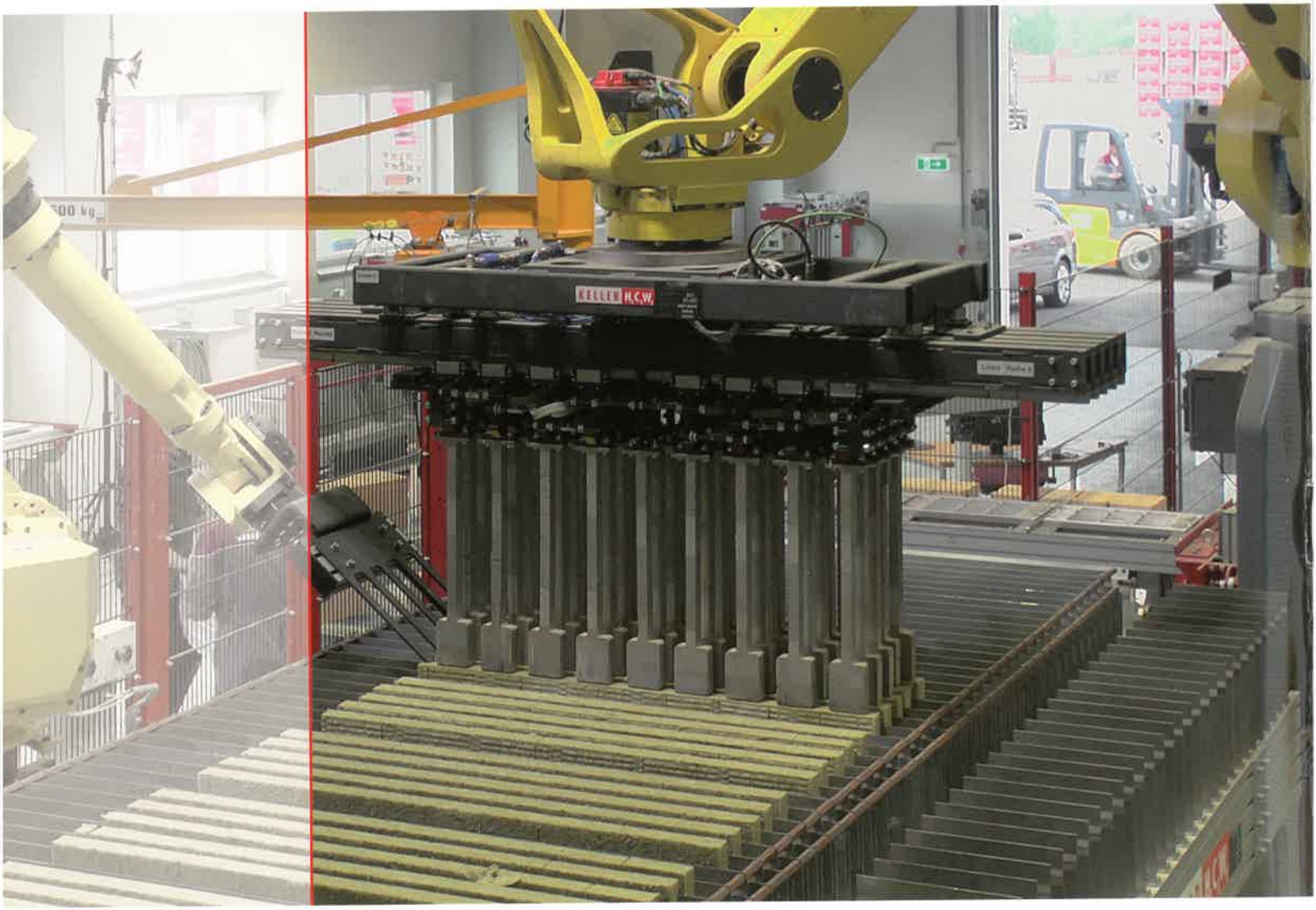

# Robotics and Automation

KELLER

*Creating Solutions*




*4-axis palletizing robots with special grippers for filling of hollow bricks with mineral wool*
*Customer: Wienerberger Ziegelindustrie, Haiding (Austria)*

## *Creating Solutions*

For 120 years, KELLER has been among the world market leaders for the manufacture of plants and machinery for the heavy clay industry.

But outside of this industry, the name KELLER is still relatively unknown.

***We want to change that!***

Because we are of the opinion that more than 500 robot solutions which have been realized by us since the mid 1990's offer interesting solutions for challenges in many other industries.

Our Claim *Creating Solutions* stands for our commitment to develop individual and convincing solutions. Because they …
… have been reflected very carefully,
… are flexible and future-oriented,
… far exceed the defined requirements.

