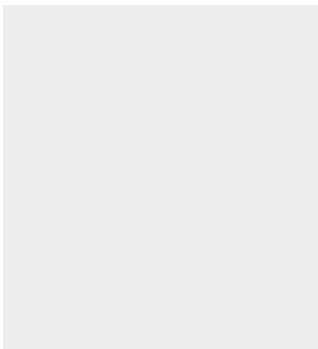
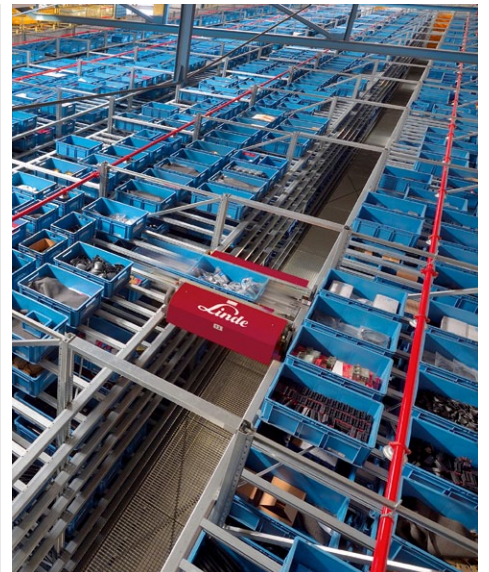
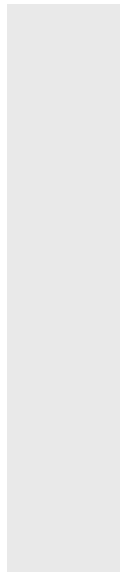
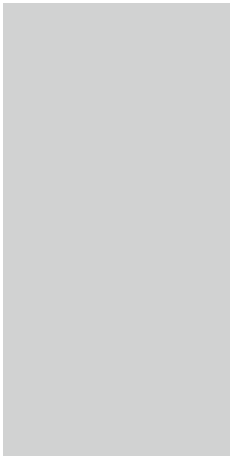
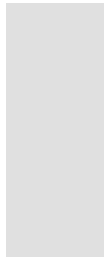


Linde Material Handling

Linde

INTRALOGISTICS SOLUTIONS

Reliability. Versatility. Performance.



ONE-STOP SYSTEM SOLUTIONS

From product expertise to process expertise

Many businesses today are finding that the sheer flow of goods – driven by online sales – is demanding ever faster working procedures. And while processes are becoming smaller and more specialised, the number of units handled is climbing to dizzying heights.

Many companies are therefore being forced to fundamentally rethink their procedures and to automate repetitive operations. This has costs benefits, increases workplace safety and makes process chains more manageable for the workforce.

In the world of intralogistics, expertise is less about the products and more about the processes, and combining solutions to form an inte-

The focus on smaller-unit stock movements with more individual picking and packaging demands increasingly efficient stock handling

grated process chain. The key here is tailored consultation, based on a thorough analysis of the starting position and a joint identification of future needs.

The intralogistics solution has to grow with the business model, so a sustainable intralogistics solution offers components for varying degrees of automation. The advantage: existing processes, structures and equipment can be integrated into the overall solution – minimising the investment risk. Linde Material Handling specialises in this kind of process optimisation and focuses on a safe, efficient and flexible supply of materials.

MORE EFFICIENCY, POINT FOR POINT

1. INCOMING GOODS

Every smooth-flowing production chain begins with efficient unloading, lifting and stacking. Linde MH's broad selection of high-performance transport systems (trucks and stackers) offers a diverse range of options when it comes to individual solutions.

6. OUTGOING GOODS

Even minor errors when loading outgoing goods can bring entire process chains to a halt. Linde MH's vast range of options delivers individual, pinpoint handling and loading at the end of the process chain too.

5. DISPATCH

The process of consolidation is closely linked to order picking and outgoing goods. Grouping the items to be dispatched requires highly developed material handling components and reduces transport and shipping costs. The WMS (Warehouse Management Systems) used enable transparency plus an efficient flow of materials.

