High-Performance Material Flows for Sustainable Growth

Your practical guide to unlocking greater efficiency, productivity, and scalability.

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Table of contents

The importance of the material flow	Page 3
Analysis of the current state	Page 4
Planning and developing strategies	Page 6
Process optimization in practice	Page 8
Making processes more efficient with technological solutions	Page 10
Process optimization can only be achieved through employee qualification and participation	Page 12
Optimizing material flows as a continuous process	Page 13
Success stories from customers	Page 14
Conclusion: Optimizing material flows as a means for sustainable company success	Page 16
Resources	Page 17

The importance of the material flow

Intralogistics is an important and strategic success factor. Companies worldwide are under pressure in a fiercely competitive environment to not only deliver faster, but also to respond more individually to customer requirements. And all this while simultaneously having to optimize their cost structures. An efficient material flow forms the basis for rising to these challenges: It forms the operational backbone for distribution and service quality. And it ensures faster lead times, thus faster deliveries and a significantly higher reaction speed to market changes. For globalization and volatile markets, this provides an enormous competitive advantage – and satisfied customers.

The growing importance of high-performance intralogistics systems is also reflected in global investments in warehouse automation. The strategic importance of automated warehouse solutions is underscored by market trends:

According to forecasts by Interact Analysis, the global market volume will rise from US$48.0 billion in 2025 to US$66.1 billion in 2030, growing by an average of about 7 % per year.[1] The main drivers of this trend are, in particular, the ongoing e-commerce boom, increasing demands for delivery speed and service quality, and the growing shortage of skilled workers. Companies are therefore increasingly relying on automated warehouse and material flow systems to efficiently expand their capacities, boost productivity, and remain competitive in the long term. To meet the rising demands for efficiency, speed, and scalability, goods and information must flow seamlessly through all intralogistics processes – from goods receipt through storage and order picking to delivery. Efficiency and cost-effectiveness depend significantly on a high-performance material flow. In practice, however, the material flows of many companies have evolved over time and remain unoptimized.

Typical problems in inefficient material flows

- **Lacking transparency:**
  Many companies lack a reliable data basis and, consequently, clear visibility into inventories, material flows and operational bottlenecks, often because they rely on manual entries or Excel-based processes. As a result, they lack a reliable basis for proactively managing and controlling their processes. Without a proactive approach, companies can quickly face long customer wait times, excess inventory or stock shortages.

- **Inefficient layouts and unclear warehouse structures:**
  If materials have to be moved multiple times or are stored incorrectly, this leads to long searching times and reduced productivity.

- **High manual effort**
  A high number of manual processes typically leads to greater staffing requirements and rising error rates, particularly in increasingly complex operations.

- **Limited scalability**
  As a result, systems and processes are unable to adapt flexibly to increasing volumes or new requirements.

The consequences of these challenges quickly become evident in the form of longer lead times, rising costs and reduced responsiveness. Material flow serves as the backbone of intralogistics. When systematically analyzed and optimized, it has a decisive impact on the efficiency of the entire value chain and lays the foundation for stable processes, increased productivity and sustainable scalability.

This white paper examines how companies can achieve gradual material flow optimization in practice and the potential benefits that can be realized as a result.

+38 %

Projected market growth for automated warehouse solutions from 2025 to 2030.[1]

Analysis of the current state

Every optimization effort begins with a clear understanding of the current situation. Only on this basis can measures aimed at improving efficiency be meaningfully justified and implemented. All material flows across the value chain should be systematically reviewed and analyzed, from production to warehousing to transportation and IT systems – to ensure a comprehensive assessment, relevant functions and stakeholders from Purchasing, Logistics, Production and Management should also be included.

