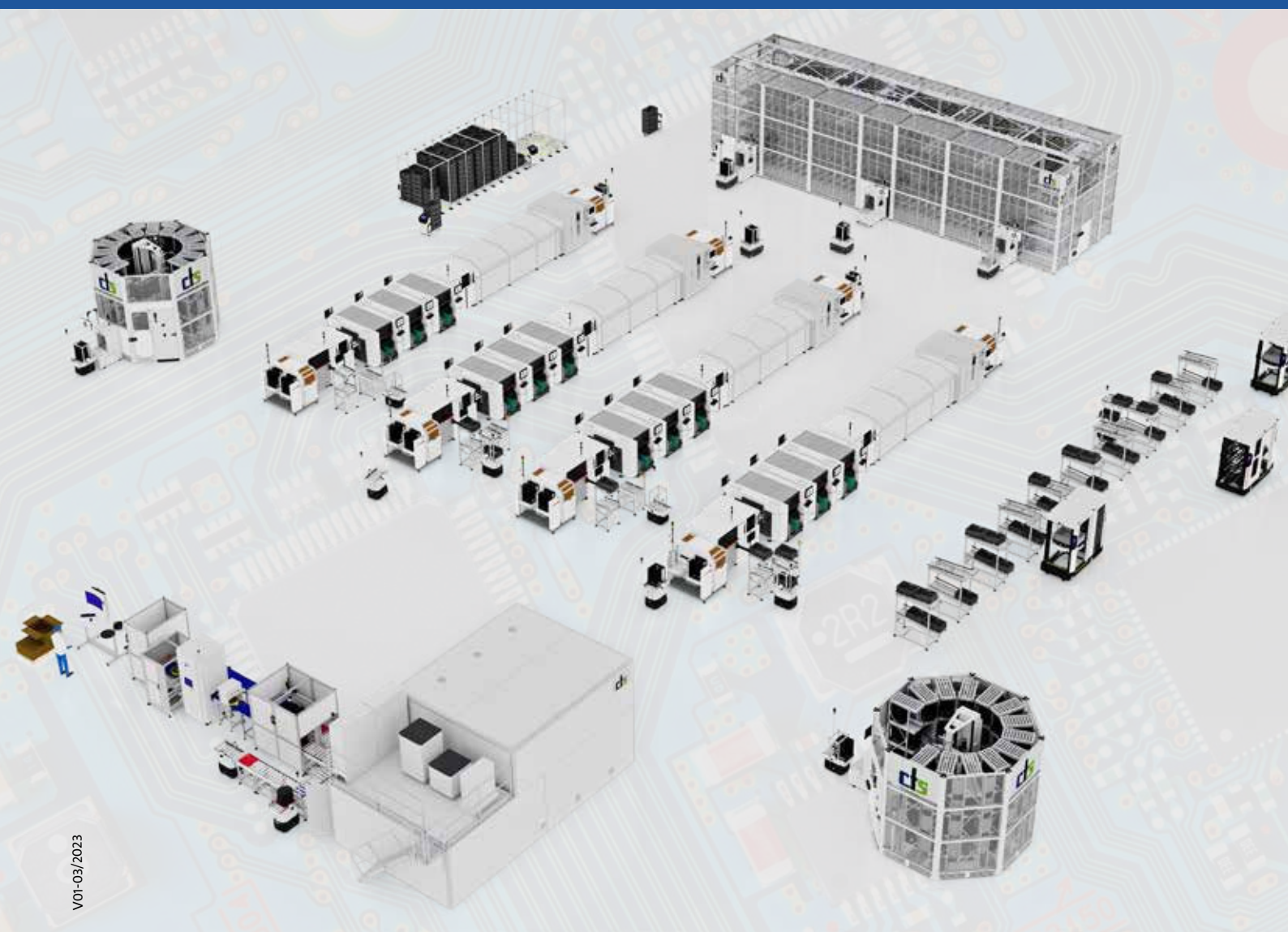




SMART ELECTRONIC FACTORY

With our solutions to the lived Industry 4.0

Effizient. Flexibel. Just-in-time.