TGS TRUCK GUIDANCE SYSTEM

The Truck Guidance System optimises the flow of materials by identifying products and pallets, monitoring stock and allocating driving tasks, increasing the efficiency of intralogistics.

WMS

WAREHOUSE MANAGEMENT SYSTEM

The WMS manages, controls and optimises the different intralogistics processes.

2. STORAGE

Storage is at the heart of the various processes. Optimum use must be made of the available space, and products of various types and sizes must be stored efficiently. The broad portfolio of Linde MH storage systems (automatic or manual) is designed to allow stock to be moved in and out of storage efficiently, whether from a range of different rack types or on the floor.

3. PRODUCTION SUPPLY

Linde MH production supply is about an intelligently controlled, optimum movement of goods, ensuring that they are in the right place at exactly the right time. Tailored transport solutions (manual or autonomous) based on actual requirements ensure process reliability, cost-effectiveness and energy efficiency.

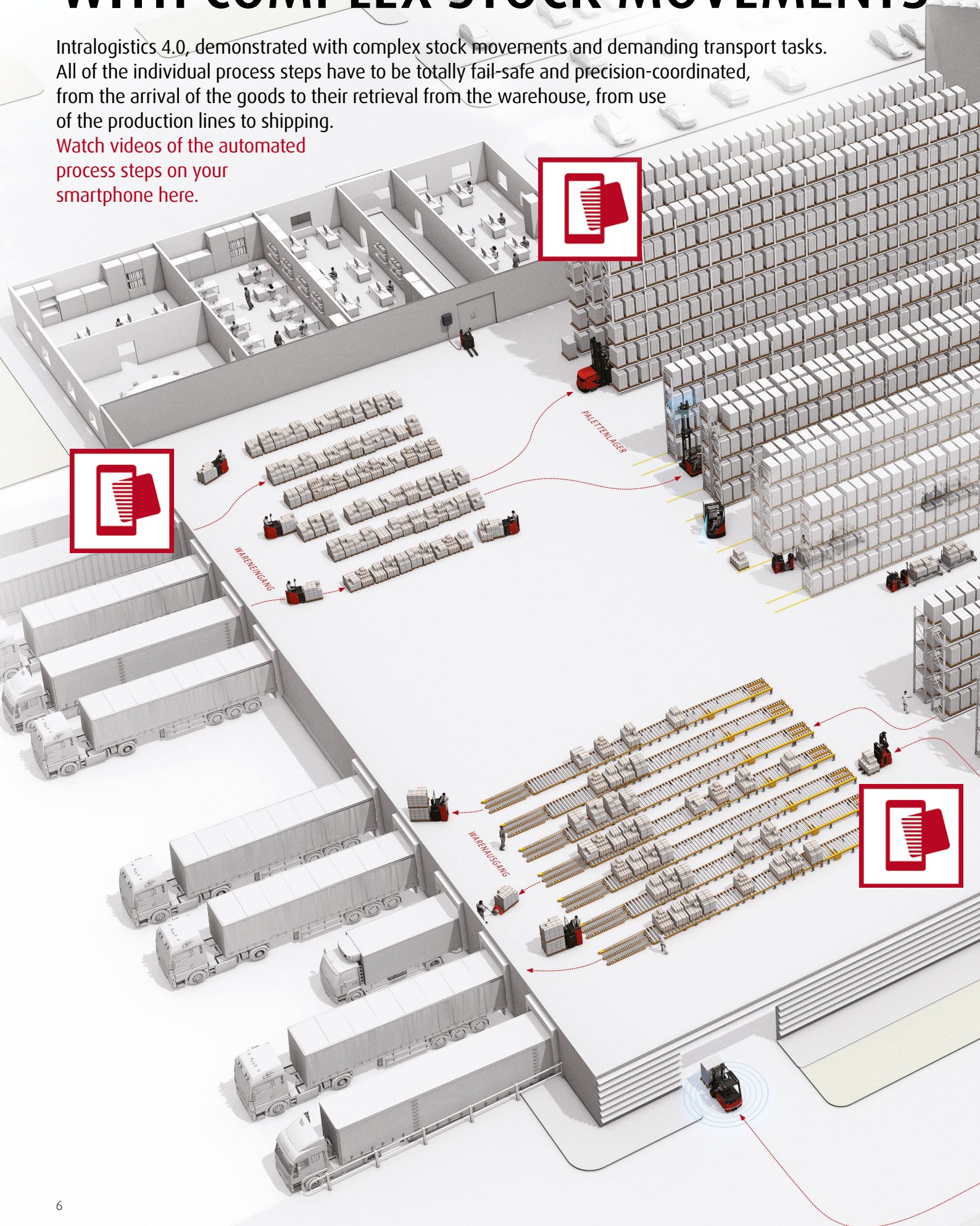
4. ORDER PICKING

The human-machine interface ensures smooth single-stage and multi-stage order picking. The Linde MH solution portfolio is designed for error-free picking operations and on-time delivery of goods, strengthening the client's competitive position.

DEMONSTRATING INTRALOGISTICS 4.0 WITH COMPLEX STOCK MOVEMENTS

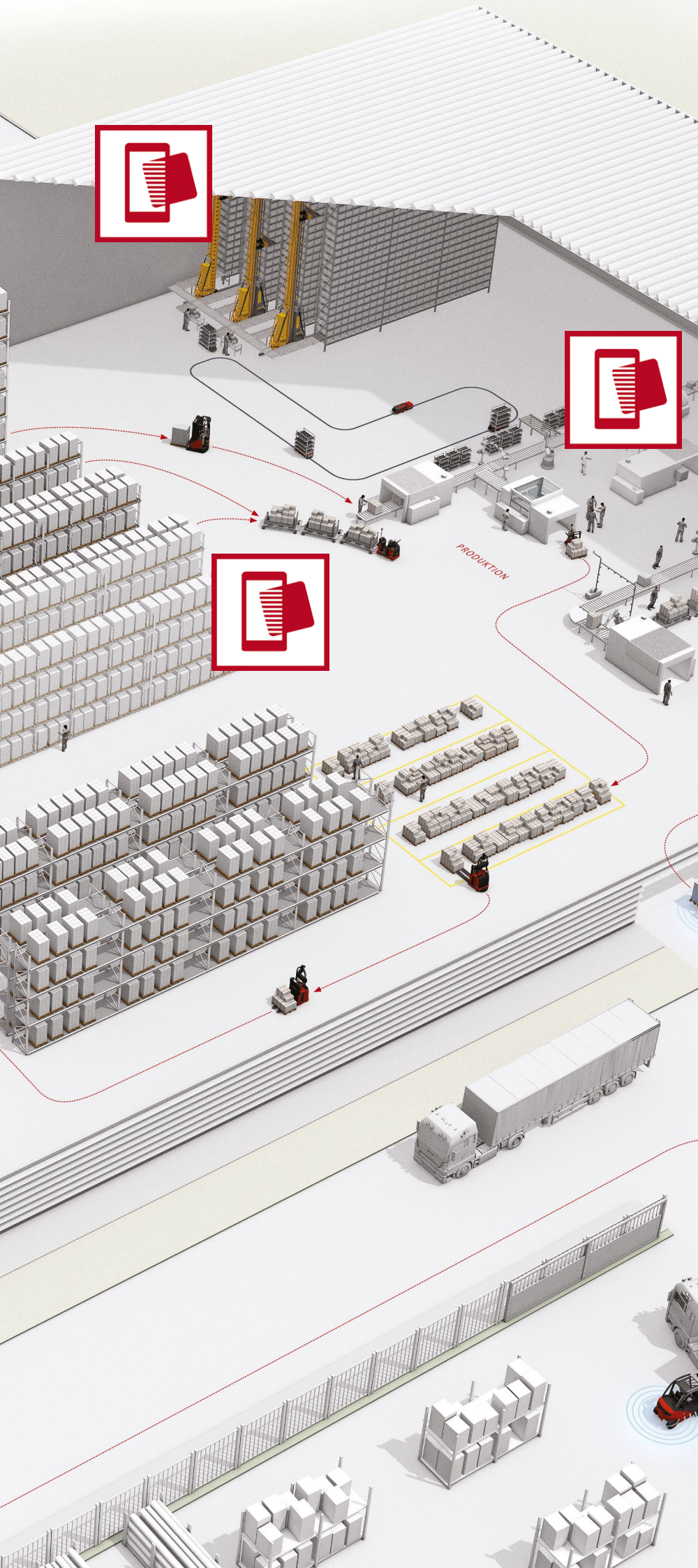
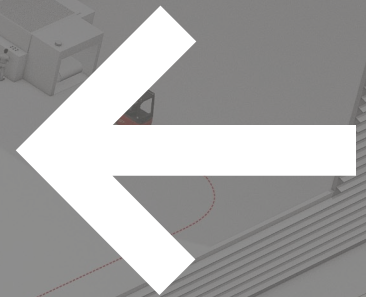
Intralogistics 4.0, demonstrated with complex stock movements and demanding transport tasks. All of the individual process steps have to be totally fail-safe and precision-coordinated, from the arrival of the goods to their retrieval from the warehouse, from use of the production lines to shipping.