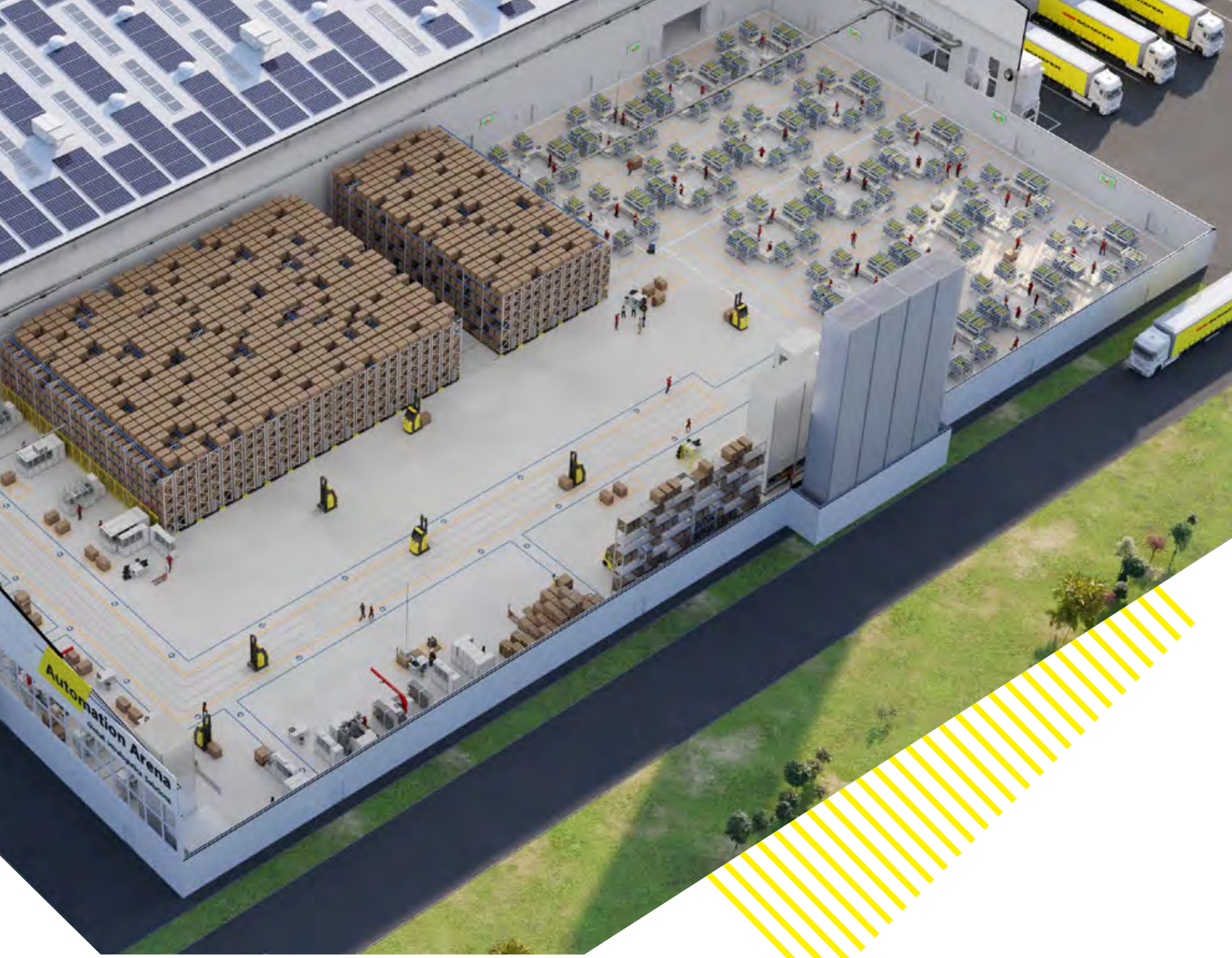
Which aspects must be observed for optimizing material flows?

The first step in the **process analysis** is to identify bottlenecks and weaknesses. It focuses on gathering the details of the existing processes and critically evaluating them. This makes it possible to quickly identify bottlenecks and inefficient workflows, uncover unnecessarily long travel distances and determine where errors or other delays repeatedly occur.

The analysis should not be limited to reviewing available data; interviews with employees and direct on-site observations can also quickly uncover weaknesses and inefficiencies. In any case, all process steps must be systematically documented to ensure that no important interfaces or other critical paths are overlooked.

A key tool: A **material flow matrix** that records what is moved from one location to another and how frequently those movements occur. Within this matrix, transport routes and means of transport can also be mapped using a distance matrix, enabling the clear visualization of material flows based on this data.

Data analysis can be used to evaluate cycle times, inventory levels and productivity key figures. They enable an objective assessment of current operational performance while also revealing seasonal fluctuations and emerging trends at an early stage. The data from warehouse management systems and production logs are relevant for future planning and serve as a basis for proactive actions as well as temporary and long-term scalability. The analysis becomes significantly easier when modern digital systems are already in use within the intralogistics environment.



These systems also form the basis of the third aspect addressed during the analysis of the current state: As part of the **technology assessment,** existing systems should be evaluated to determine whether they meet current and future requirements. The intralogistics technologies employed must not only demonstrate high performance and reliability, but above all be capable of seamless integration and efficient operation within the overall system.

