recording of the use and condition of the trucks and networks the fleet.
- ▶ In addition, faster and more precise information about possible error messages helps to minimise downtime.
- ▶ Response times are accelerated and the right conditions for predictive maintenance and remote diagnostics are created.

STEP 2:

COLLECT AND PROCESS DATA

- ▶ The data collected by the telematics box is displayed in the Jungheinrich FMS, Jungheinrich's fleet management system, as well as other locations. This means that all fleet data can be managed and evaluated in the Jungheinrich FMS.
- ▶ In the Jungheinrich WMS, Warehouse Management System, the data on all goods movements and warehouse processes is mapped, analysed and optimised.
- ▶ The Jungheinrich WMS also supports the automated and detailed analysis of large amounts of data using proactive analytics and clearly displays identified trends and deviations.



STEP 3:

USE DATA PROFITABLY**► Warehouse management**

Using the data collected in the WMS and its data centre, possible capacity bottlenecks can be predicted and trends and outliers can be identified. As a result, existing resources can be used optimally and search times, returns and error rates can be effectively reduced.

► Fleet management

The Jungheinrich FMS is a web-based tool that combines technical and commercial truck data in one system. This enables a detailed analysis of utilisation at truck level. Unused or inadequate capacities as well as potential for optimising the fleet composition are easy to identify.

► Interface management

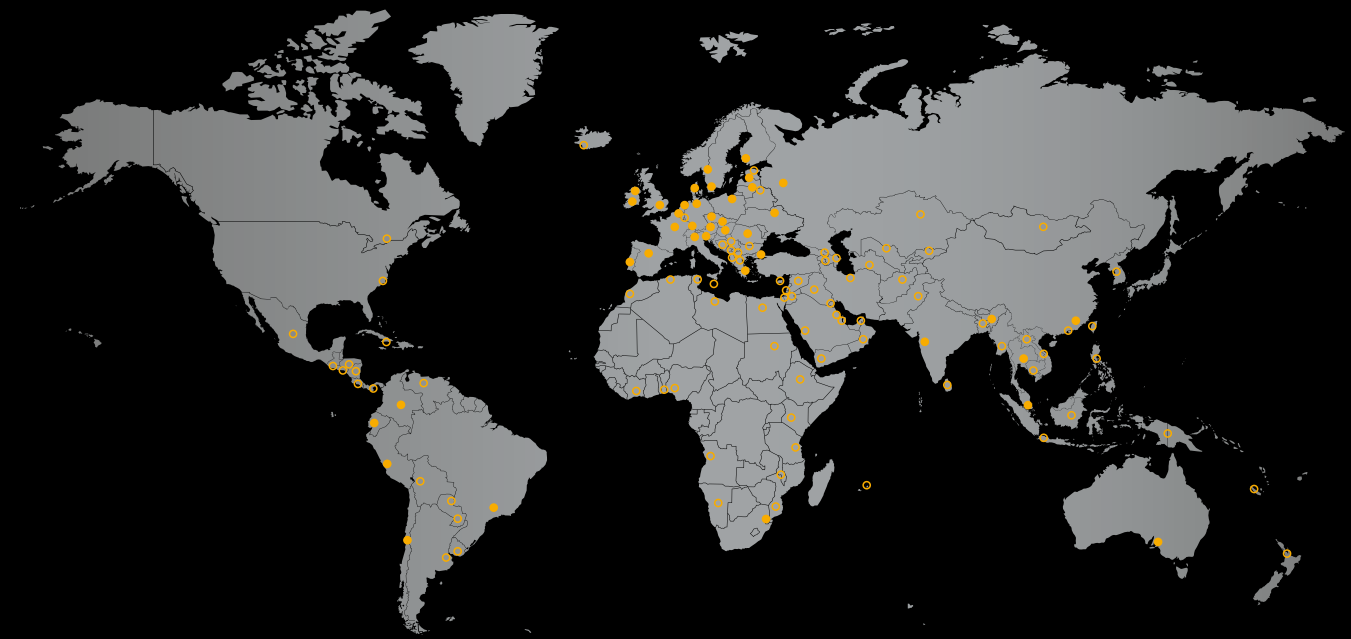
In order to get the most out of the data, optimal interaction between hardware and software is essential. Interface management solutions from Jungheinrich ensure an optimal connection and efficient data exchange between trucks, warehouse technology and software. Former manual processes can be partially automated and can therefore be carried out more efficiently and ergonomically.