Watch videos of the automated process steps on your smartphone [here](#).



EXPERIENCE INTRALOGISTICS 4.0 LIVE ON YOUR SMARTPHONE!

1. Download the
"Linde Move AR" app
from the App Store
2. Start the app
3. Hold your smartphone
over the two pages in
camera mode
4. Launch the 6 videos!



EIGHT STEPS TO SUCCESSFUL INTRALOGISTICS PLANNING



1

PROJECT DEFINITION

Outlining the project in writing, precisely defining the planned task and specifying the intended objective of the entire project.

2

STATUS CHECK

Recording the current status, i.e. all areas relevant to the project, along with their corresponding work processes and structural data (item and warehouse data, performance values, times taken, client aims and expectations, etc.).

5

ACTION PLAN

Creating a list of all measures required in terms of structure, processes and IT (target concept). Drawing up a cost projection and a timetable, indicating potential savings.

6

SOLUTION DEVELOPMENT

Drafting potential system solutions with a focus on equipment, organisation, control and management and how these will be implemented within the context of the available and agreed structures.



**Frank Heptner, Senior Director Consultancy and Projects
Intralogistics Solutions at Linde MH:**

“ Achieving futureproof intralogistics doesn't necessarily have to involve a huge budget. What you need is expert consultation, and people who are able to analyse the current situation on-site and develop an individually tailored solution from existing system components. Linde Material Handling offers everything from a single source – from the first conversation to planning, implementation and a lifetime partnership. ”

3

ANALYSIS PHASE

Establishing the weak points in the recorded workflows, turnaround times and waiting times, error rates, damage incidence and key metrics (storage, transport, order picking).

4

POTENTIAL ASSESSMENT

Working out the options for improvement in terms of organisation, new equipment and information technology and defining the target status.

7

SOLUTION COMPARISON

Comparing the draft solutions and creating a decision matrix based on the key project variables. Consideration of the potential for savings and outlining the anticipated return on investment.

