

CASE STUDY

Reference Brose: A technical success for Brose regarding an innovative material flow design for a highly dynamic production supply - all within a forklift free factory.

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SSI SCHÄFER

INNOVATION IS IN OUR DNA

When designing its new logistics center at the Czech Republic location in Ostrava, the Brose Group, the world's fourth largest family-owned automotive supplier, turned to the experts at SSI SCHAEFER. The general contractor



In its long history, the Brose Group has distinguished itself through innovative products and manufacturing technologies. Always in view: the technological trends of tomorrow.

The location, constructed in 2004, is the second largest production facility for Brose Group, a producer of mechatronic components and systems for vehicle doors, seats, and electric motors. A leading employer with a staff of around 26,000 at

62 locations in 23 countries around the world. With new vehicle models increasing customer requirements and innovative proprietary developments, the range of items for production supply continued to expand.

Steady company growth since its inception led to a shortage of warehouse capacities. Thus, external warehouses were leased in order to handle the increasingly complex provision

prepared an innovative material flow concept for a highly dynamic production supply, which is supported by a highly custom SAP Extended Warehouse Management (EWM) system.



“The new solution allows for minimal manual handling, direct, optimized material provision, reduced effort by staff, and improved ergonomics. We have simplified and streamlined workflows, made processes more transparent, and increased throughput with system automation, material flow conversion, and a consistent SAP solution. We are extremely satisfied with this intelligent solution for a fully automated production supply.”

Claudia Vogel-Daniel,
Project Coordinator

Brose Fahrzeugteile
GmbH & Co. KG, Coburg

structures, which increased administration and financial burdens. These reasons, along with continued growth, led corporate management to restructure the logistics and production supply.

NEXT STOP: PROGRESS

Take a fully automated trolley train that supports production while fully integrated and controlled through SAP Extended Warehouse Management (EWM), and one will witness a highly innovative high-tech solution - completely forklift free.

To start the process, Brose cooperated with the Technical University of Munich in preparing specifications and collecting expertise. Ultimately, SSI SCHAEFER, as a general contractor for material and information flow, was awarded the contract to generate a highly-automated in-house logistics solution. The material flow concept and the process efficiency for the new logistics center were completely innovative.

What started as a restructuring project evolved to become a logistical reference system with numerous innovations, which each exceeded industry standards.

