

Contents

Portrait	3
Areas of application	
Installation	4
Robotics + driverless transport system.....	8
Logistics	9
Technical information	
Conveyor system	10
Control and process control system	11
Driverless transport system.....	12
Robotics	14
Matrix production.....	15

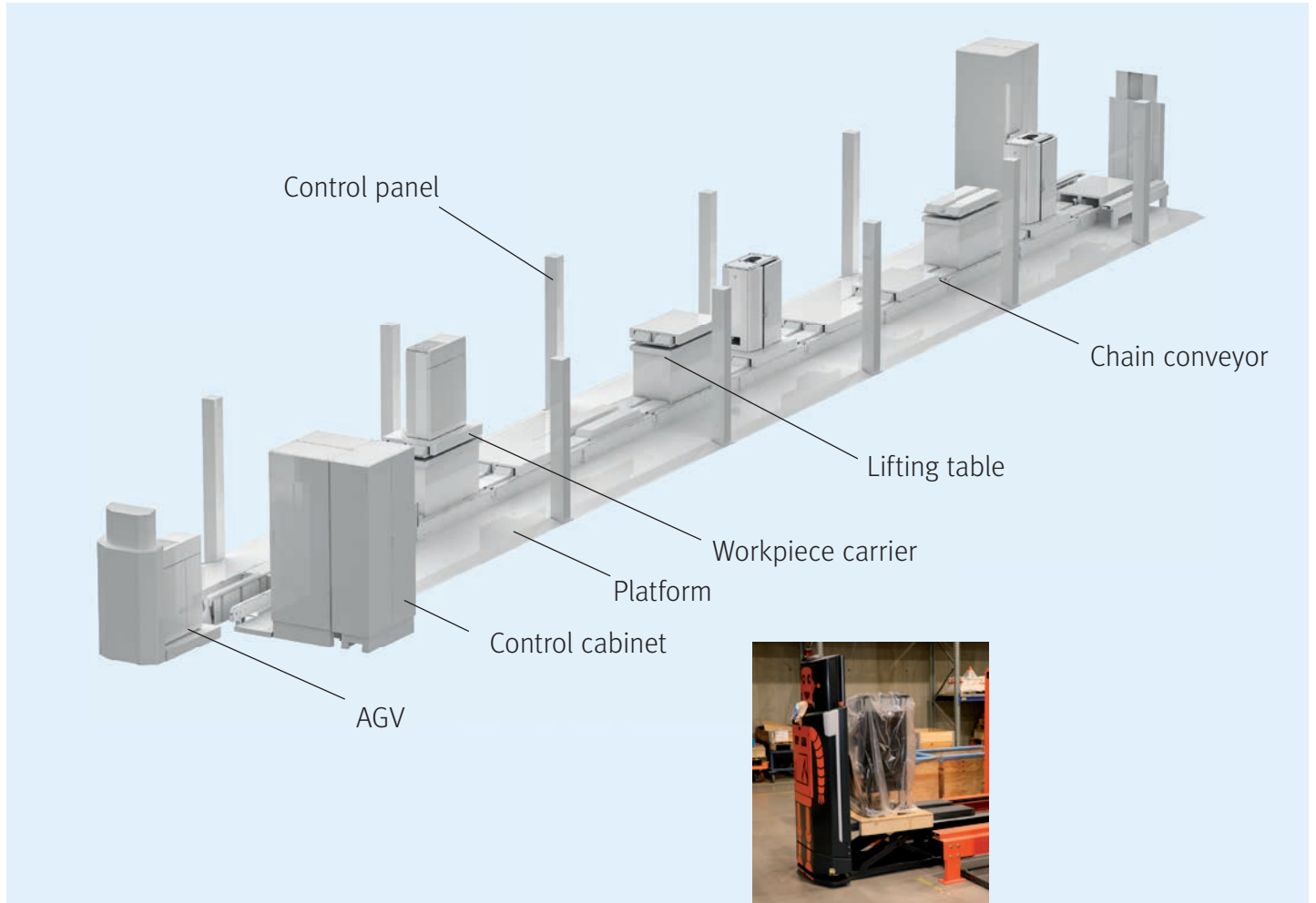
KNOLL .It works



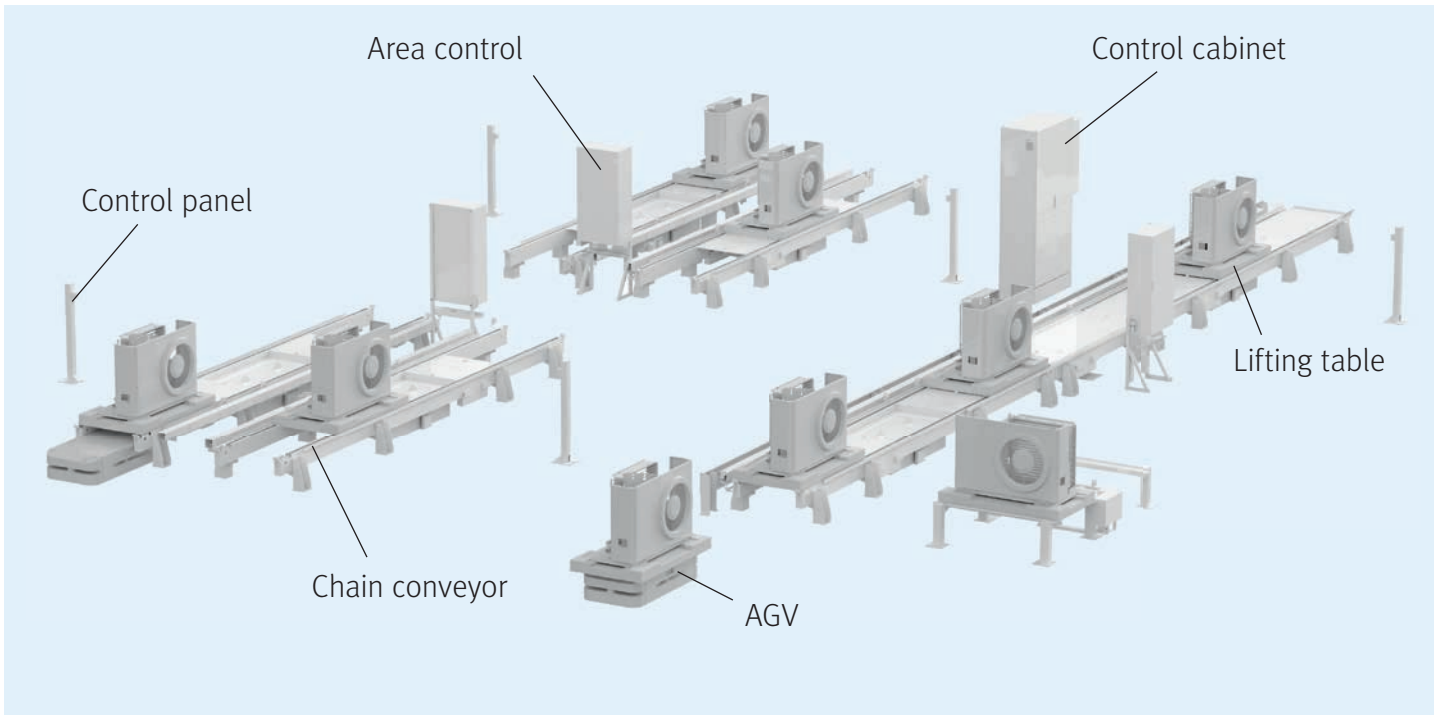
KNOLL is the leading provider of conveyor systems, filtration units and pumps for metal-working. These transport and separate chips and cooling lubricants. The comprehensive product range offers systems for decentralised or centralised applications.

Its Automation division deals with solutions for demanding assembly and logistics tasks. These include stationary transport systems