Various analyses provide valuable insights that can be used to:

- Identify trends that inform future optimization initiatives
- Detect seasonal variations and
- Quantify operational performance

A comprehensive analysis of a company's intralogistics operations forms the foundation of a targeted optimization strategy, helping to ensure that improvement measures are aligned with actual challenges and deliver meaningful results.

Planning and developing strategies

Once a solid foundation has been established through the insights gained from the analysis of the current state, the strategic planning of process optimization begins. During this phase, **clear objectives are established, priorities are determined and targeted measures** are developed. All activities should be aligned with the objective of achieving long-term and sustainable improvements.

1 Determining measurable objectives and defining a schedule

A business case developed at the outset of the strategy definition process outlines the budget available for process automation and specifies the key performance indicators that must be achieved through the optimization efforts. To determine whether these objectives are being achieved and to enable adjustments to the strategy along the way, the **defined objectives** must be both measurable and realistic.

Typical examples include reducing cycle times by 20 % or lowering error rates by 15 %. Defining a clear timeframe is equally essential. However, these objectives should not be considered in isolation. Instead, they must be aligned with the overall business strategy and assessed within the broader context of the processes analyzed beforehand. This way, you can prioritize the objectives:

Cost reduction
- Reducing storage and transport costs for each order
- Reducing average storage costs for each item
- Reducing transport costs for each delivery

Increase in efficiency
- Avoiding unnecessary transport movements and double work
- Increasing degree of automation in core processes
- Optimizing routes

Flexibility (adapting to changes in demand)
- Reducing response times to changes in demand
- Increasing forecast accuracy
- Improving delivery performance

Sustainability (reduced CO_2 emissions and efficient use of resources)
- Reducing CO_2 emissions
- Reducing energy consumption
- Increasing the use of sustainable packaging

KPIs provide the basis for measuring and evaluating the achievement of these objectives. These KPIs provide continuous insight into the effectiveness and efficiency of the optimization measures being implemented. Another key consideration in the planning phase is future growth, whether anticipated as part of the company's strategic development or driven by unforeseen market trends. Organizations should consider their strategic plans for the next five to ten years and assess the extent to which their existing facilities can accommodate future growth and expansion.

2. Selecting tools and technologies for implementing the plans

Designing an intralogistics system for long-term success requires planning for future growth through adequate capacity reserves and the use of expandable systems. The **selection of adequate, future-proof technologies** plays a key role in planning. At the same time, the selected systems must be capable of seamless integration into the existing IT landscape in order to support faster and more accurate processes as well as scalability.

Data analysis tools for prognoses and optimization

Key selection criteria:

- Scalability
- Easy integration into existing systems
- Return on investment (ROI) calculation

3. Step-by-step planning of measures and implementation phases

A **long-term intralogistics strategy** defines the road map from the current state to the desired future-state operating model. A 3-to-5-year road map with clearly defined short-, medium- and long-term milestones provides valuable guidance. These milestones can range from process analysis and the realization of quick wins to the implementation of automated systems and the full connectivity of devices (IoT / Internet of Things) and AI technologies. Since market conditions and technologies are constantly changing, a flexible strategy is crucial to ensuring that intralogistics systems remain efficient, scalable and future-ready. Furthermore, successful implementation requires comprehensive training programs for employees working with the new systems, as well as robust monitoring mechanisms, continuous improvement processes and the incorporation of sustainability objectives.

Process optimization in practice

The actual optimization of the material flow in intralogistics takes place on process level. The objective is to make processes as efficient, error-free and flexible as possible, thereby increasing productivity and responsiveness.

Central anchoring point: Structured optimization of the warehouse layout

To shorten transport distances and improve cycle times, warehouse areas, picking zones and material flow routes are strategically arranged to support efficient and streamlined operations. A thorough analysis of existing material flows forms the basis for optimization. It helps identify high-frequency transport routes, bottlenecks and inefficiencies that hinder operational performance. Furthermore, an ABC analysis of storage location allocation creates the basis for faster picking processes by ensuring a more efficient allocation of inventory within the warehouse:

- **Warehouse zone structuring**
  Clear separation of goods-in, storage, picking and shipping areas
- **Grouping** of items that are frequently ordered together
- **Creating fast-access storage areas** for high-turnover items
- **Using suitable load carriers** for reducing transport processes

CONCLUSION

A well-structured warehouse layout minimizes travel distances, search times and transport activities, while improving picking efficiency, process reliability and scalability.