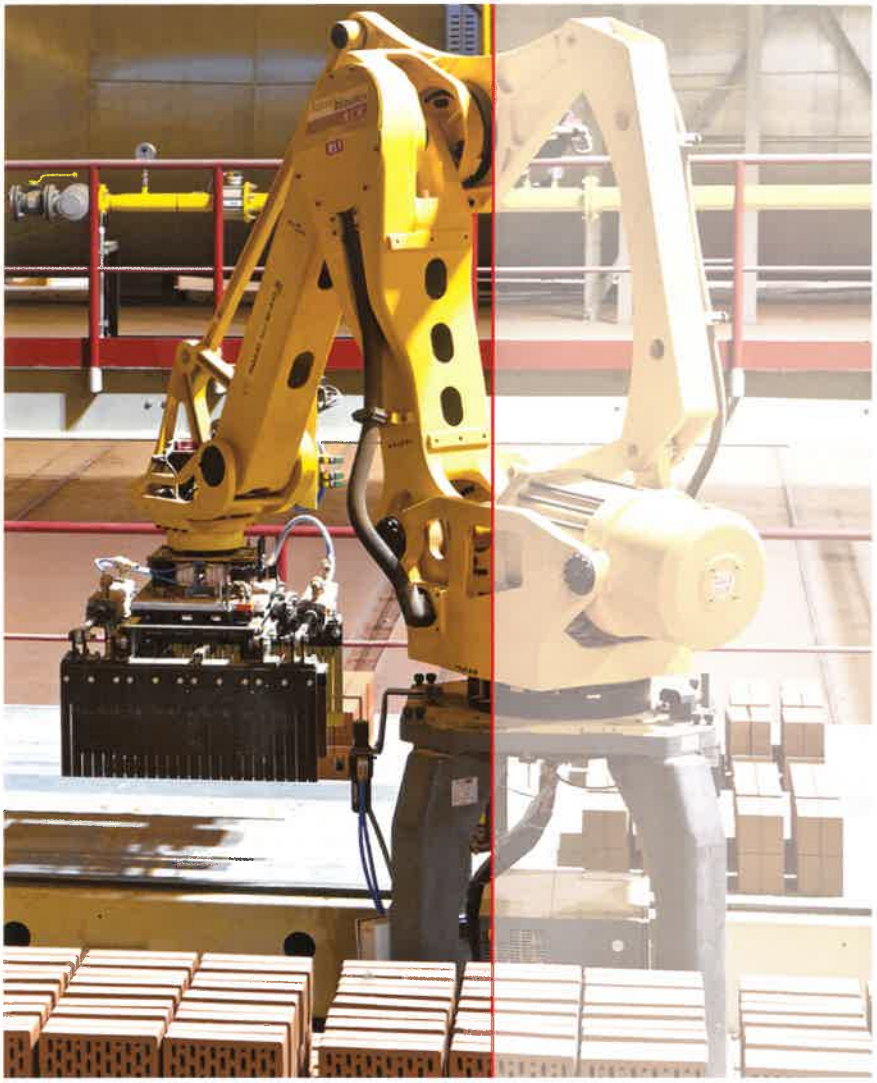
***Let yourself be inspired!***

With this brochure we would like to give a first impression of the high innovation potential of KELLER for plant automation with robots.

Be inspired by our examples and discover the solution for your needs.

***Contact us!***

Our automation specialists are pleased to design and implement convincing solutions for you.



*4-axis palletizing robot for kiln car setting*
*Customer: Braer, Tula (Russia)*

## Innovation based on tradition – since 1894

The success story of KELLER begins in 1894 in the Westphalian Laggenbeck. Carl Keller, the company founder, is proud to present the result of his design work, the first finger car for brick factories. This is the start of automation in the heavy clay industry.

The passionately keen inventor made sure his first successful design was followed by many others, including the first fully automatic machine for brickworks, with which he gained a reputation far beyond Germany in 1910.

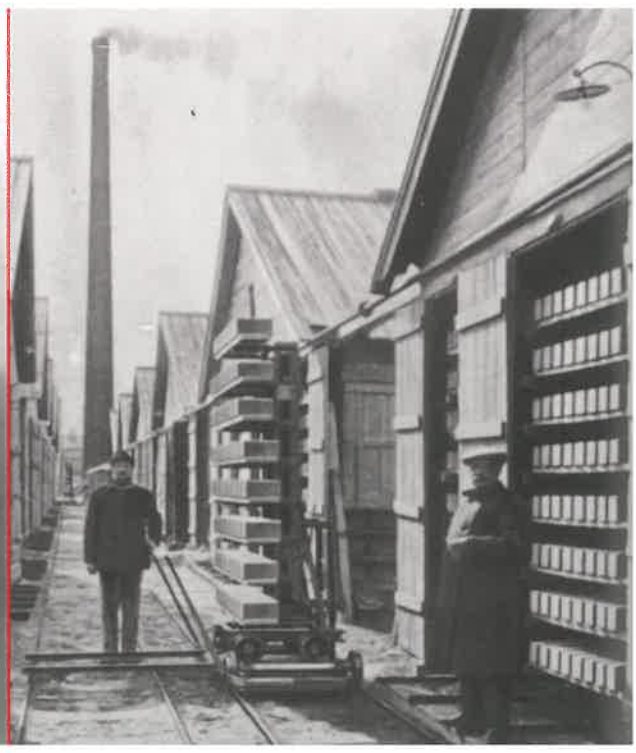
Until today, KELLER has been sticking to the principles of its founding father Carl Keller and most consistently develops plants and machinery according to the motto Innovation from tradition, so that all machinery and plants always leave KELLER in Ibbenbüren-Laggenbeck with the latest technology.