with chain and roller conveyors. With the integration of handling (robots, cobots) and transport robots (AGVs), flexible systems are created from a single source.

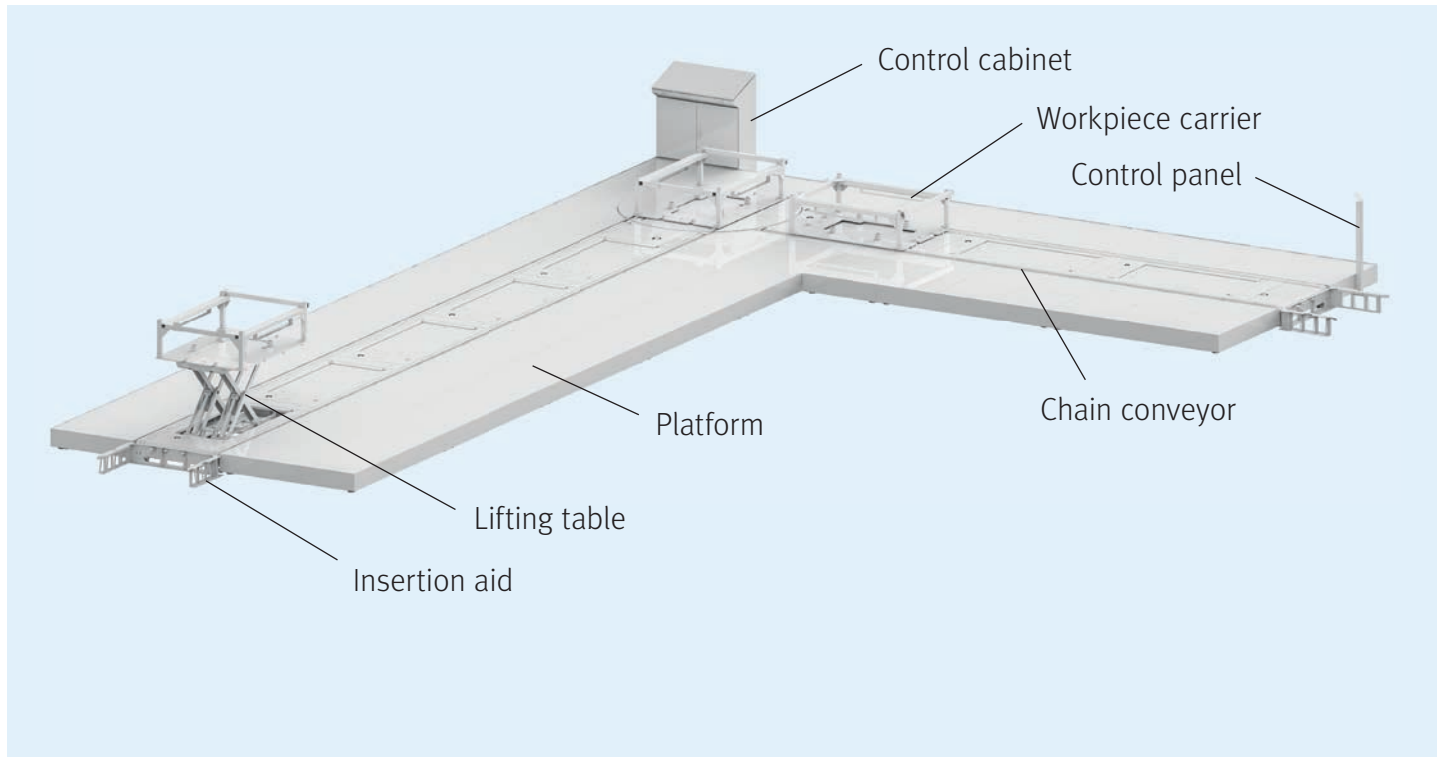
KNOLL originally developed several transport systems for its own use. The goal was the efficient line assembly of assembly groups and end products. In the meantime, other companies are relying on the conveyor and assembly systems from KNOLL. They transport parts in a wide variety of sectors such as engineering, plant construction, electrical engineering, vehicle construction and the automotive industry. In addition, the possibility of wagon transport enables innovative logistics solutions to be implemented in combination with tigger trains.