Reducing waste through Lean principles

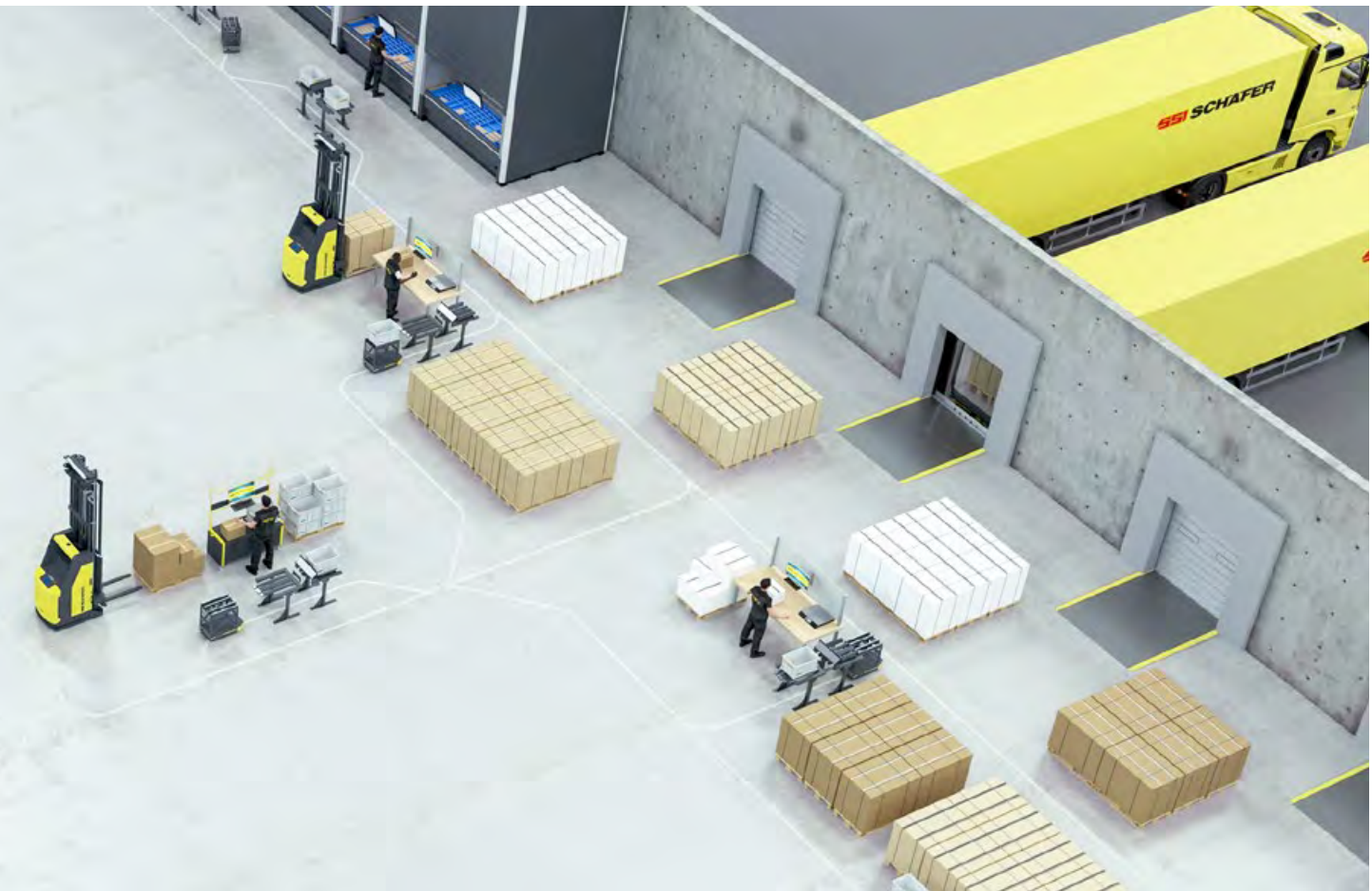
In addition, the implementation of Lean principles provides a structured approach to systematically eliminating waste, whether in the form of time lost through unnecessary movement, excess inventory or inefficient processes. Some common measures for implementing these principles are:

- **5S principle**
  A Lean methodology originating in Japan that organizes workplaces, reduces waste and makes processes more stable and efficient.