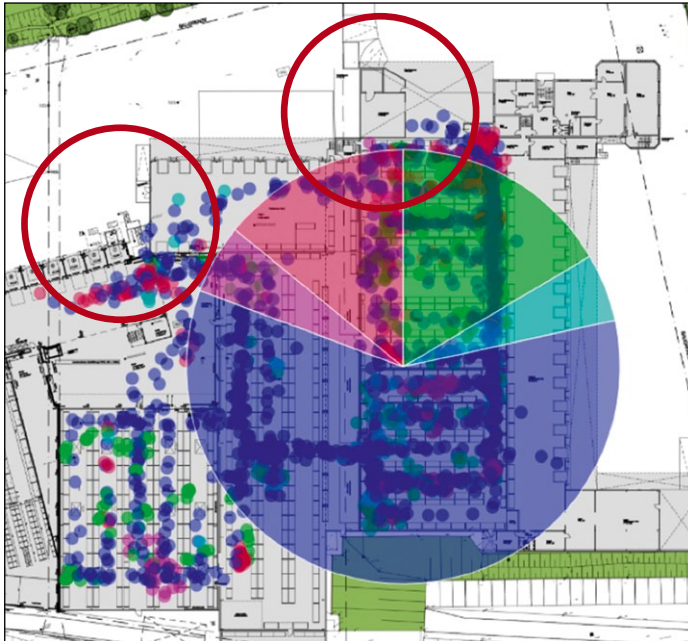
8

MANAGEMENT SUMMARY

Drafting a recommendation based on the key project criteria, including evaluation of the individual systems, as a decision-making tool for the client.

1 ERROR RATE HALVED AND PRODUCTIVITY BOOSTED THANKS TO THOROUGH ANALYSIS

MULTI-MOMENT ANALYSIS 2016/2017



2016

REDUCED TRANSIT TIME / INCREASED PRODUCTIVITY



2017

TASK The medium-sized enterprise EGV in Unna specialises in communal catering for the healthcare and social services sector, educational facilities, corporate catering facilities and the regional and national hotel sector. The company's goal is to provide these different groups with highly efficient, high-quality, precisely timed food deliveries.

CHALLENGE Supplying precisely timed food orders to a range of different clients on a daily basis, with a constantly expanding portfolio (from hygiene products to refrigerated and frozen products), and a process chain extending from vehicle loading to delivery at the on-site warehouse.

SOLUTION Multi-moment analysis across the entire central warehouse and heat map analysis to determine pivotal movements. This allowed all processes to be categorised and error sources, as well as unnecessarily time-consuming, unproductive workflows, to be identified. Careful analysis helped pinpoint the potential for optimisation.

BENEFITS OF THE SYSTEM SOLUTION Various insights were gained. The installation of new, local printers removed the need for time-consuming journeys to the central printer to print out orders. An automated stretch machine made for more efficient film wrapping. Vehicles with a lift ensured quick, ergonomic order picking on multiple levels, reducing waiting times. It was established that the same volume of work could be achieved in the same amount of time with fewer people.



Client: EGV AG, Unna

Employees: 385

System solution:

Conventional food warehouse with 3 temperature zones (dry storage +10 °C, refrigerated storage +7 °C and frozen storage -20 °C)

Product: Foods

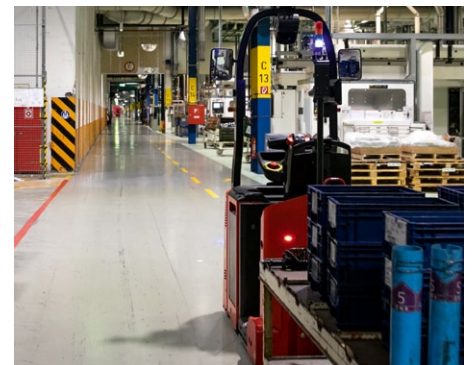
Area: 18.000 m²

Capacity: 8,548 order picking bays, picking zones on platforms

Scope of supply: Planning (process analysis)

Stock movements: 17,500 picks per day

2 EFFICIENT TRANSPORT OF GOODS THANKS TO AUTOMATED TUGGER TRAINS



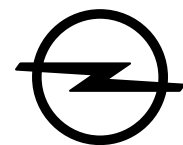
Many different goods have to be transported long distances

TASK The Opel plant in Aspern (Austria) produces engines and transmissions. The production line has to be supplied with exactly the right items from the warehouse at exactly the right time, and manufactured items have to be placed in temporary storage. The highly cost-conscious plant is constantly looking for more efficient solutions in all areas. The goal: more cost-effective goods transport and greater safety for personnel, transported goods and processes.