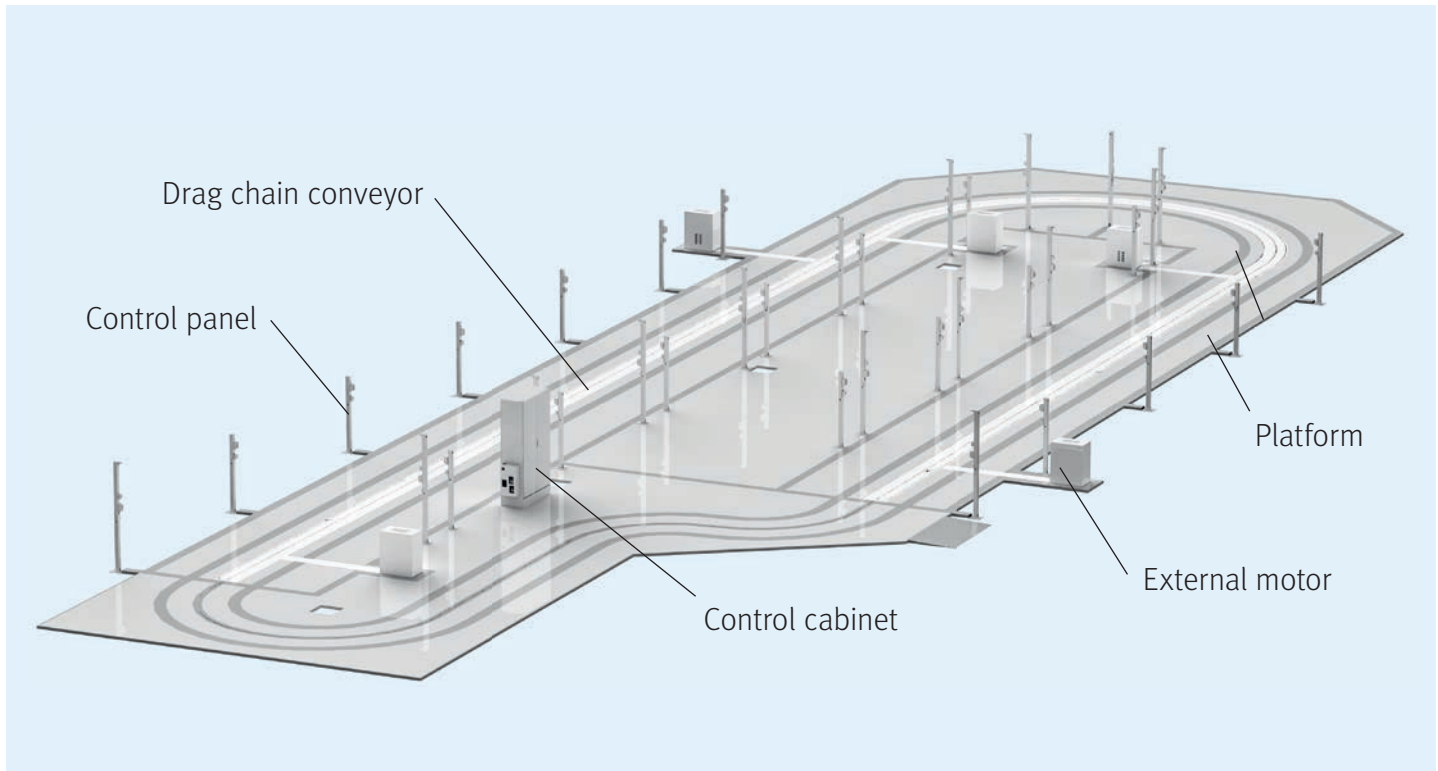
- Added value concentrated in the assembly line
- Exemplary occupational safety and ergonomics
- Investments in Industry 4.0 technologies
- Connection to MES system
- Material supply via AGV