The challenges for the electronics industry are constantly growing!

How can these be overcome?

We at cts are experts in smart intralogistics and support our customers in the transformation to a smart factory!

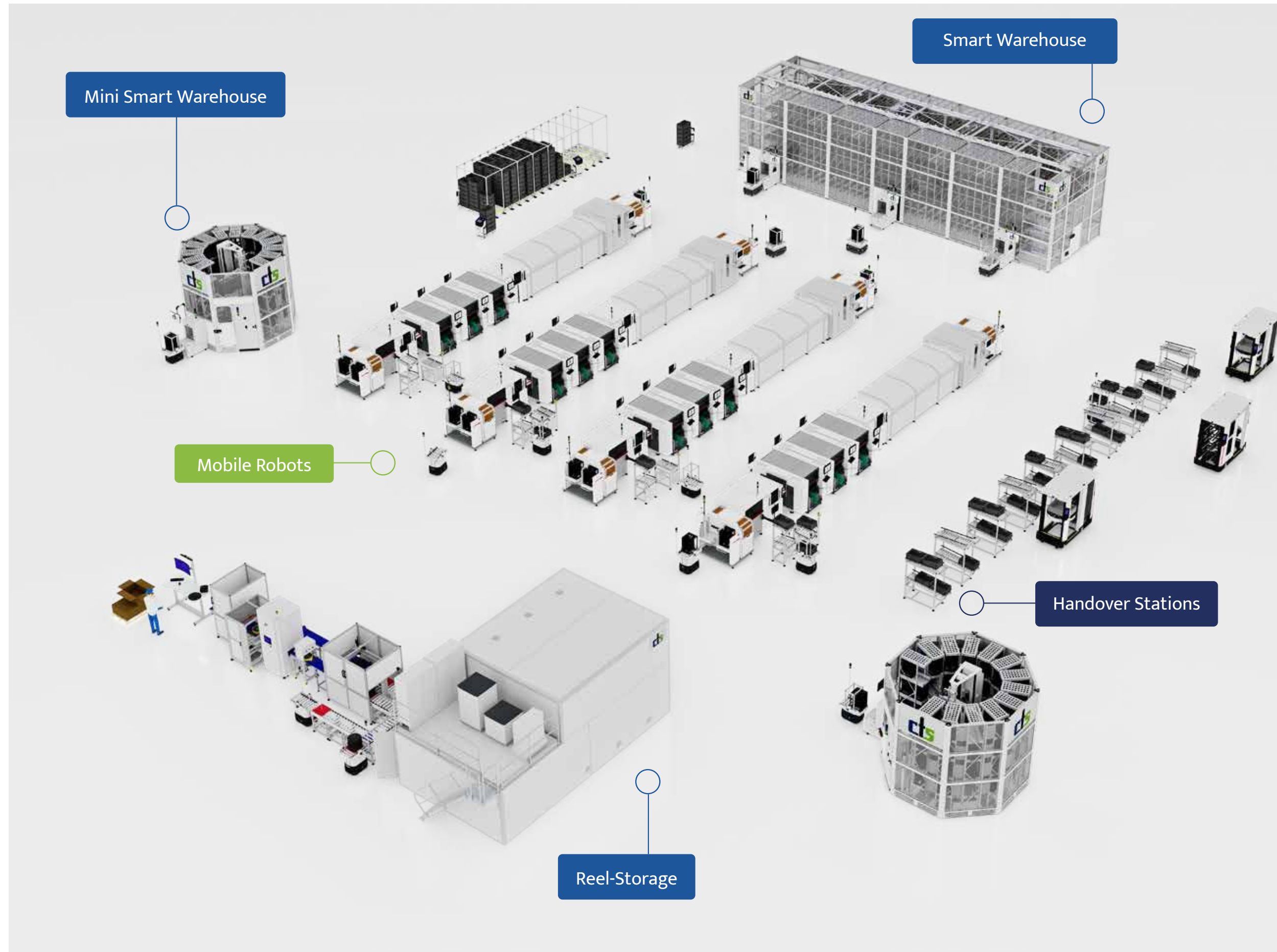
From goods receipt with complete reel recording and storage in the Gigaflex Storage Center to buffering of the PCB magazines in the cts Smart Warehouse and Mini Smart Warehouse. Our storage solutions are an intelligent, modular and highly effective way to store component reels and PCB magazines. By significantly reducing shopfloor occupancy, these allow you to save valuable floor space on the production floor!