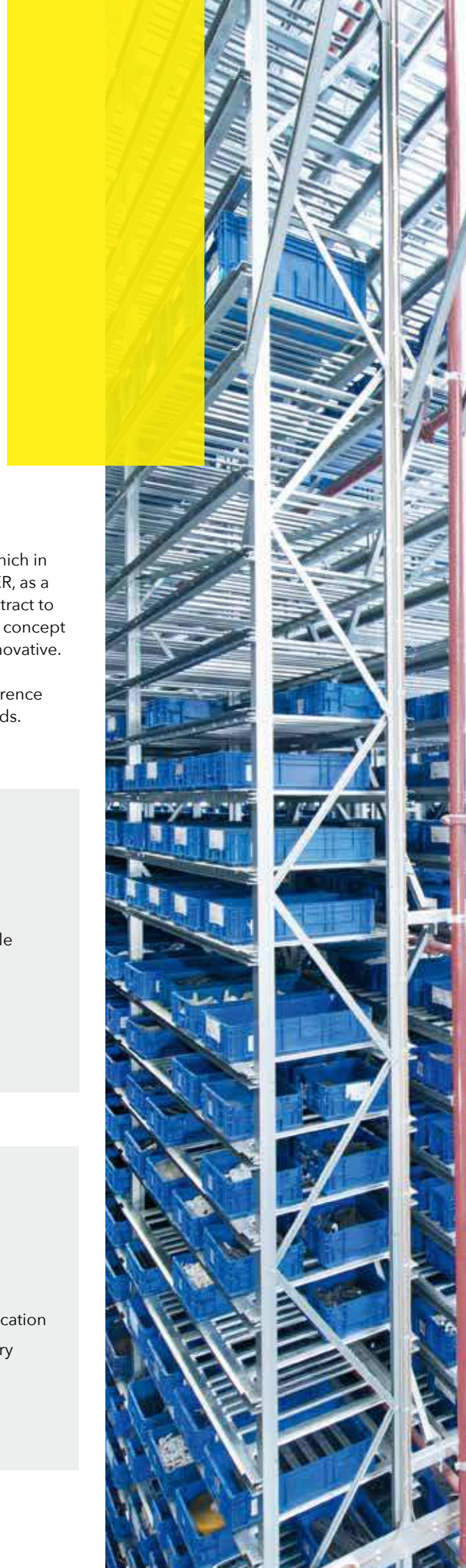


“We were convinced by the flexibility that SSI SCHAEFER has to offer. Plus, using one source for the integrated implementation concept for the hardware and software infrastructure was much easier. Thanks to the internal coordination of the implementation phases, they were able to provide an extensive design concept and complete the project on schedule despite tight lead time requirements.”

Claudia Vogel-Daniel
Project Coordinator, Brose Fahrzeugteile GmbH & Co. KG, Coburg

PROJECT OBJECTIVES

- Significantly reduce the cost of logistics and transport
- More transparent and robust supply processes
- Concentrate warehouse capacities at the Koprivnice production location
- Process optimization of the production supply and improve delivery quality
- Innovative trolley train solution for a forklift free factory
- An integrated process controlled by SAP EWM







The seven Schäfer Miniload Cranes generate a turnover of 840 bins an hour.

EVERYTHING IN FLUX

All processes within the logistics center are designed for ultimate reliability. Controlled by SAP EWM, the fully automated high bay warehouse is efficient with conveyor technology and a state-of-the-art robotics application as well as an automated miniload system, which ensure reliable delivery capability for Brose.

For logistics involving heavy load carriers, SSI SCHAEFER has developed a new, 5-aisle high bay warehouse with 9,750 pallet spaces for single-depth storage. Five Exyz single mast storage and retrieval machines with telescopic load handling attachments guarantee energy efficient storage and picking at a total handling capacity of 200 double cycles per hour.

The warehouse consists of the incoming goods area, the conveyor technology, and processing workspaces as well as a seven-aisle automated miniload system. The latter features a capacity of 23,520 bins for one-deep and two-deep storage. Also located upstream are four train stations where the bins for production supply are pre-sequenced. In a next step, the bins are transferred fully sequentially and automatically to the tugger trains.



The high-bay warehouse acts as a replenishment buffer, connected to an existing structure via a bridge construction.



The transfer carriage delivers source pallets that are not delivered in system totes to the manual repacking stations

The palletized incoming goods from approximately 30 external parts suppliers are inspected and received in incoming goods and then transferred to the pallet conveyor system at one of the four dispatch locations. On a vertical conveyor, the pallets are transported to a staging area and from there move along on a bridge structure to the high bay warehouse.

To equip the automated miniload system, the pallets are dispatched along a bridge and with a lift, where they are then delivered to a transfer trolley. SAP EWM calculates the need based on inventory data and consumption using the most recent periods as the basis. The replenishment pallets are distributed to different packing stations according to SAP EWM specifications and supplied there to a robot cell. Unpacking of the bin pallets occurs fully automatic.

Robotic applications assume the fully automated depalletizing process, transferring each bin onto the bin conveyor system, which then are transported to the automated miniload system. The particular challenge was the robot teaching process, because four different bin types are used. The solution: State-of-the-art image recognition linked with the device control system and SAP EWM. First, the depalletizing robots uncover the pallets. Then, a camera system captures and analyzes the bin types and the position, calculating the approach mode for the grippers.



The robot is equipped with a special gripper finger system for transferring.