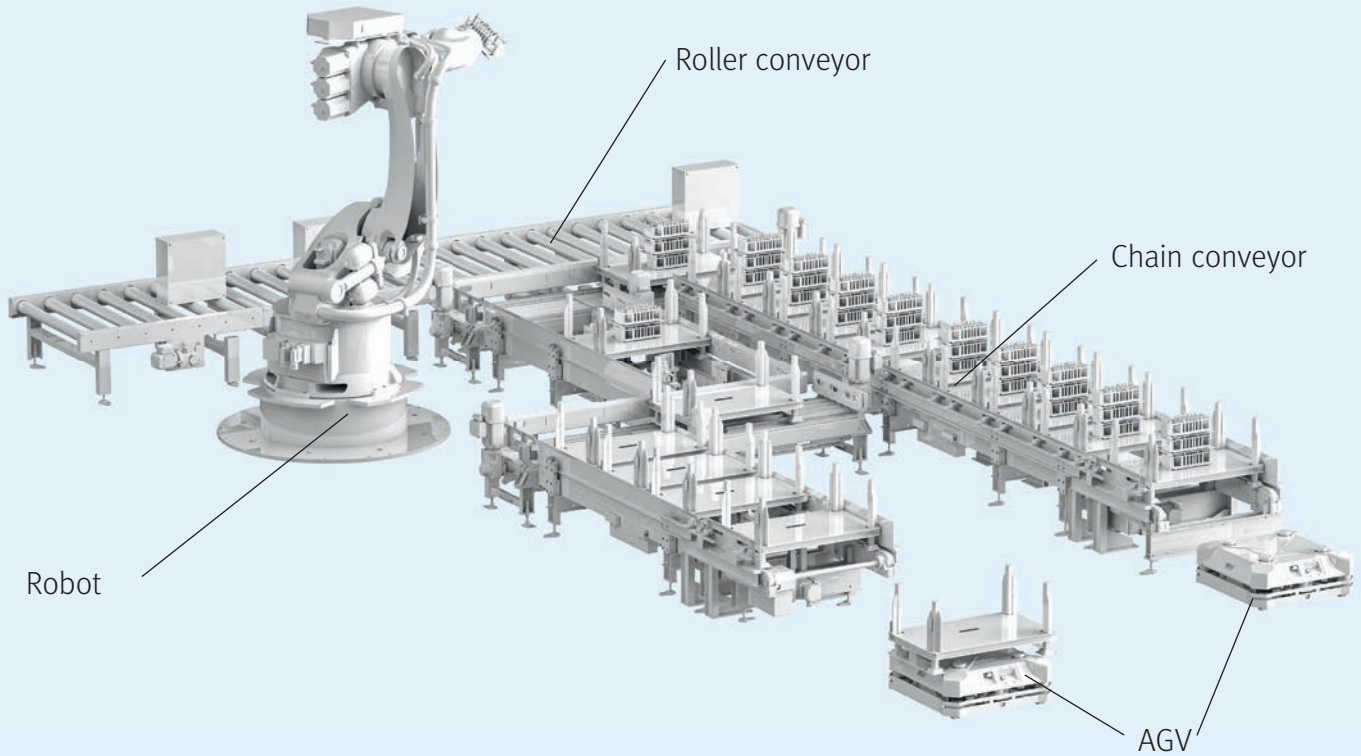
- 8 different product variants
- 100 identical workpiece carriers that are compatible with each product type
- Buffer rack for 64 workpiece carriers
- Universal assembly modules that are networked via an AGV
- Ergonomic assembly workplaces
- Product tracking with feedback to the ERP system