Automatic supply of storage solutions and equipment using AMRs of various sizes and payloads provides a flexible, reliable and traceable solution and optimizes your material flow. The customized mini buffer solutions (cts transferstations) reliably compensate for small asynchronies in the production flow.

The use of different AMRs, partly from several manufacturers, is easily possible through our middleware sloXis®. sloXis® combines all elements of a modern industrial plant: Starting with AMRs from different manufacturers with different functionalities, small buffers up to the smart warehouse. The software is the central interface to the MES/ERP.

From our Mularis Ecosystem we also offer a Material Management System (MMS) for the goods on the shopfloor - whether in stations, warehouses or shelves.

In combination with the Material Flow Controller (MFC), the materials are then distributed fully automatically coordinated based on the MES detailed planning records.



cts Smart Warehouse and Mini Smart Warehouse

The requirements in terms of flexibility and product variance are constantly increasing, more demanding material flows require powerful and innovative solutions!

The requirements in terms of flexibility and product variance are constantly increasing, more demanding material flows require powerful and innovative solutions! For efficient production, it is crucial that the required goods are stored in a space-saving manner and close to production. Our Smart Warehouse systems are an intelligent, modular and highly effective way of doing this. At the core of the warehouse moves an innovative, space-saving gripping system. This ensures effective storage and retrieval. With our Smart Warehouse solutions you have the possibility to store magazines, FOSBs, trays or KLTs, traceable and fully automatically deliverable by means of AMR.

By significantly reducing shopfloor occupancy, valuable space can be saved in the production area. The storage capacities of the Smart Warehouse range from 400 to 1100 PCB magazines with a footprint of 8.5m/4.2m/4.4m to 17.8m/4.2m/4.4m. The size of the Smart Warehouse can be customized to meet your needs.

Modularity and space savings at the in/out storage ports

The in/out storage ports can be placed at different positions on a side. A port requires only one shelf space. During storage, PCB magazines are identified and optionally matched with customer master data. During retrieval, this information can be cross-checked again.



Mini-Smart-Warehouse

The cts Mini-Smart-Warehouse closes the gap to its established big brother. It is aimed at companies with a storage requirement of <300 magazines. With two basic footprints of 4.2m,x4.2m as well as 4.8mx4.8m, it is an efficient and space-saving solution that can fit in almost any production facility. Thanks to flexible heights, the available installation space can be used perfectly. The Mini-Smart-Warehouse is also suitable for decentralized storage solutions.

Options for expanding the Mini-Smart-Warehouse

The Mini-Smart-Warehouse can be expanded by another Mini Warehouse at any time. In terms of construction, this is possible on almost any side. By means of a connection port, any number of warehouses can be linked together. The warehouse solution adapts flexibly to your production!

The processes, software and handling are identical to the large Smart Warehouse.

Our warehouse solutions for the perfect combination with AMR systems

The storage/retrieval ports have a software interface for AMR. Thus, there is the possibility of a complete automation of the material flow. We accompany you on the way to the Smart Factory and advise you on further possibilities to optimize your production.

The advantages at a glance:

- Intelligent, modular and highly effective
- Significant reduction of shopfloor occupancy due to high storage density
- Automatic loading/unloading by AMR
- Individual adaptations possible
- ISO6- variant for FOSB storage (Mini-Warehouse)
- ISO7 variant for FOSB storage



Autonomous Mobile Robots (AMR/AGV) in Production

AMRs of different sizes and payloads increase productivity in production and logistics processes while reducing error rates and improving material traceability.