- **Kaizen**
  A Japanese concept that literally translates to "change for the better". It stands for continuous, incremental improvement, pursued every day and involving every employee. Kaizen is not a one-time initiative, but a mindset and organizational culture focused on continuous optimization and improvement.

- **Just-in-time**
  A production and logistics approach that ensures materials, components and products are delivered precisely when required in the process, minimizing unnecessary inventory and storage costs.

- **Kanban system**
  Controlling pull system. It structures material and production flows so that only the quantities needed at a given time are produced or supplied. Once effectively integrated, it delivers long-term benefits in the form of reduced inventory levels, greater transparency and faster processes.



Making processes more efficient with technological solutions

Modern technologies enable the automation of material flows, enhance operational transparency and facilitate real-time control and monitoring. But what impact do the various technological solutions have on intralogistics in detail?

31 % annual growth

Material-handling robots (e.g., RackBot Systems) are among the fastest-growing segments of mobile robotics[2]

Automated guided vehicles (AGV)
Automated guided vehicles automate the transport of goods within buildings. Their primary applications include production line supply and the movement of materials from storage to picking operations. As a result, manual transport activities are minimized, allowing employees to focus on higher-value tasks while reducing the burden of repetitive and time-consuming work. Furthermore, they enhance both safety and scalability by enabling flexible adaptation to evolving operational requirements. The rapid pace of change in this technology sector is also reflected in market trends. Growth forecasts underscore the increasing relevance of mobile automation solutions:

Interact Analysis forecasts an average annual growth rate of approximately 18 % for the global mobile robotics market between 2025 and 2030, which should increase the market size from $6.0 billion to $13.7 billion, while the material handling robots segment (e.g., RackBot Systems) is expected to exhibit even higher growth momentum at an anticipated 31 % per year.[2] This development is driven in particular by the shortage of skilled workers, rising demands for flexibility, and the growing need for automated material flow solutions in production and distribution. As a result, driverless transport systems and autonomous mobile robots are increasingly becoming a central component of modern and future-proof intralogistics solutions.

18 % annual growth

The global market for mobile robotics is projected to grow by an average of 18 % per year between 2025 and 2030.[2]

Automated conveying system
In high-throughput environments, including high-volume warehouses and sorting facilities, conveying systems play a critical role in maintaining efficient and reliable material flow. They serve to implement continuous material movements without manual interventions. The benefits are obvious: High speed, constant processes and thus less errors.

Robot-supported picking
Picking robots enable fast and accurate order fulfillment in picking. They can operate around the clock, significantly increasing productivity while relieving employees of repetitive workloads. In addition, they reduce errors and improve overall process quality. For even more efficient order control, these systems can be integrated with the warehouse management system (WMS).

IoT and data analytics for real-time monitoring
The integration of the various systems used in intralogistics forms the foundation for efficient control, as well as end-to-end transparency across data and processes. Sensors capture real-time information on inventory levels, material movements and equipment conditions. This data is then used to support informed decision-making in bottleneck analysis and process optimization. In addition, predictive analytics enables maintenance and demand forecasting, allowing operations to be managed proactively.

Process optimization can only be achieved through employee qualification and participation

When approached strategically, process automation can deliver significant efficiency gains for companies. Nevertheless, automation serves as a complement to and **support for employees.** The successful implementation of new systems and processes depends on the active involvement of employees throughout the transition.

Since employees interact with these systems in practice and are expected not only to embrace them, but also to leverage them to improve operational efficiency, **comprehensive training is a critical success factor.** Training programs provide employees with the knowledge required to operate AGVs, robotic systems and warehouse management systems (WMS), ensuring the safe and effective use of these new technologies. At the same time, they help reduce uncertainty and build confidence in new solutions and technologies.

In addition, **engaging employees in optimization initiatives** promotes acceptance of change while fostering a stronger sense of ownership and involvement in continuous improvement efforts. Employees bring valuable practical expertise to the table and can contribute key insights that support continuous improvement initiatives. Workshops, feedback sessions and pilot projects provide effective formats for this purpose. Transparent communication of objectives and benefits within a structured change management framework supports the process by clearly conveying the value and advantages of the improvements. Success stories and pilot projects can help increase employee acceptance.