For the past 120 years, this has made KELLER one of the technological world market leaders for the manufacture of machinery and plants in the heavy clay industry.

Moreover, for many decades the name KELLER has been standing worldwide for intelligent solutions for automation, measurement and control, as well as in the area of plastics technology for the most accurate skiving machines for polyethylene (PE) and polytetrafluoroethylene (PTFE).

*Company founder Carl Keller*

*First fully automatic brick factory in Russia (1912)*
*Astrakhan (Russia)*



Since the mid 1990's, KELLER has already been using robots in the heavy clay industry.

4-axis palletizing robots with a loading capacity of up to 450 kg are mainly used in brick factories and 6-axis articulated-arm robots in roof tile factories. Since 2014 4-axis Delta robots are used for sorting and packing of smaller products. These robots dispose of a 3-axis wrist allowing in total six degrees of flexibility.

Today, most of the size changes in brick factories can be achieved fully automatically by using servomotor-driven grippers. Otherwise, in case of size and product changes the grippers can be changed just as quick and easy by gripper stations.

In contrast to many other areas of application the robots used in the heavy clay industry not only have to prove themselves in continuous operation around the clock, beyond that they are exposed to extreme dust and dirt.

Due to the high preparation water content as well as their hole pattern extruded and cut common bricks are always exposed to the risk to be deformed during the further handling process. The handling of the so-called green products on the wet side therefore is regarded as particularly challenging and difficult.

*Characteristics of the KELLER robot setting plants on the wet side:*

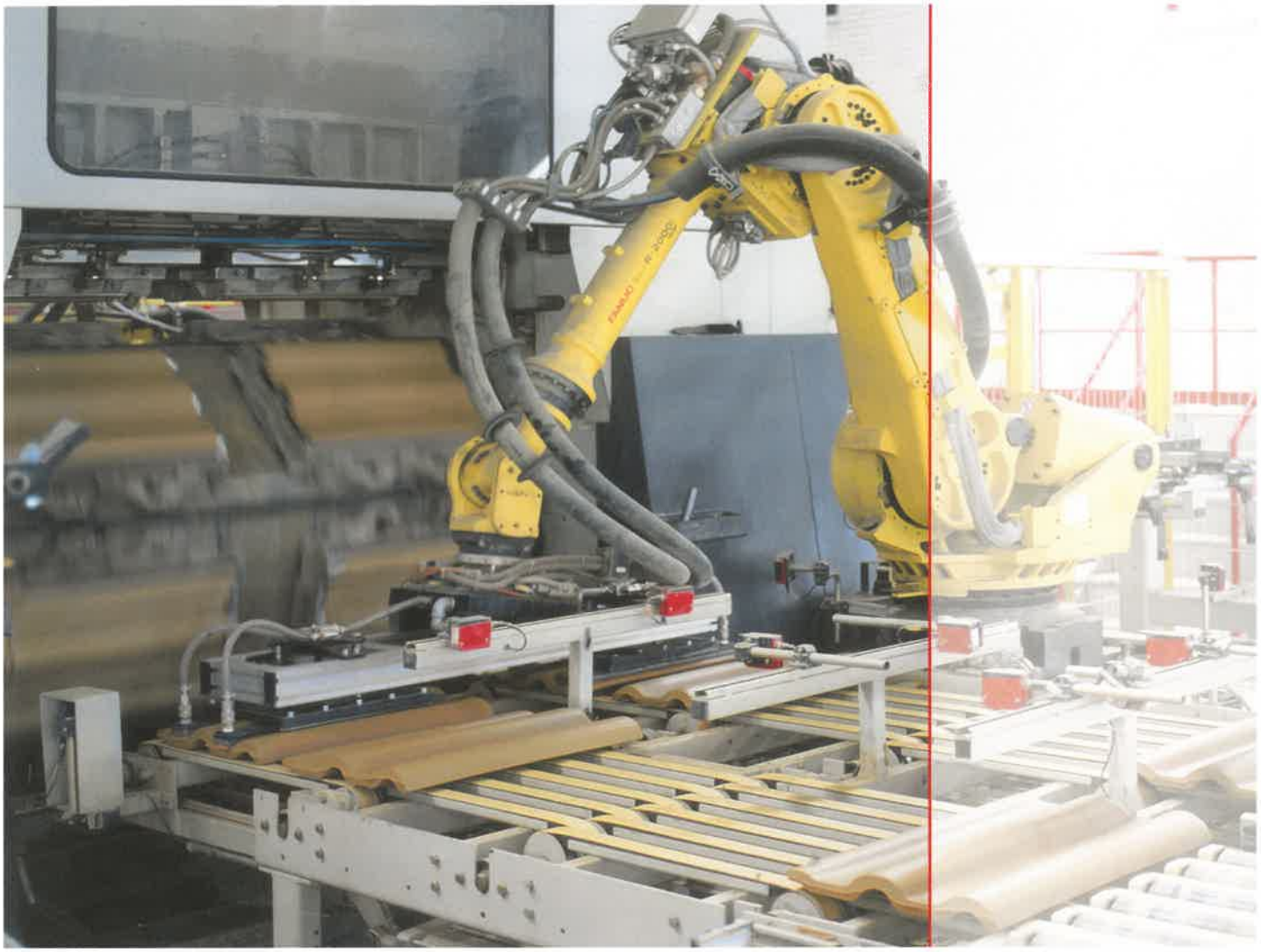
- *Very sensitive layout of robot and gripper*
- *Smooth gripping and setting in the moving process*