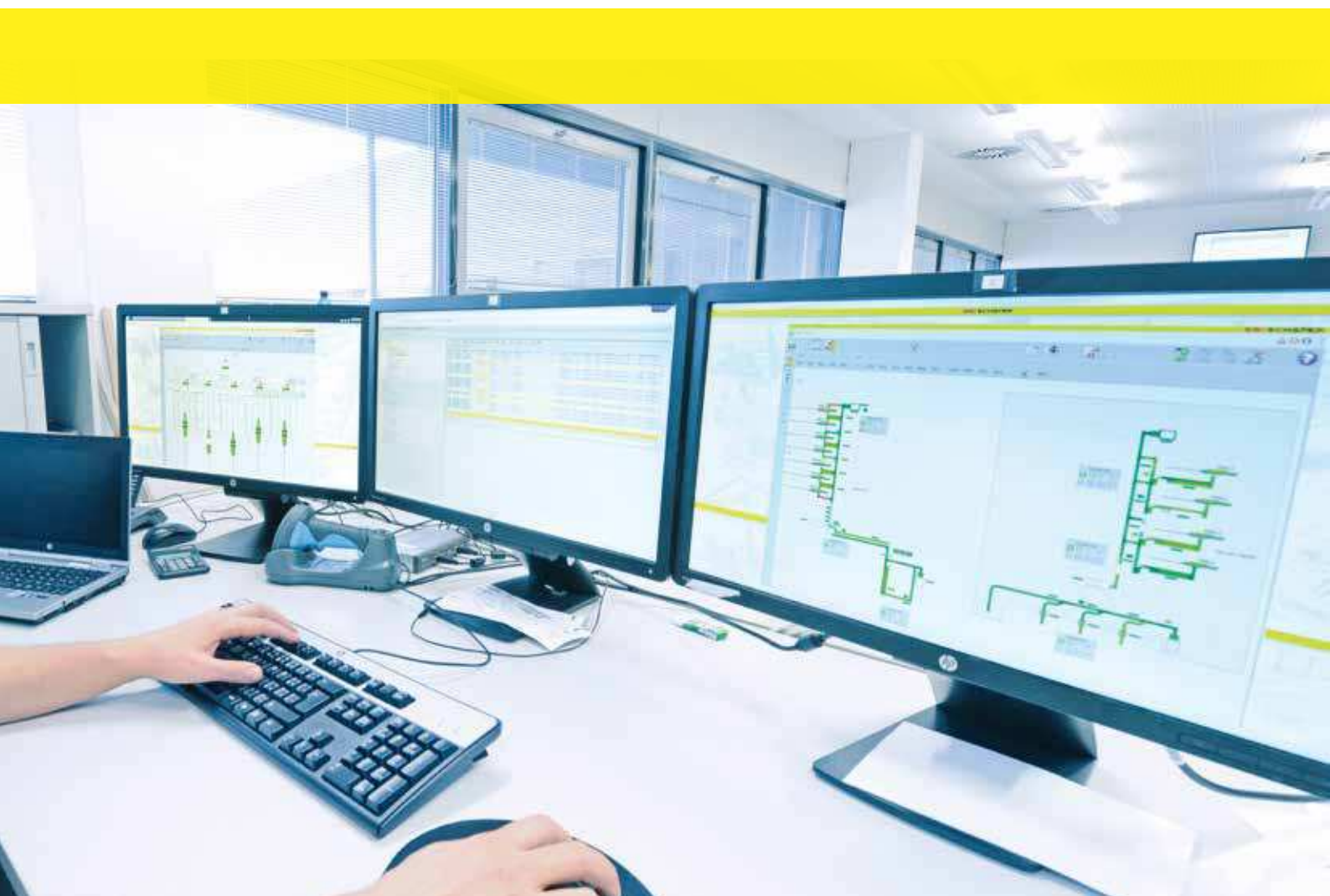
FOR A RELIABLE TIMETABLE

The innovation of the material flow concept is apparent in the functional scope of SAP EWM, a concept unrivaled in the industry. It includes sequenced retrieval and provision based on needs as well as the fully automatic loading of bins for tigger trains.