Due to our very broad knowledge in the field of "Autonomous Mobile Robots" (AMR) we are able to develop an individual solution for each

customer. cts offers you the know-how for a successful and trouble-free integration into new and existing production environments.

The modern industrial robots can be used in almost all industries. Completely according to your individual wishes, requirements and application areas.

We work with the following AMR base manufacturers:

- Omron (We are Omron Solution Partner)
- MiR
- Bosch Active Shuttle
- Knapp OpenShuttle Fork
- Magazino SOTO



Foto: ©Bosch Rexroth



Foto: ©Knapp

The suitable cts software components

Thanks to our cts middleware sloXis®, the individual elements (AMRs, machines, storage locations ...) can be easily and quickly connected and clearly displayed. So you always have an overview of your production.

In addition, with our cts MMS, we offer software for managing your material on the shopfloor - whether in manual racks, floor roller conveyors or intelligent warehouses, as well as fully automatic distribution with the MFC.

Different payloads, different transport options

We have AMRs for different payloads in our program. The fully automatic transport of KLTs, magazines up to pallets is possible without any problems.

The advantages at a glance:

- Increased productivity in production and logistics processes
- Reduction of the error rate
- Improved material traceability
- Individual adaptations through multifunctional design variants
- Immediately usable, no structural measures necessary for the orientation of the AMRs

Magazine transport:

The automatic supply and disposal of SMT production lines with PCB magazines is a typical application for the use of autonomous mobile robots. Our RGMZ series is perfectly adapted to this and in combination with automatic supply from the cts Smart Warehouse (or your own central or distributed storage system) to/from the production lines/buffers you get a clear competitive advantage.



KLT-Transport:

Distribution from a picking or Kanban warehouse to the assembly line or pre-assembly station is demanding due to space constraints. With current AMR technologies, sharing of confined space between humans and robots is much more feasible than with classic AGV concepts. Our RG, HVSRG, RG2S, RG-TLM model series offer a wide range of transport automation options, from classic frontal conveying to automatic height-adjustable transfers to lateral transfers as well as simultaneous transfers on 2 levels.



Floor roller transport:

In many cases, container stacks on floor rollers are used for material supply in established production structures. These are usually organized in stations which are loaded and unloaded manually. With the Bosch Active Shuttle we relieve your employees by fully automatic transport of the floor rollers up to 250kg! Thanks to highly automated production and assembly lines, we can also transport the floor rollers directly into the machine with the Active Shuttle AMR - for end-to-end automation of the material supply process.



Foto: ©Bosch Rexroth

Pallet transport:

Pallet transport has long been an automated process. This often takes place in closed, classic warehouse environments. In production environments, especially in mixed traffic with other participants, AGVs reach their limits. The Knapp OS Fork is highly flexible and suitable for dynamic environments with different road users. Thanks to innovative lifting technology, in addition to ground-to-ground transport, it is also possible to pick up/drop off from/to conveyor systems or pallet racks up to 1.2m high!



Foto: ©Knapp

Supply Chain-Roboter SOTO:

With the Supply Chain Robot SOTO we expand our AMR range for even more transport capacity! The SOTO brings materials just-in-time and completely autonomously to the assembly line and reacts flexibly to a changing demand. The SOTO can completely replace or interact with picking trucks or tugger trains. The SOTO transports different KLT sizes and weights and is operational for up to 20 hours a day. It can be flexibly configured, relieves employees and works together with machines, vehicles and workers.



We accompany you through the entire project process



1. Consulting phase

Technology introduction AMR
Advantages/Disadvantages
Recommendations for introduction



2. Identification

Use cases/application definition
Suitable vehicle types, fleet size
IT infrastructure, machine connection
Budgeting



3. Offer

Individual offer elaboration
Clear solution description



4. Project implementation

Careful implementation
Regular coordination



5. Delivery

Test and delivery release
Delivery



6. Commissioning

Installation
Commissioning
Instruction



7. After Sales

Maintenance
Support and spare parts packages

Our mini buffers: : the cts transferstations

Despite innovative technology solutions, unexpected delays can occur again and again at production plants, which make it necessary to buffer again directly at the production line.