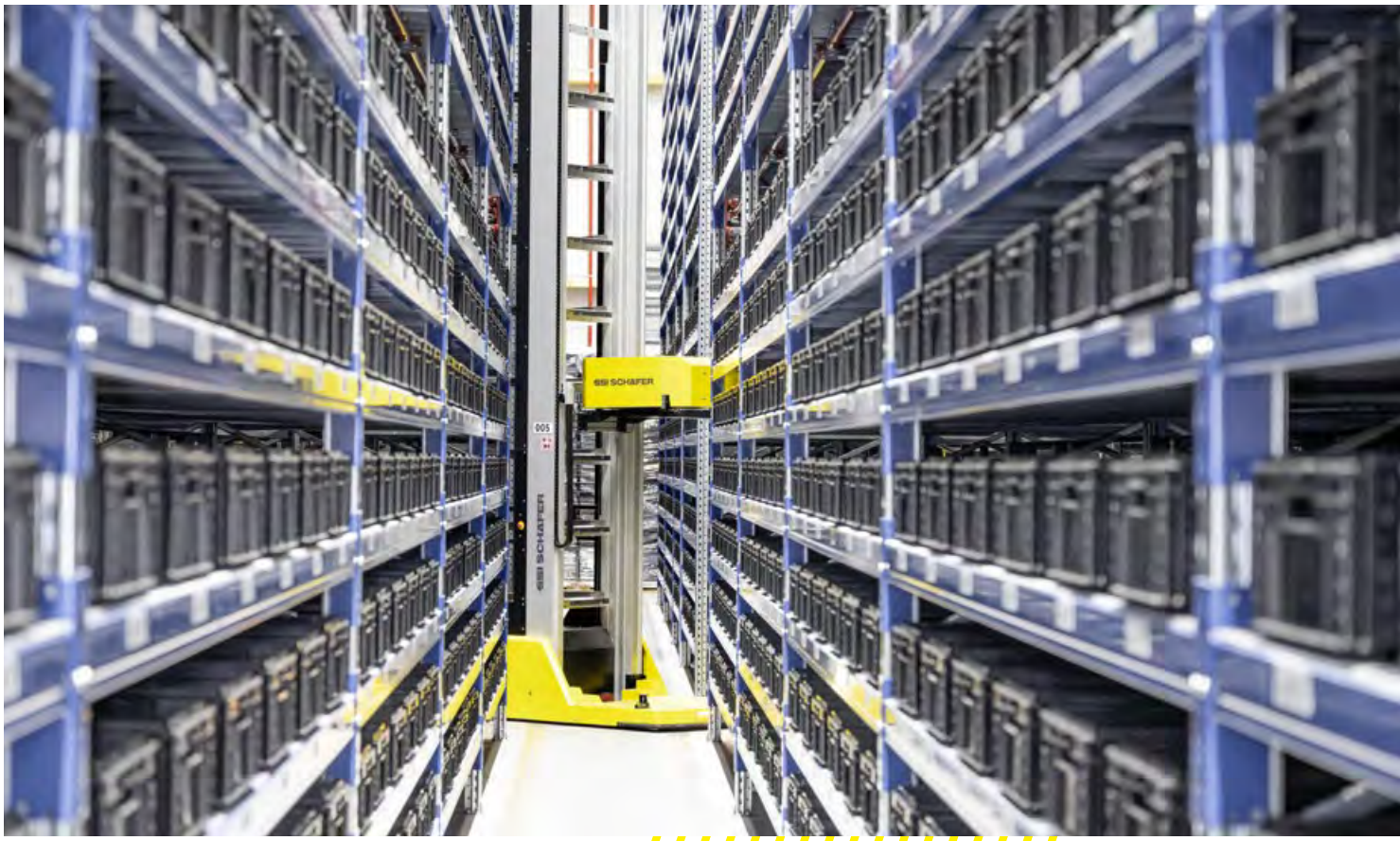
Optimizing material flows as a continuous process

The implementation of the previously planned measures does not mark the end of the "Material Flow Optimization" project. It is a continuous process, which is constantly assessed and adapted. The effectiveness of the implemented measures must therefore be systematically monitored.

Implementing measurement systems is the first step toward ensuring continuous access to the real-time data required to gain valuable insights into intralogistics performance. Dashboards of modern monitoring systems visualize key performance indicators and enable rapid responses to deviations or bottlenecks through automated alerts.

Companies must determine and establish which KPIs are most relevant for monitoring their intralogistics performance. Key indicators for evaluating the effectiveness of the implemented measures and their ROI include order cycle time, inventory turnover, picking accuracy, cost per handling operation, order line or unit processed, as well as on-time delivery performance. These KPIs not only make progress measurable, but also help uncover additional optimization potential.