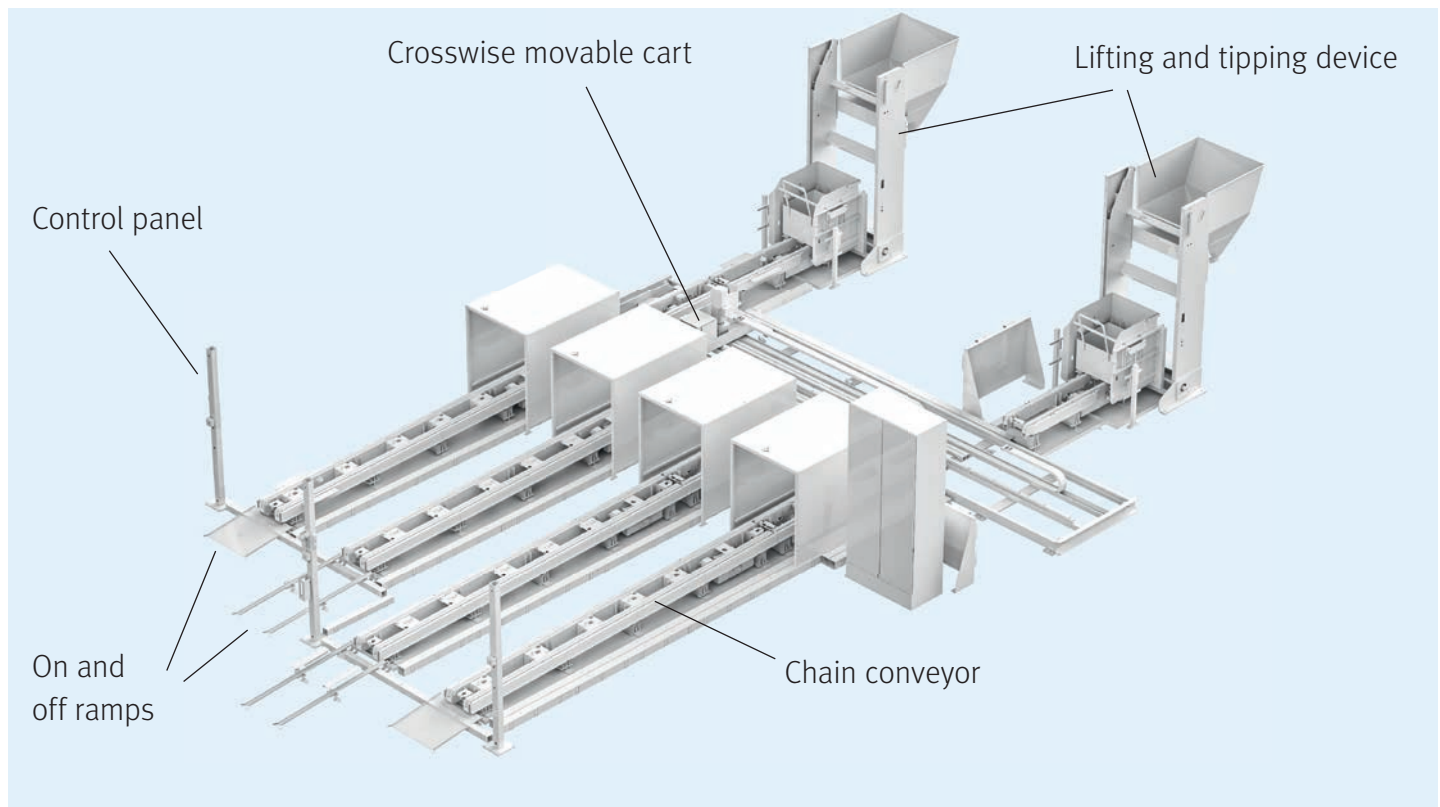
- Ergonomic solution for batteries weighing tons
- Forklift batteries in 120 variants
- Unit weight up to 3,000 kg
- Customer-specific workpiece holder
- Information transmission via RFID



- Drag chain transport system
- Customer-specific assembly cart
- No structural measures required
- System height 60 mm
- Weights up to 4 tons per cart
- Various operating modes possible (flow, clocked or mixed)



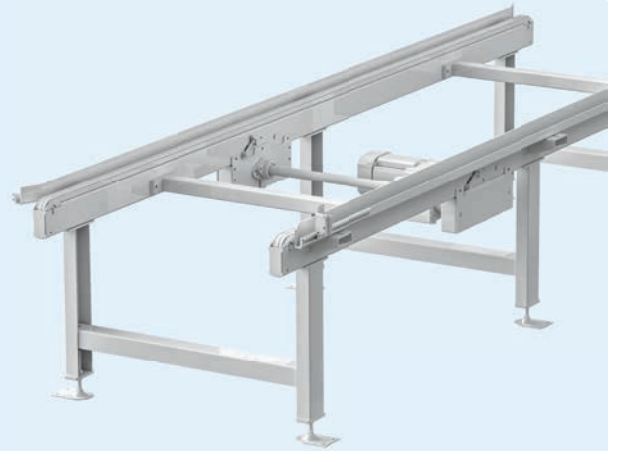
- Autonomous loading of the load carriers
- Precise providing of the load carrier
- Transport of customer-specific load carriers
- Loading and unloading via AGV or forklift
- Automatic container station with robot loading
- Unmanned palletizing by robots



- Customer-specific containers
- Personnel management
- Continuous utilization of the downstream process thanks to the buffer concept
- Self-controlled process
- Comprehensive safety concept

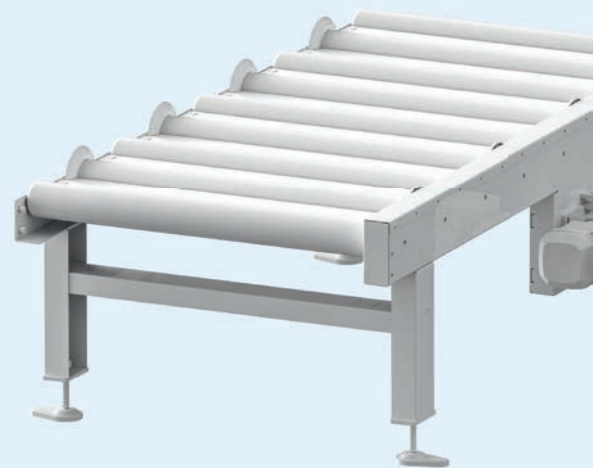
Chain conveyor

- Max. belt length: 6,000 mm
- Height: ≥ 230 mm
- Transport weight: Accumulation roller chain 1,500 kg/m, straight link chain 4,000 kg/m
- Accumulation roller chain and straight link chain (maintenance-free upon request), $\frac{3}{4}$ " duplex chain
- Accumulation of transport units possible
- Functional units: Separator, backstop, indexing units, etc.
- Transport medium: Transport cart, workpiece carrier, pallet, pallet cage, special load carrier, etc.