CHALLENGE Ensuring the most efficient and safest possible transport of a wide range of materials, varying in quantity and size, at various times to various destinations. Dealing with extremely long transport distances (journeys of 1.5 km in a production area of 149,500 m²) with constantly changing process flows.

SOLUTION After consultation, the status quo was recorded and analysed and then a system solution developed that offered the best possible value for money. Autonomous trolley trains with a range of different trailers were used. These are controlled via GPS navigation. Implementation of this solution did not involve changing the existing structure or making alterations to the existing floor.

BENEFITS OF THE SYSTEM SOLUTION Processes were radically simplified and noticeable cost savings were achieved at the same time. Automation reduced the risk of accidents along the lengthy process chain.



Client: Opel Wien GmbH

Employees: 1,600

System solution:
Automated trolley trains

Transported goods: Small load carriers and cardboard boxes

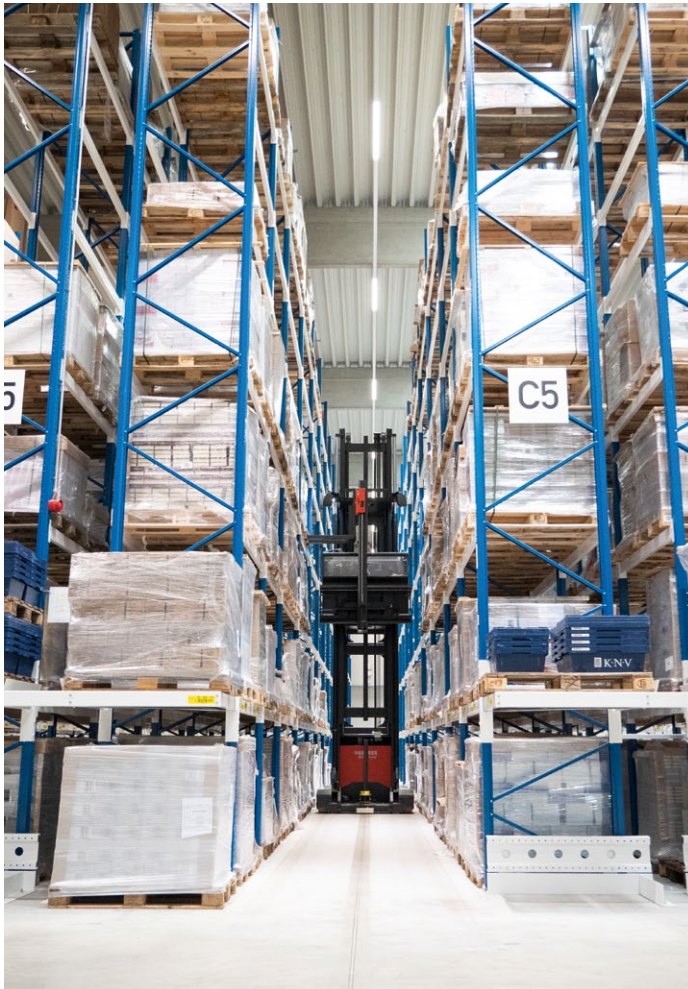
Product: Small parts for engine and transmission manufacturing

Area: 149,500 m² production (l x w: 906 x 182 m)

Scope of supply: Planning and realisation, automated transport systems incl. navigation system and interface to ERP

Stock movements:
6 journeys/hour (each 1.5 km)

3 EFFICIENT SMALL-UNIT STOCK MOVEMENTS THANKS TO CUTTING-EDGE TECHNOLOGY



A bird's-eye view of the KNV Logistik reserve warehouse in Arnstadt



Extremely small-unit stock movements in media logistics



TASK Development of a sustainable system solution for the new reserve warehouse of the media logistics company KNV Logistik GmbH in Arnstadt near Erfurt as a pioneering step on the road to Logistics 4.0.