Based on the available data, regular audits and process reviews can be conducted and workflows can be adjusted accordingly. The analyses and optimization recommendations generated by integrated systems also play an important role in this process. A continuous improvement approach focused on incremental enhancements, in line with the Kaizen principle, helps ensure that intralogistics operations remain highly efficient over the long term.



Success stories from customers

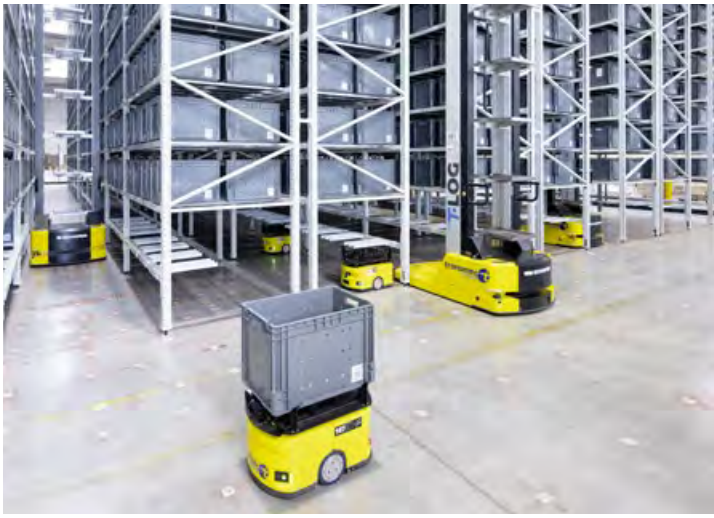
The true potential of material flow optimization is best illustrated by our success stories. Numerous companies have already improved the efficiency of their operations with SSI SCHAEFER solutions, achieving higher throughput rates, business growth without requiring additional space and increased picking performance.

600,000 units per day for over 800 stores
Coop, Sweden, one of the leading grocery retailers, modernized their logistics operations with a highly automated distribution center in Eskilstuna, Sweden, implemented by SSI SCHAEFER. The objective was to streamline and consolidate manual processes while enhancing efficiency, sustainability and the delivery reliability. The centerpiece of the new distribution center is an integrated end-to-end solution featuring WAMAS software, robotics and the SSI Case Picking system, which handles up to 600,000 units daily during peak demand periods. 700 SSI Flexi shuttles ensure efficient storage and retrieval operations.

The solution significantly improves transparency, process quality and throughput while reducing transport volumes and CO_2 emissions. As a result, the solution enables the reliable supply of more than 800 stores while simultaneously increasing productivity and improving the work environment.

50 % increase in picking performance in just 8 weeks
Transmec, Italy, a logistics service provider operating across Europe, modernized their 3PL warehouse in collaboration with SSI SCHAEFER through the implementation of the RackBot System COMPACT. The solution is a scalable integrated system comprising autonomous mobile robots, rack systems, work stations and intelligent software. 15 mobile robots now handle transport, storage and retrieval, as well as the replenishment of picking stations.

The implementation was completed in just eight weeks and enables the flexible integration of a wide range of customer systems. The collaboration delivered impressive results: A 50 % increase in picking performance, enhanced transparency and reliable omnichannel fulfillment.



50 % higher picking productivity, 110 m² less storage space
WFL Millturn Technologies, Austria, optimized their small parts warehouse together with SSI SCHAEFER by implementing six vertical lift modules of type SSI LOGIMAT®. The objective was to address space constraints and improve operational efficiency without introducing additional subsystems.

The solution was integrated directly into the existing SAP environment and enhanced with batch picking capabilities. As a result, both ergonomics and process speed improved significantly. Approximately 12,000 of the roughly 15,000 items in the small parts warehouse were restructured. Overall, the expansion of storage capacity resulted in savings of 110 m² of space and increased picking productivity by up to 50 %. The scalable solution enables further growth to meet growing demands.

Stable Material Flows in 6 Months
Gebr. Ostendorf Kunststoffe GmbH, Germany, a leading manufacturers of sewage pipe systems, optimized their intralogistics at their site in Emstek, with a semi-automated solution by SSI SCHAEFER. Rather than implementing a fully automated system, the company selected a quickly deployable plug-and-play solution combining automated guided vehicles, existing mobile rack infrastructure and WAMAS software.