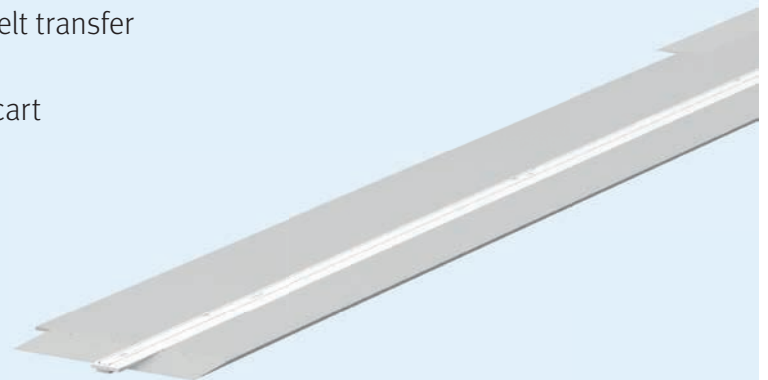
Roller conveyor

- Max. belt length: 6,000 mm
- Height: ≥ 230 mm
- Transport weight: 3,000 kg/m
- Drive roller to roller
- Accumulation of transport units possible via friction roller
- Functional units: Separator, backstop, indexing units, etc.
- Transport medium: Workpiece carrier, pallet, pallet cage, special load carrier, etc.



Drag chain conveyor

- Max. belt length: 50,000 mm – Extension via belt transfer
- Height: 60 mm
- Transport weight: Max. 3,500 kg per transport cart
- Drive arranged between chain strands
- Continuously variable speed
- Position control possible
- Master-slave combination possible with two drive trains
- Underground or aboveground
- Chain driver variably adjustable
- Carrying unit transport cart spring-loaded
- Decoupling from the tension cord via separators
- Transport medium: Transport cart



The control concepts from KNOLL enable targeted operation of the plant. Thanks to standardized functions and interfaces, the user finds structured menu navigation that is very intuitive to use. Customer requirements can also be incorporated individually.

Numerous interfaces offer almost limitless possibilities for exchanging data and information with neighbouring systems. Common standards, as well as individual customer solutions, are used here. Different remote solutions allow fast remote access. This saves time and costs.

Other applications that are usually provided as a separate system can also be implemented, e.g., employee management system or energy data acquisition.



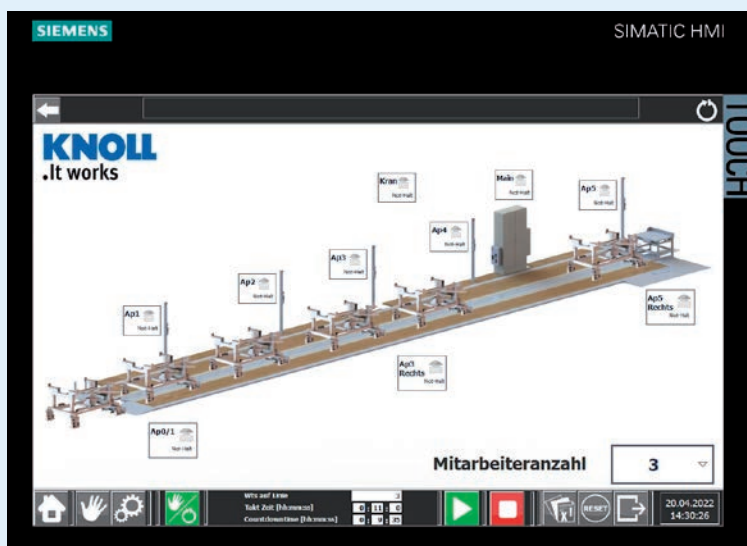
Plant overview with the status of the workplaces



Sensor overview over plant detail



Easy menu navigation using symbols



Homescreen of the overall plant: Contains the most important information



AGV S3

Available soon.
**Technical specifications are subject
to change without notice.**

- Forward and reverse travel possible
- Turn around in a lane width of 1 m
- Wear-free charging in the process using an inductive charging system
- LiFePo4 battery
- Flat design with a height of just 220 mm, making it ideal for driving underneath
- 7" touch display for easy handling
- Agent-based control for communication between the AGV and its environment
- Electric lifting pin for attachment and delivery of trailers up to 500 kg
- Travel speeds up to 1.6 m/s
- Hybrid navigation of magnetic track, contour navigation, camera navigation and odometry
- Safety laser scanner in the main direction of travel

AGV M4

- Forward and reverse travel possible
- Wear-free charging in the process using an inductive charging system
- Scalable battery capacity from LiFePo4 batteries to adapt to process requirements
- Flat AGV with a height of just 220 mm, making it ideal for driving underneath
- 7" touch display for easy handling
- Agent-based control for communication between the AGV and its environment
- Electric lifting pin for automatic attachment and delivery of trailers up to 1,500 kg
- Travel speeds from 0.02 m/s to 1.6 m/s
- Hybrid navigation of magnetic track, contour navigation, camera navigation and odometry
- Safety laser scanners in each direction of travel