Partly the processes themselves require a new, minimal buffering directly at the line. cts offers so-called mini buffers, which are also called transfer stations. These are available in different designs and serve as a short-term intermediate storage area directly at the lines.



Material stations for Bosch ActiveShuttle

We have a special material station for the Bosch ActiveShuttle. It serves as a buffer between incoming goods and the production facilities.

The material flow is controlled via our Material Flow Controller. This enables flexible, demand-oriented material supply and efficient order management. The Bosch ActiveShuttle transports floor rollers loaded with KLT from A to B quickly and autonomously.



Foto: ©Bosch Rexroth

SMT-Reel storage – the Gigaflex Reel-Storage Center

The Gigaflex Storage Center is the material, logistics and order picking center for all SMT component reels in electronics manufacturing. It offers an enormous storage volume in the smallest possible space: more than 50,000 7" reels can be stored on a floor area of approx. 40 m². Of course with full transparency and traceability!

Intelligent picking and Material supply

Intelligent, automatic picking, which is directly linked to the Enterprise Resource Planning System, the SMT lines and, if necessary, other systems, makes it possible to provide the material just-in-time. The material requirements

of the production lines can also be processed automatically and without manual handling via AMR fleets.

Thermal treatment processes can be fully integrated

The Gigaflex Storage Center includes a fully integrated MSL material handling system. In addition, dedicated zones for the re-drying process can be integrated without additional air conditioning of the total volume - efficient and energy-saving!

The Gigaflex Storage Center can be equipped with climate zones either completely or only in certain areas, depending on how the volume distribution of sensitive components requires this.



The advantages at a glance:

- Highest storage packing density
- Intelligent picking
- Warehouse management and inventory system
- Automated material supply
- Integration of different climate zones possible
- Flexible expansion concept
- Integration of ERP/MES systems possible without any problems



sloXis® Middleware

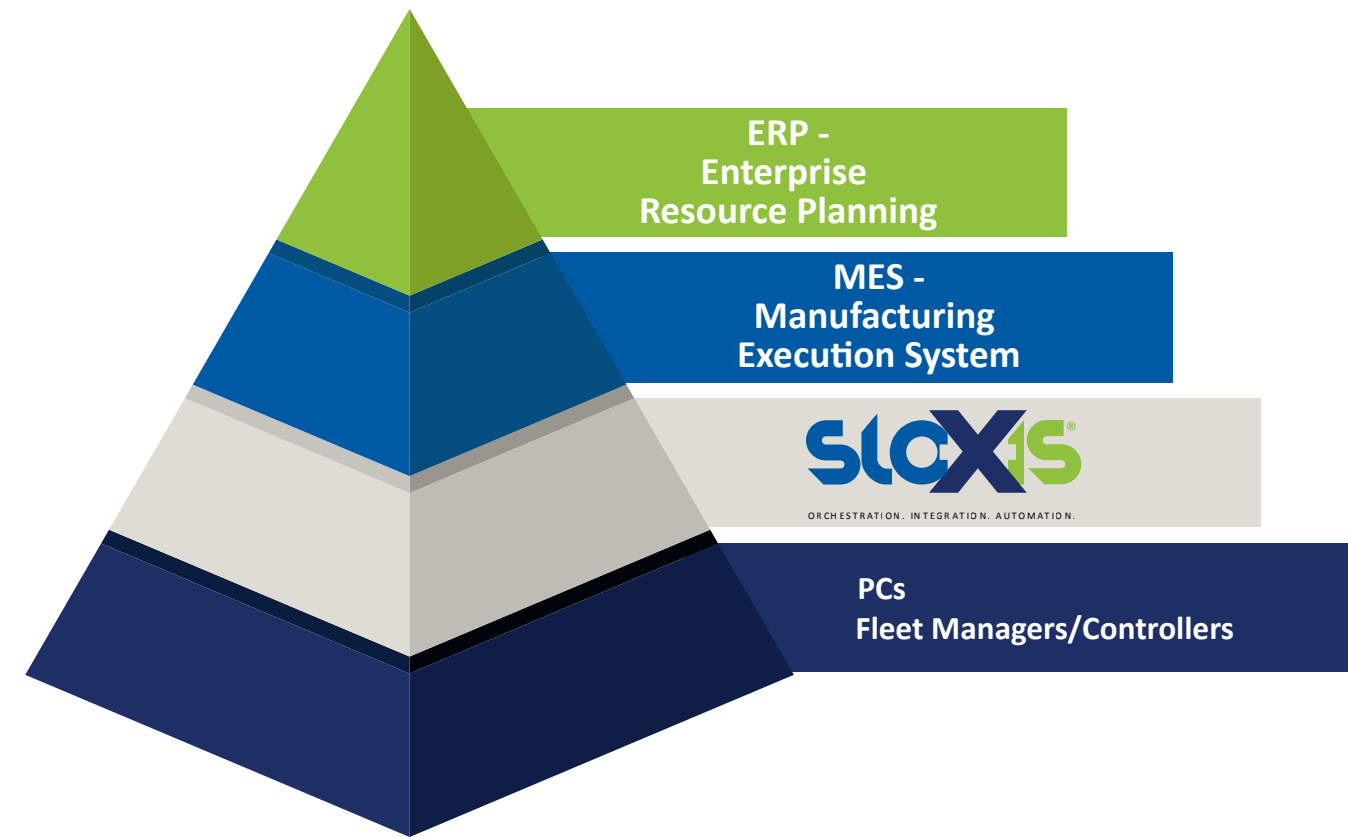
Production processes in industry must become increasingly flexible and efficient. To achieve this, AMRs of various weights and designs are used and take over the internal flow of materials.