*4 axis palletizing robot on the wet side with pneumatic gripper*
*Customer: Girnghuber, Marklkofen (Germany)*

*The extruded and cut bricks are set on large dryer pallets by two 4-axis palletizing robots with pneumatic grippers*
*Customer: Laterizi Fauci, Sciacca (Italy)*

*Robot setting machine with 6-axis articulated arm robots and pneumatic grippers for extruded bricks*
*Customer: Malpesa, Bailén (Spain)*

*Setting pattern for extruded bricks generated by the KELLER application K-matic VR*
*Customer: Malpesa, Bailén (Spain)*



*Pre-shaped roof tile slugs are loaded into a revolver roof tile press by a 6-axis articulated arm robot*
*Customer: Nibra, Groß-Ammensleben (Germany)*

## Robot loading and unloading plants for roof tile presses

Also roof tiles are exposed to the risk to be deformed during the loading and unloading of the roof tiles press due to their preparation water content and their form and size. Therefore, the robots and grippers for loading and unloading of roof tile presses must be designed in a very sensitive way.

*Characteristics of KELLER robot loading and unloading plants for roof tile presses:*

- *Very sensitive layout of robot and gripper*
- *Smooth gripping and setting*

*Two 4-axis palletizing robots with pneumatic spacing grippers for setting soft mud bricks on kiln cars*
*Customer: SVK, Sint-Niklaas, Belgium*

## Robot setting and unloading plants

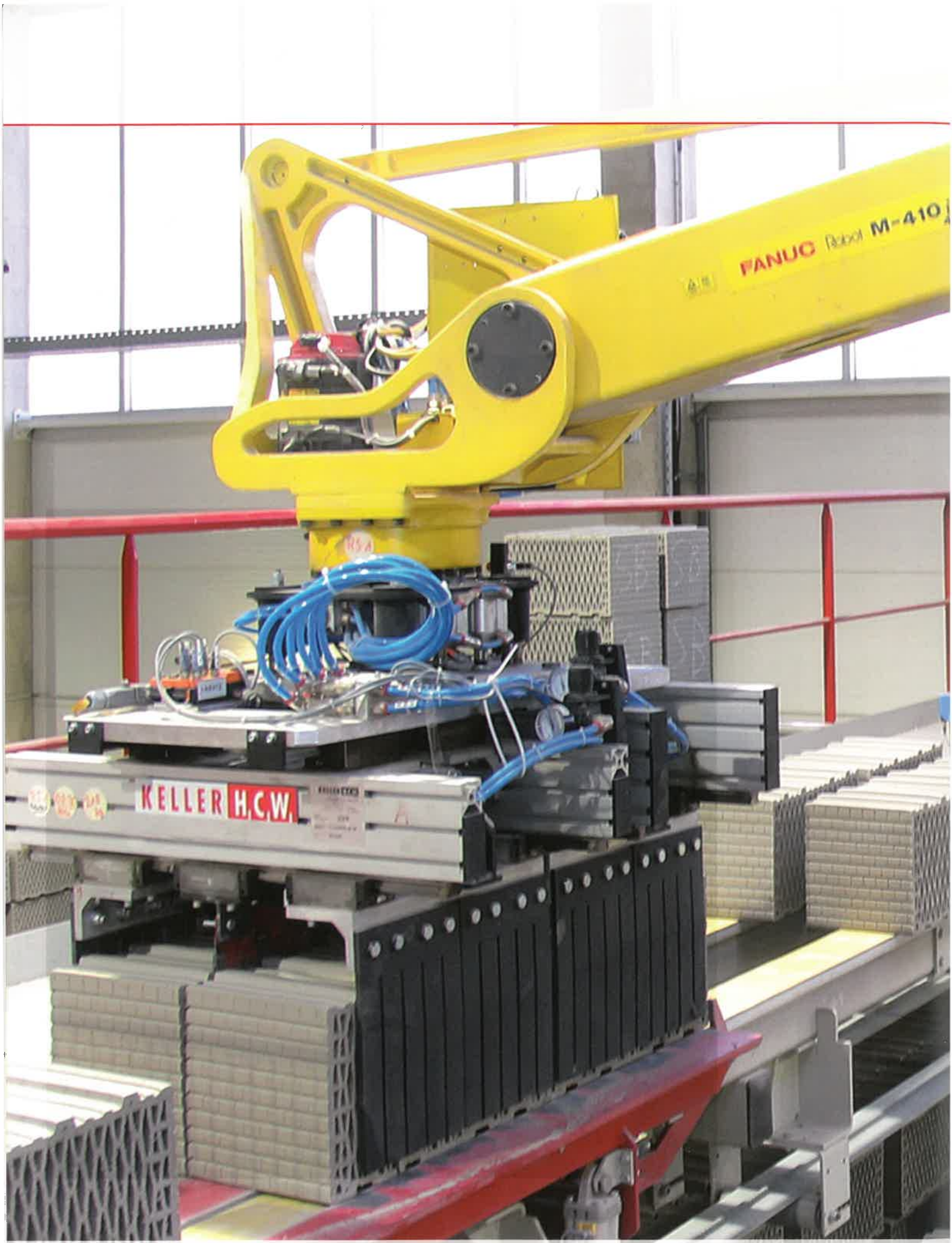
Robot setting and unloading plants are the standard of today in the heavy clay industry. They unload the dryer cars, load and unload the kiln cars and at the transition points of the separate areas they set the bricks from one transport line to the other.