AGV M4-C

- Forward and reverse travel possible
- Wear-free charging in the process using an inductive charging system
- Scalable battery capacity from LiFePo4 batteries to adapt to process requirements
- Flat AGV with a height of just 220 mm, making it ideal for driving underneath
- 7" touch display for easy handling
- Agent-based control for communication between the AGV and its environment
- Electric scissor lift for lifting loads of up to 1000 kg
- Lifting height of up to 40 mm in 5 seconds
- Travel speeds from 0.02 m/s to 1.6 m/s
- Hybrid navigation of magnetic track, contour navigation, camera navigation and odometry
- Safety laser scanners in each direction of travel Available soon

AGV L1

- Surface-movable/Omnidirectional
- Charging during the process with floor sliding contacts
- 7" touch display for easy handling
- Agent-based control for communication between the AGV and its environment
- Variable setups, e.g., conveyor technology
- Lift loads up to 1,500 kg with four lifting columns
- Transports up to 3,000 kg
- Safety laser scanners in each direction of travel
- Travel speeds up to 1.0 m/s

AGV X1

- Forward and reverse travel possible
- Differential drive allows turning on the spot
- Wear-free charging in the process using an inductive charging system
- Scalable battery capacity from LiFePo4 batteries to adapt to process requirements
- 7" touch display for easy handling
- Agent-based control for communication between the AGV and its environment
- Four electric lifting columns for lifting loads of up to 1,500 kg
- Travel speeds up to 1.6 m/s
- Hybrid navigation of magnetic track, contour navigation, camera navigation and odometry
- Diagonally arranged safety laser scanners

Our core competence lies in the combination of robotics, conveyor technology and driverless transport systems for different applications.

Handling

- of workpieces of all types
- palletizing/depalletizing
- machine loading

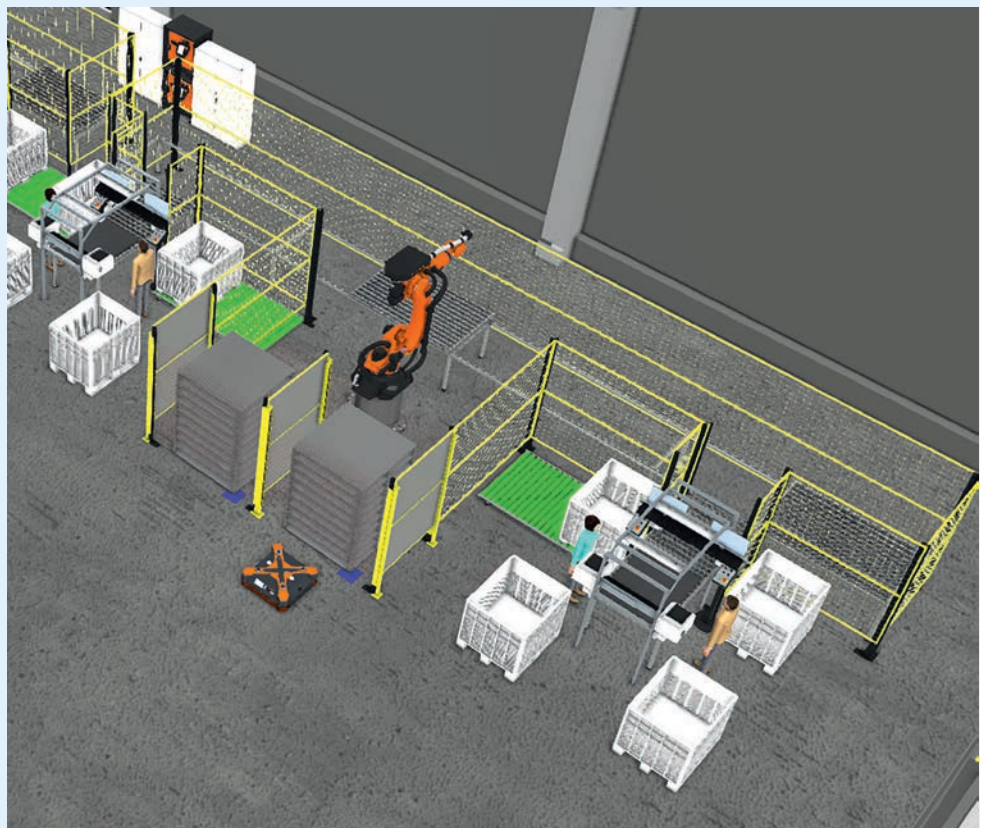
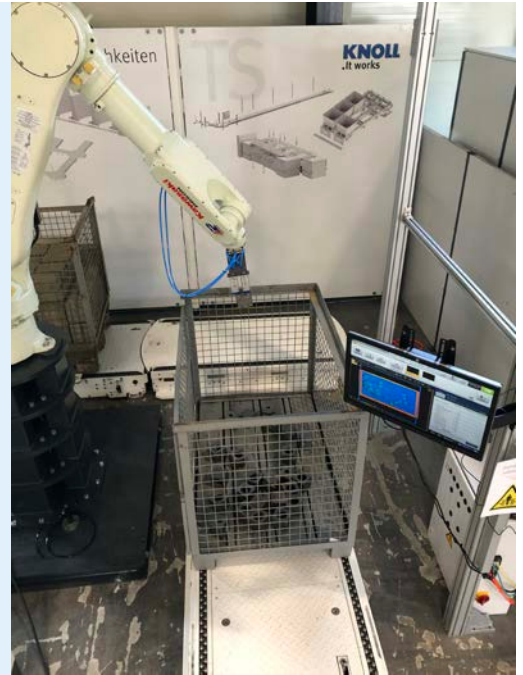
Component recognition by vision systems