Robots from different manufacturers often have to work together. The problem here is that each manufacturer has its own non-standardized master control software or fleet management. These are not compatible with each other, and direct cooperation between AMRs is not possible. In addition, ideally all machines and robots should be bundled in one software, so that the MES/ERP systems have only one point of contact.

Our intelligent data hub between AMRs, fleet managers, production machines, MES and ERP

Our cross-platform middleware sloXis® combines all elements, starting with the AMRs of different manufacturers with different functionality, via small buffers up to the Smart Warehouse. The software is openly designed to be able to connect and integrate further participants in the best possible way while forming the central interface to the MES/ERP.

Via native interfaces to different manufacturers as well as core functions of the open VDA5050 standard, the middleware combines various AMR from different manufacturers in a heterogeneous fleet. The integration of conventional floor conveyors, production machines, fire alarm systems, peripheral devices is possible without any problems.



Take control of your goods distribution into your own hands
With SmartSignalManager in sloXis, you can configure your automatic material flow between manufacturing processes on a graphical, web-based interface.

Reporting and dashboard functions
You have the current running and planned orders always and everywhere in view. The sloXis reporting and dashboard functions show you optimization potentials and increase the efficiency of your intralogistics. You also have access to all transport processes for evaluation and tracking.

Everything in view with the "Universal Map"

The "Universal Map" is a virtual map of your production environment. Not only does it give you an overview of all transport robots and other road users, it also provides you with all relevant data on your machines and equipment in real time with just one click.

Safety in case of fire:

In order to define fire protection zones and escape zones of the AMRs individually for your production, sloXis® connects to the fire alarm system. In case of fire, the AMRs are directed via the universal map.



cts Material-Management-System (MMS)

The cts MMS takes over the management, organization, monitoring and optimization of logistical processes and materials. In addition, the interface connections for transport, handling and control of intralogistic transport processes are also implemented. In combination with our material flow controller and the transport robotics middleware sloXis®, the MMS acts in perfect symbiosis. This enables completely automated material management and transport.

cts Material-Flow-Controller (MFC)

The cts MFC acts as an executive organ of the MES detailed planning regarding the intralogistic processes. Based on the detailed planning records and in connection with the cts MMS as well as the middleware sloXis®, the MFC orchestrates the material flow in production. With forecast calculations and exception handling scenarios, the MFC optimizes the intralogistic process flow of manufacturing.



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