CHALLENGE Extremely small-unit stock movements as a result of the vast number of books and the complex associated requirements. To achieve greater efficiency and operational reliability, specific racking technology and a complex system solution involving a variety of trucks were required.

SOLUTION Semi-automated warehouse system (automated driving, manual picking) with over 90,000 pallet bays for picking at a height of up to nine metres. Interface to higher-level WMS in order to control incoming and outgoing goods and to manage stock. All required components from a single source.

BENEFITS OF THE SYSTEM SOLUTION Efficient, safe processes and greater reliability as a result of the semi-automated system with direct access to all items in the warehouse.

KNV • LOGISTIK

Client:

KNV Logistik GmbH Erfurt

Employees:

1,000, 70 in reserve warehouse

System solution:

Semi-automated narrow-aisle warehouse (automated driving/manual picking)

Goods stored:

EUR-pallets and tubs

Product:

Books/media

Area: 43,000 m²

Capacity:

> 90,000 pallet bays

> 55,000 small load carrier bays (tubs)

Scope of supply:

Planning and realisation, warehouse and transport systems incl. racking system

4 AUTOMATED TRUCKS FOR EXCEPTIONALLY HIGH RACKING



The 16 m high special racking in the new warehouse



TASK Developing a complete system solution following the merger of several depots into a large complex in Hartmannsdorf near Chemnitz. Setting up a high-rack warehouse with all the trimmings: 14,500 pallet bays, consistently efficient workflows, including labelling of the stored goods, and sustainably economical and safe goods transport with cutting-edge truck technology. The objective: more efficient logistics with a faster turn-around rate and greater safety for all associated processes.

CHALLENGE Responsibility for the complete project. From planning the 16 metre-high racking, to introducing highly developed truck technology, procuring all of the system components and constructing the racks.

SOLUTION A complete system solution, with high-performance trucks that can cope with loads of up to 650 kg at a height of 16 metres, can be precision-controlled using warehouse navigation and floor loops as they make their way through the high, narrow-aisle warehouse and are reliably networked with the ERP system.

BENEFITS OF THE SYSTEM SOLUTION Sven Mohaupt, Production Director Komsa AG: 'The new capacities allow us to provide an even faster service for our partners in trade and industry.'



Client: KOMSA Kommunikation Sachsen AG

Employees: 1,800

System solution: Semi-automated narrow-aisle warehouse (automated driving/manual storage)

Goods stored: EUR-pallets

Product: Electronic and IT components

Area: 3,200 m²
(lxwxh: 64x50x21 m)

Capacity: 14,500 pallet bays

Scope of supply: Planning and realisation, storage and transport systems incl. navigation system and racking system

Stock movements: 150 pallets/hour

5 FLOW RATE OF 150,000 PRODUCTS A DAY THANKS TO GREATER EFFICIENCY



High-performance distribution centre with 24,000 pallet bays in an area of 30,000 square metres

TASK Planning and realisation of a complex warehouse and racking system including trucks for online shipping for the Czech Republic's biggest e-commerce retailer. The goal was to carry out a precise needs assessment and then, as quickly and smoothly as possible, to source the required system components, some from totally different suppliers.

CHALLENGE Extremely limited time frame for planning and realising a warehouse and racking system for the large distribution centre with high-performance order picking. Complete project responsibility for the steel construction taking into account an automated system realised on-site.

SOLUTION Warehouse system with integrated picking tunnel (pick to belt) and supply of the picking bays from the outside. Racking system with five levels and 24,000 pallet bays in an area of 30,000 square metres. Wide range of transport systems for incoming and outgoing products.

BENEFITS OF THE SYSTEM SOLUTION The entire mail-order process was streamlined to ensure maximum efficiency. The new solution allows the company to store and pick a comprehensive product range (from very small to very large) with a high degree of flexibility. This solution also delivers significant cost benefits and takes the mail-order company's operations to a new safety height.