To achieve this, Brose designed an extensive planning tool in collaboration with the Technical University of Munich. SSI SCHAEFER implemented this directly within SAP EWM. The tool provides the capability to preplan the timing of tigger trains based on, for example, shifts, breaks, or routes in a timetable. The tigger trains are clocked. 45 minutes remain for each driving cycle for retrieval, provision and loading processes. The call orders are made through the SAP system. If inventory is low, employees at the production islands scan the

pass-through bins with necessary material. Subsequently, SAP EWM generates a need in the automated miniload system and initiates the relevant retrieval.

Parallel to this, the integrated timetable generator in the SAP system calculates the runtime of the tigger trains accounting for the course of the route and allocating the ideal storage space to optimally assign each tigger train dynamically.



Fully automated tigger train loading controlled from SAP EWM.



Bins are released once the trolley train reaches the loading position.

New routines had to be developed for SAP EWM. With these routines, the system is able to calculate and control the ideal window of time for the retrieval as well as a sequenced and volume-optimized provision that ensures a correct Kanban route and automatic loading of the trolley trains. All of this takes place without impacting the system standards, ensuring that its release capability remains unchanged in the future as well.

The bins are retrieved based on an ideally synchronized sequence calculated by SAP EWM along a conveyor route to the four trolley train stations. The tours are organized by production areas and the unloading points are defined in SAP EWM. Each of the four train stations consists of a shelving system with four racking levels and a total of 32 bin channels. The channels are equipped with gravity roller conveyors and are operated from the rear by an Schäfer Miniload Crane.

An overlapping, retractable pulley stops the bins from sliding forward at the opposing rack side. At the loading time, a trolley train with four trailers arrives at each train station. Its trailers are equipped with a rack system, which is equivalent to the train stations rack system and offers two bin spaces with pulleys stacked one above the other on four levels and on a slight incline - thus a total of eight bins per trailer, 32 for each trolley train. The blocking pulley drops down and the bins roll onto the trailer spaces.

Consequently, SAP EWM calculates how to allocate the provision space for each tour, plans the trains, trailers and spaces accordingly, and organizes and controls all of the downstream processes to ensure that the provision space is loaded and supplied on time. The provision of full pallets for the production department to the large load carrier stations is based on similar calculations.

FIGURES/DATA/FACTS

System Indicators

Site surface area	5,000 m ²
Surface area of order-picking hall	1,000 m ²
Surface area of order-picking warehouse	2,500 m ²
Order-picking principle	Goods to Person / Kanban

SSI SCHAEFER Scope of Supply and Service

Planning, Implementation and Service	
Design concept	<ul style="list-style-type: none"> - Turn-key preparation of a state-of-the-art logistics concept - Simulation and implementation planning - Visualization
High bay Warehouse	
L x W x H	22.5 m x 87 m x 22 m
Loading equipment	Europallets, pallet cages, flat steel pallets
Spaces	9,750
Storage type	One-deep
Number of storage retrieval machines	5 Exyz
Load handling attachment	Telescopic fork
Handling capacity	200 pallets an hour
Automated Miniload System	
L x W x H	38 m x 20.5 m x 10.5 m
Loading equipment	Bins
Spaces	23,520
Storage type	Two-deep
Number of storage retrieval machines	7 Schäfer Miniload Crane
Load handling attachment	Box gripper
Handling capacity	840 bins an hour
Conveyor System	
Pallet conveyor system	Roller conveyor, chain conveyor, loading/delivery station, vertical conveyor, corner station, 90° turning conveyor belt, transfer trolley, pallet stacker/de-stacker, pallet stacker straightening station
Bin conveyor system	Belt conveyor, roller conveyors, turning station, scale, repacking tables, curved roller conveyor, belt ejector, console lifter, S conveyor
Production Supply	
Fully automated tugger train loading	4 tugger train stations
Software	
Logistics software	SAP
Functions	Warehouse management, incoming/outgoing goods, order-picking, material flow control, visualization, wireless data system







SIX 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 and original equipment manufacturer, 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, both during and 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.

- **Internationality:**

As a global organization, SSI SCHAEFER has local offices worldwide. With over 70 operative subsidiaries, our team of experts speak your language.



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