STEP 4:

RELY ON AUTOMATION FOR OPTIMISATION

- Industrial trucks, warehouse components, logistics processes, software and IT security form a self-sustained ecosystem at Jungheinrich. The systems are designed to learn to control and optimise themselves using AI and machine learning. At great benefit to those who work with them.
- One example of this is the autonomous mobile robot arculee S from Jungheinrich. The small and agile autonomous robot works seamlessly with other AMR and AGV in Intralogistics 4.0 and thus helps to significantly increase throughput and efficiency in the warehouse.

A leader in intralogistics. There for you across the globe.



● Our own direct sales companies in 42 countries.

○ Partner companies in around 80 other countries

More than 20,000 employees.

More than 6,100 service engineers worldwide.

Founded in 1953, Jungheinrich is one of the world's leading providers of intralogistics solutions. With a comprehensive portfolio of industrial trucks and automated components, as well as services, we offer tailor-made solutions that allow you to devote your full attention to your core business. With our unique direct sales and service network, you can call upon a reliable partner who is at your side at all times, wherever you may be in the world.



AUTOMATED SYSTEMS

Based on our comprehensive process knowledge and extensive experience in a wide range of industries, we can provide you with tailor-made automated systems, ranging from semi to fully automated solutions. We will thus work together to raise your efficiency and productivity to a whole new level.



NEW TRUCKS

Lifting, stacking, transporting, order picking – electrically, by combustion engine or by hand? Our product portfolio contains the perfect trucks for your needs.



WAREHOUSE EQUIPMENT

From pallet racking to automated small parts warehouses, we have the right solution for every item and warehouses of all sizes. Combined with Jungheinrich industrial trucks and IT solutions, the result is a future-proof, integrated intralogistics concept of unique quality.



RENTAL

Forklift truck rental is not just an ideal solution for addressing short-term or seasonal requirements. Jungheinrich offers "power on demand" for all companies, regardless of their size or industry. There are rental solutions available to suit all requirements, with trucks available instantly in a wide number of variants across the globe.



USED TRUCKS

JUNGSTARS are used trucks from Jungheinrich, which are among the best on the market. With high-end reconditioning according to our 5-star principle, every truck is returned to an outstanding technical and visual condition to satisfy the highest safety and sustainability standards.



DIGITAL SOLUTIONS

With intelligent software and sophisticated hardware components, we ensure complete digital networking within your warehouse. All processes can be monitored centrally and controlled with utmost efficiency. Systems from different manufacturers can also be integrated with ease.



CONSULTING

Products and services must meet your exact requirements. That is why our consulting service combines a high level of technical ability with process knowledge and in-depth industry expertise. We can thus work together to identify the perfect complete solution.



FINANCING

Jungheinrich Financial Services is your reliable partner throughout the entire life cycle of your Jungheinrich product. We offer individual solutions for trucks, racking, warehousing and system solutions, while taking your budget and the special requirements of your business into account.



AFTER SALES

The trouble-free operation of your intralogistics solution is our top priority. That is why we offer reliable, global support for your trucks and systems with more than 6,100 qualified service engineers. This allows us to be on-site within a very short time frame to restore the availability of your trucks and systems.

ISO 9001 The German production facilities
ISO 14001 in Norderstedt, Moosburg, Landsberg
and Kaltenkirchen are certified.

 Jungheinrich trucks
conform to the European
Safety Requirements.

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