MALL.CZ

Client: Mall.cz

Employees: 300+

System solution:

Warehouse system with integrated picking tunnel (pick to belt), complex racked warehouse with different picking levels and bays

Goods stored:

Pallets and boxes

Product:

Full range for e-commerce

Area: 50,000 m²

Capacity:

24,000 pallet bays, 30,000 m² picking zones on platforms

Scope of supply:

Planning and realisation, complete racking and picking zone, plus warehouse system with picking tunnel including interface to WMS

Stock movements:

150,000 picks per day

“ DYNAMIC GOODS HANDLING PROCESSES MUST REMAIN ADAPTABLE ”



**Seven questions for
Mr Markus Schmermund,
Vice President Intralogistics
Solutions at Linde MH**

Mr Schmermund, you are responsible for the most seminal part of Linde Material Handling. Where do you see intralogistics in 20 years' time?

Demands for expertise are changing. Familiar driving forces such as digitalisation are allowing us, as a leading hardware specialist, to expand into the world of data. As a customer-oriented tech company, we want to meet the growing demands of our market with a constantly updated range of products and systems. Our task is to identify and analyse the data and use the findings to develop intelligent systems and equipment. We are already preparing the ground with our automation solutions.

What does a company adopting this approach have to look out for?

Our industry has never been static in nature. It has always been shaped by dynamic processes and by growth. Growth phases like this always call for creativity - and the solutions have to be adapted to a constant stream of new demands. Because intralogistics is strongly driven by digitalisation, software expertise is an increasingly important competitive factor. As evidence, we need only look at the growing demand for networked objects: today it is around 8 billion per year worldwide, but by 2020 it will be 20 billion!

What is the general approach to system solutions? What is the best way for clients to embark on a project like this?

We begin every project with a frank and open consultation. We listen and then pinpoint the issues so that we can jointly draw up the remit for the project. That sounds simple - but when you realise the extent to which processes change during a project, it is not so straightforward. This is why it is useful for each project to be based on total transparency of processes and information from the outset.

Do clients who are willing to invest have to replan everything from scratch and switch to a new setup?

Not necessarily. Of course medium-sized enterprises introducing new intralogistics technology will face the issue of the technology's incompatibility with existing systems. But there are also possibilities for starting small with futureproof system solutions and systematically expanding them step by step.

Your products have a worldwide reputation. Where are your strengths as a problem solver and guide to the future of intralogistics?

Our approach, which is to fulfil every need in terms of vehicle and fleet applications on a customer-specific basis, requires us to have an in-depth understanding of the problems facing the client. That is the best basis for success as an intralogistics solution supplier. We offer the right technology components for each individual application. Our market penetration and our affiliation with the KION Group mean that we are always in a position to develop software-controlled modular and scalable solutions that map the diverse and differing business models of our worldwide clientèle.

What are the key advantages for your clients?

At the end of the day, it is always about problem solving, reducing the customer's pain points and helping them to become process leaders. With the technical possibilities that digitalisation offers, we are able to reduce unit costs, improve turnaround times, optimise stock levels and make goods handling safer.

In future you are going to be offering your clients a 'modular system' for intralogistics solutions. What exactly does that entail?

In a nutshell: the aim is to take Linde's established products and make the necessary technical adjustments to configure them as modular, scalable solutions that can handle our clients' diverse business models and can be controlled via a networked IT system. A flexible and modular approach to handling logistics processes is crucial here. Hardware 'building blocks' can also be combined intelligently in modular style.

Linde – For your Performance

Linde Material Handling develops high-performance material flow solutions tailored to individual customer needs, helping users to achieve sustainable competitive advantages. The company is one of the world's biggest manufacturers of forklift trucks and warehouse equipment and has been setting standards in solutions for industrial trucks, fleet management, driver assistance systems and service offerings for more than 50 years.