*Characteristics of KELLER robot setting and unloading plants:*

- ***Flexible design for fast size changes***
- ***Smooth gripping and precise positioning***
- ***Smooth integration into already existing plants***

*4-axis palletizing robot with pneumatic gripper*
*Customer: Laterizi Fauci, Sciacca (Italy)*

*4-axis palletizing robot with pneumatic gripper for setting common bricks on kiln cars*
*Customer: Adolf Zeller, Alzenau (Germany)*




*Two 4-axis palletizing robots with pneumatic gripper for setting common bricks on kiln cars*
*Customer: Heluz, Hevlin (Czech Republic)*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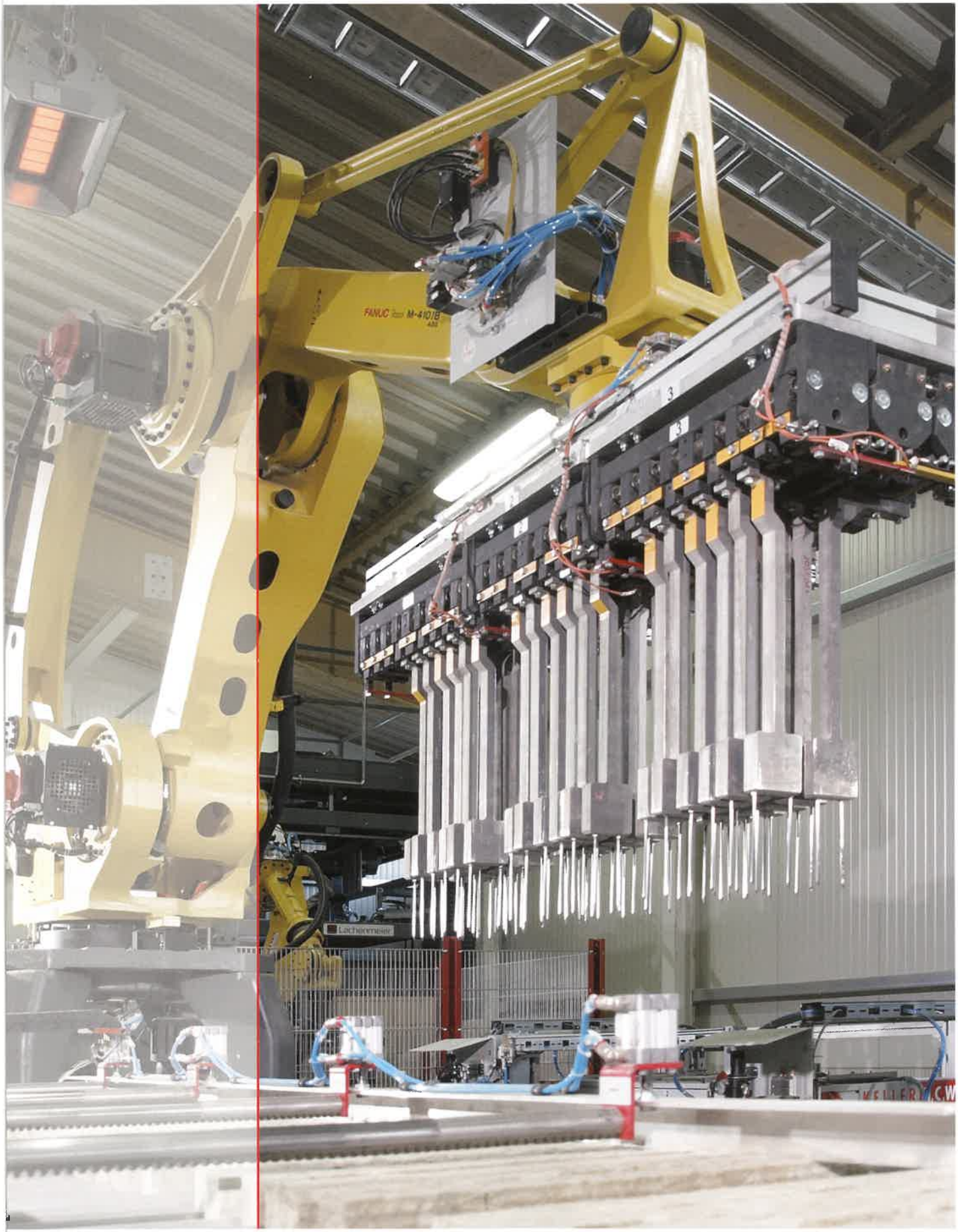
RS1