- "Bin picking"
- 2D/3D applications

Assembly tasks

- Positioning and screwdriving/riveting
- Gluing/sealing
- Welding/soldering
- Cutting

Collaborative robotics with individual gripping technology.



Delivery of a material trolley via AGV.
Distribution of the small load carriers to the manual workstations by robots and conveyor technology.

The demands placed on production today are diverse: Flexible production systems, different variants and efficiently scalable lot sizes.

Matrix production as cycle-independent line production combines the flexibility of individual production with the economic benefits of classic line production.

Advantages of matrix production are:

- Modularity
- Total capacity scalability
- Scalability of the diversity of variants
- Compensation for fluctuations in demand
- Easy integration of new products

→ Different product families can be combined on investment-intensive systems.

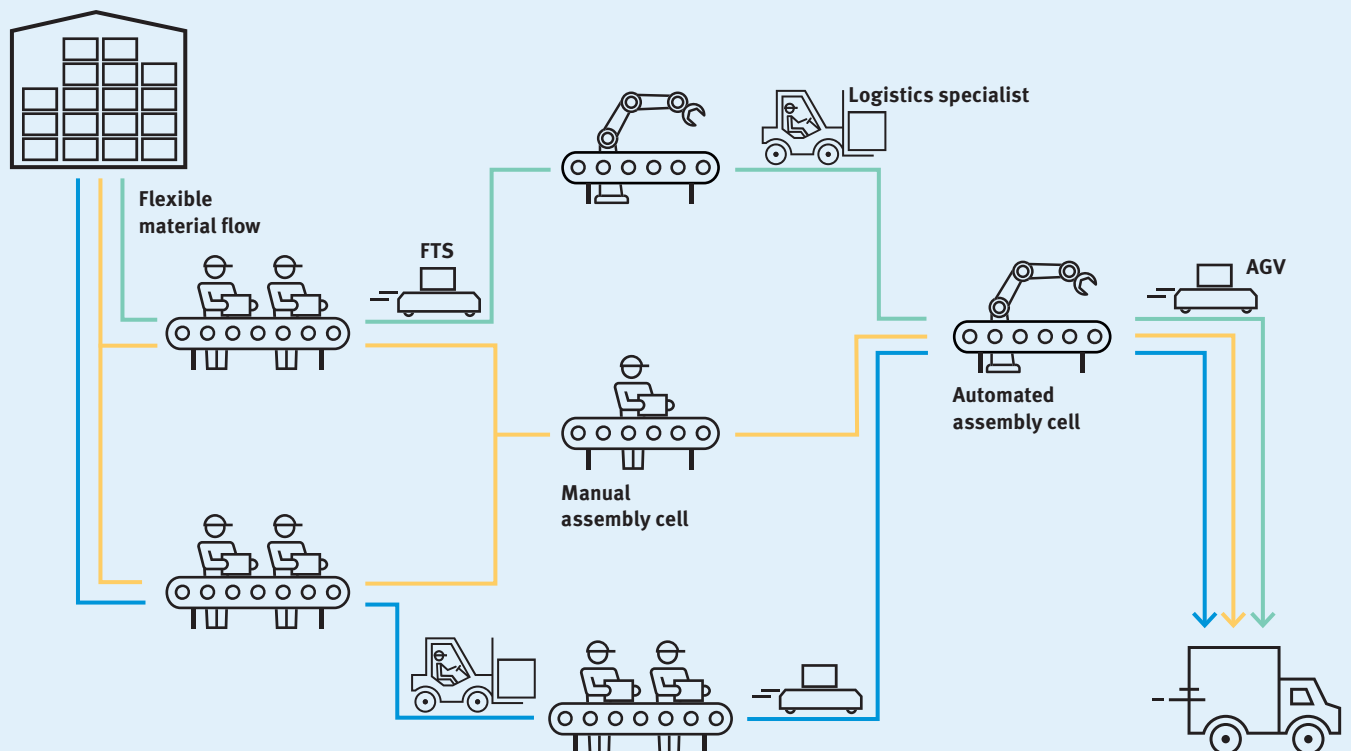
→ Automation is now cost-effective in an area where it was not before.

Product variant follows individual path:

Product A

Product B

Product C



KNOLL Maschinenbau GmbH
Schwarzachstraße 20
DE-88348 Bad Saulgau
Tel. +49 7581 2008-0
Fax +49 7581 2008-90140
info.itworks@knoll-mb.de
www.knoll-mb.com