Within just six months, processes were automated, material flows stabilized and operational transparency significantly enhanced. The solution enables consistent, resource-independent operations, reduces errors and relieves employees of repetitive and physically demanding tasks. At the same time, the solution increases efficiency and flexibility, while it is scalable when need be. This enables Ostendorf to cope with increasing demands and shorter delivery times in a cost-effective and reliable manner.

10,500 bin storage locations to meet rising demand
Fresh Servant, Finland, a leading manufacturer of ready-to-eat salads, optimized their logistics center in Edsevö (Finland), with a highly automated warehouse solution implemented by SSI SCHAEFER. The core is an SSI Cuby shuttle warehouse with 10,500 bin storage locations, Pick by Light picking stations and the logistics software WAMAS. The solution delivers significant improvements in throughput, operational efficiency and process transparency, while ensuring seamless integration with existing workflows. Thanks to automation, the company is able to better manage growing demand while maintaining high standards of quality and freshness. The scalable solution forms the basis for further growth and future extensions.

Conclusion: Optimizing material flows as a means for sustainable company success

Optimizing material flows is a critical driver of sustainable business success in today's global competitive environment. It not only enables companies to accelerate processes and reduce costs, but also to increase operational flexibility at the same time. In this way, material flow optimization acts as both a facilitator and a driver of sustainable growth for companies that view their intralogistics holistically and pursue its continuous development.

The key to a successful change process lies in technological solutions that automate processes and significantly improve their efficiency, combined with the implementation of Lean Principles. Additional critical success factors include involving employees throughout the transformation process and ensuring they are adequately trained to work with the new systems. Strategic change management provides the basis for effective governance and organizational coordination, while monitoring and continuous improvement secure long-term performance outcomes.

The process of efficient material flow optimization follows a clear structure: Every optimization initiative begins with a holistic assessment of the current state, aimed at identifying existing weaknesses as well as opportunities for improvement. Clearly defined SMART objectives and the establishment of the most relevant KPIs provide the project with clear direction and the means to measure its success effectively. The implementation phase begins with the selection of suitable technological solutions. Beyond their ability to integrate with existing systems, the primary evaluation criteria are scalability for future growth and the expected return on investment.

However, these systems must not only be integrated into the existing IT infrastructure. Moreover, the success of these systems depends on their acceptance and active adoption by employees. Comprehensive training initiatives and the active engagement of employees throughout the transformation journey are essential for building acceptance, strengthening confidence in the new solutions and ensuring their successful adoption. Regular reviews of processes and key performance indicators ultimately ensure the sustainability of process optimization, enabling organizations to make data-driven adjustments as needed.

Resources

Further reading
- Lean Thinking by Womack and Jones
- Intralogistik – Potenziale und Trends (VDI-Richtlinien)
  (Intralogistics – potentials and trends (VDI guidelines))
- Warehouse Management by Michael ten Hompel

Tools
- Warehouse management systems (WMS) e.g. WAMAS von SSI SCHAEFER
- Data analysis tools: Power BI, Tableau
- IoT platforms for real-time monitoring

Training options
- VDI workshops on intralogistics and material flow
- Manufacturer trainings (e.g. for AGV and robotics)
- Online courses: Coursera, Udemy
  (topics: Lean management, automation, IoT)

Sources

[1] Interact Analysis Warehouse Automation Mid-Year Update June 2026
[2] Interact Analysis Mobile Robots Mid-Year Update May 2026

Seven Reasons
for choosing SSI SCHAEFER

- **Stability**
  As a financially independent family business, SSI SCHAEFER is committed to long-term solutions. You can trust that our team of experts will be there for you today, tomorrow and in years to come.

- **Efficiency**
  SSI SCHAEFER solutions are scalable and able to grow with your business. You can always upgrade or retrofit.

- **Quality**
  As a systems specialist with its own production facility and software development department, SSI SCHAEFER provides tailor-made and high-quality solutions from a single source, specifically designed to meet your challenges.

- **Reliability**
  Thanks to our worldwide Customer Service & Support network, SSI SCHAEFER ensures smooth operation of your system long term, both during and even long after installation.

- **Know-how**
  SSI SCHAEFER solutions are always up-to-date with the latest technological standards and can be easily integrated into an existing (IT) landscape.

- **Sustainability**
  As a global intralogistics provider, SSI SCHAEFER is committed to sustainable, efficient and future-proof solutions. The company therefore contributes to the goals for sustainable development set by the United Nations.

- **Internationality**
  As a global organization, SSI SCHAEFER has local offices worldwide. With over 80 operative subsidiaries, our team of experts speak your language.

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