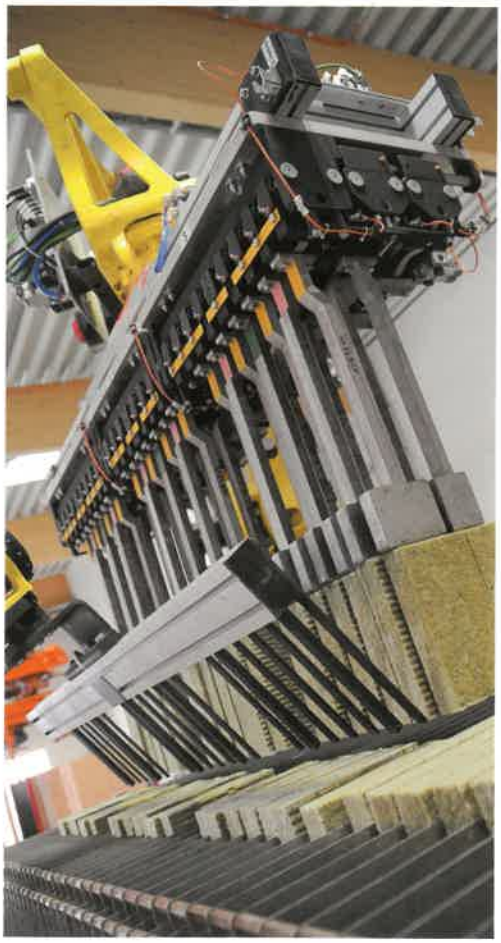

*Robot plant for filling common bricks with mineral wool*
*Customer: Röben Tonbaustoffe, Reetz (Germany)*

## Robot systems
## for filling common bricks with mineral wool

With the introduction of the Energy Saving Law in 2009 filled common bricks became the new standard in Germany. KELLER significantly developed the filling technology and is one of the world's leading manufacturer of filling systems for various insulation materials.

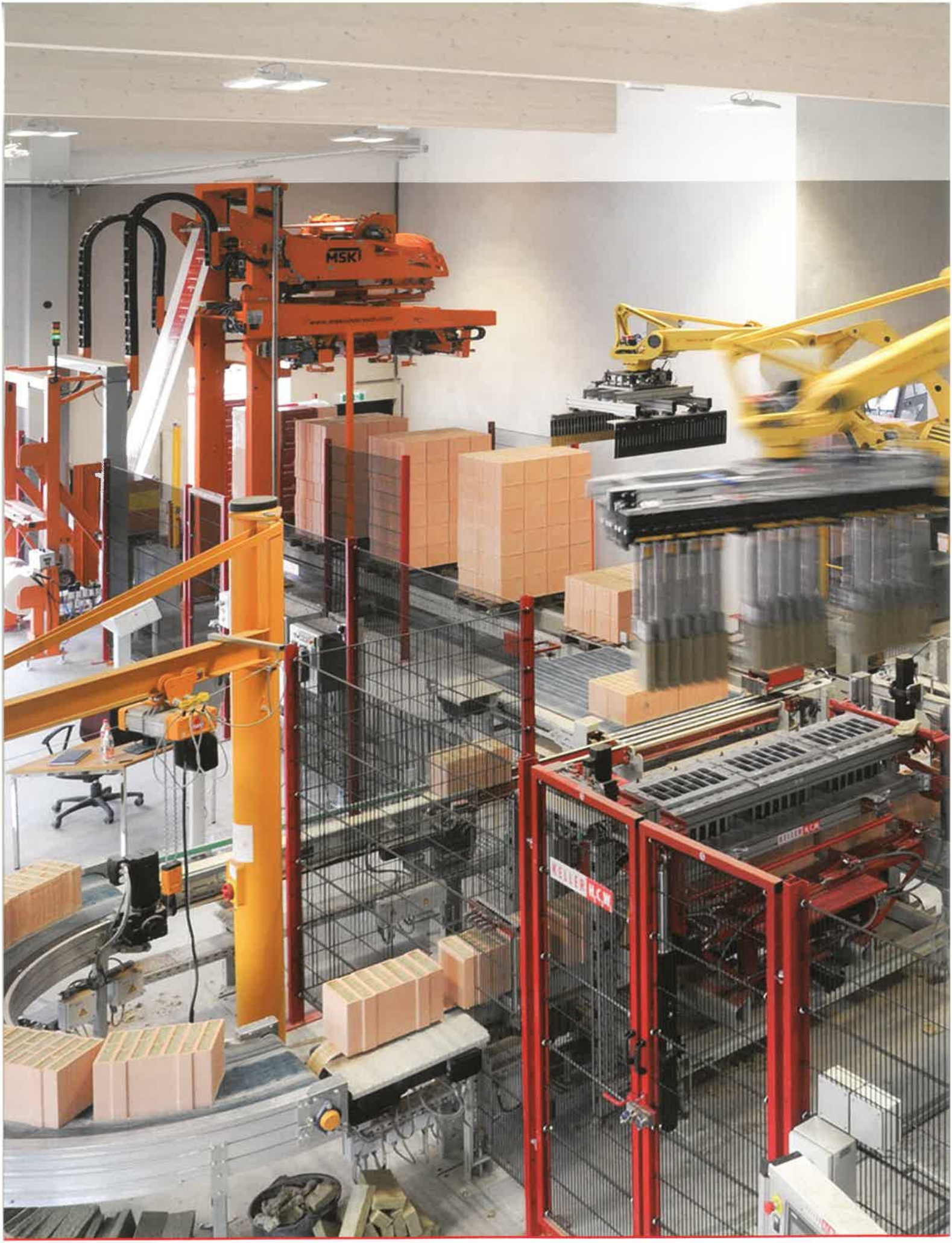
*Characteristics of the KELLER robot systems for filling common bricks with mineral wool:*

- ***Precise cutting and feeding of mineral wool cuttings to be taken-up by the filling robot***
- ***Precise and non-compressible introduction of mineral wool cuttings in the filling station***

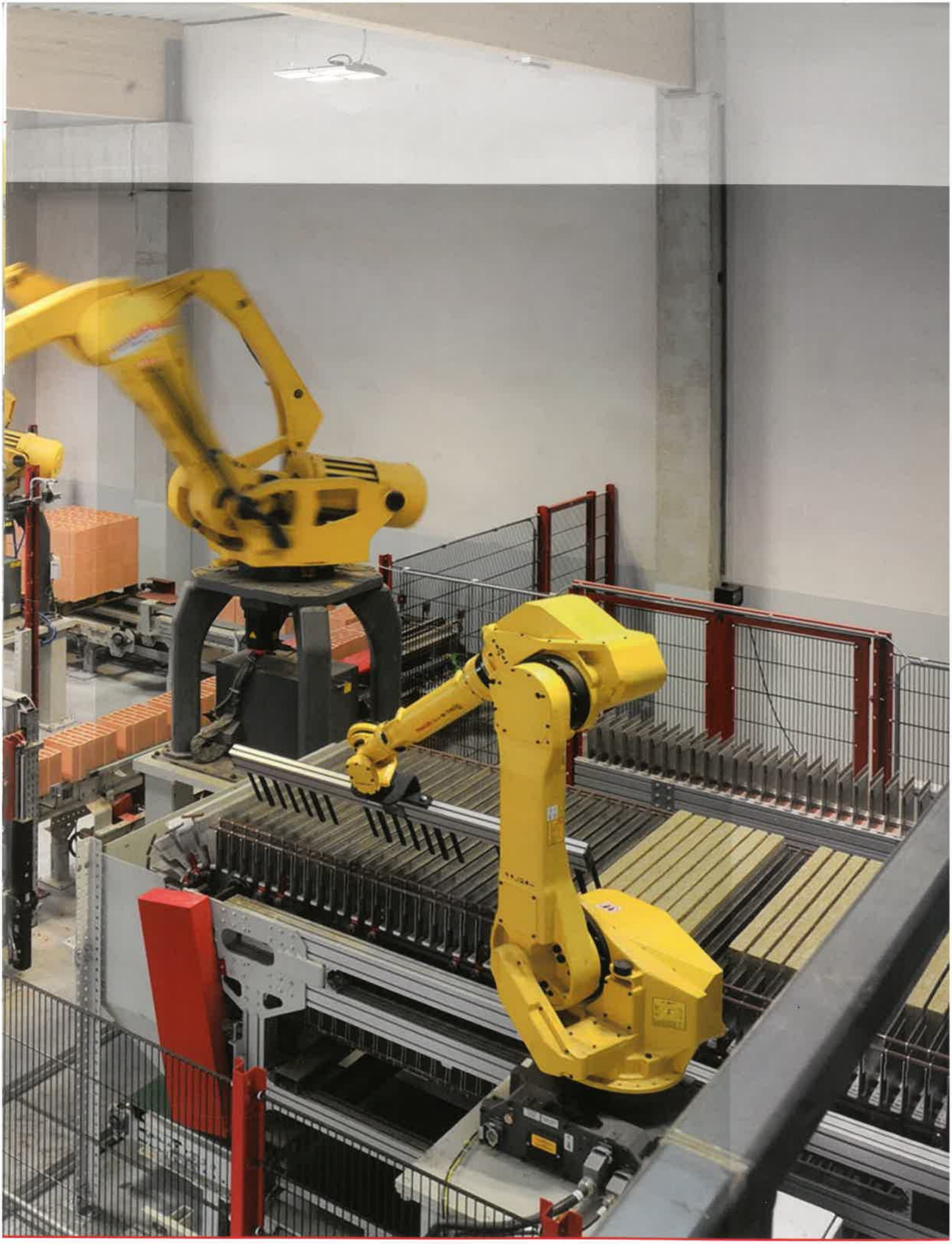


*Sting gripper to pick up the mineral wool cuttings*
*Customer: Wienerberger Ziegelindustrie, Haiding (Austria)*

*Introduction of mineral wool cuttings in the filling station*
*Customer: Wienerberger Ziegelindustrie, Haiding (Austria)*




*First robot plant for filling common bricks with mineral wool in Austria (2013)*
*Customer: Wienerberger Ziegelindustrie, Haiding (Austria)*



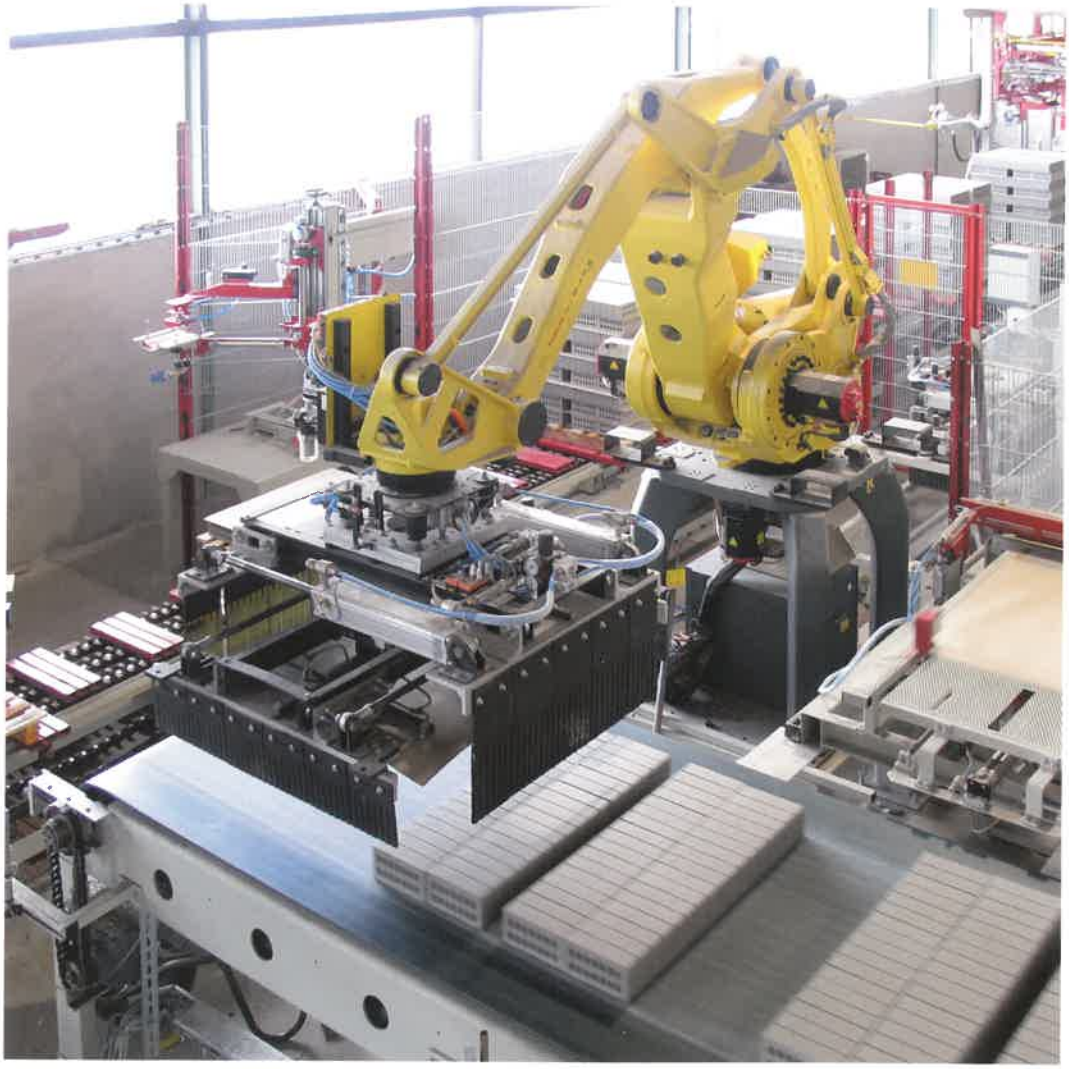
For the transport to the customer the robots stack the finished facing bricks, common bricks and pavers directly on pallets which are then welded or strapped with belt. In case of roof tiles, roof tile accessories, floor tiles and facing strips, the finished products are first combined in packs by 6-axis articulated robots, which are then optionally welded, strapped with belt or packed in boxes.

Moreover, since 2014, 4-axis Delta robots have been used for sorting and packaging of smaller products like facing strips.

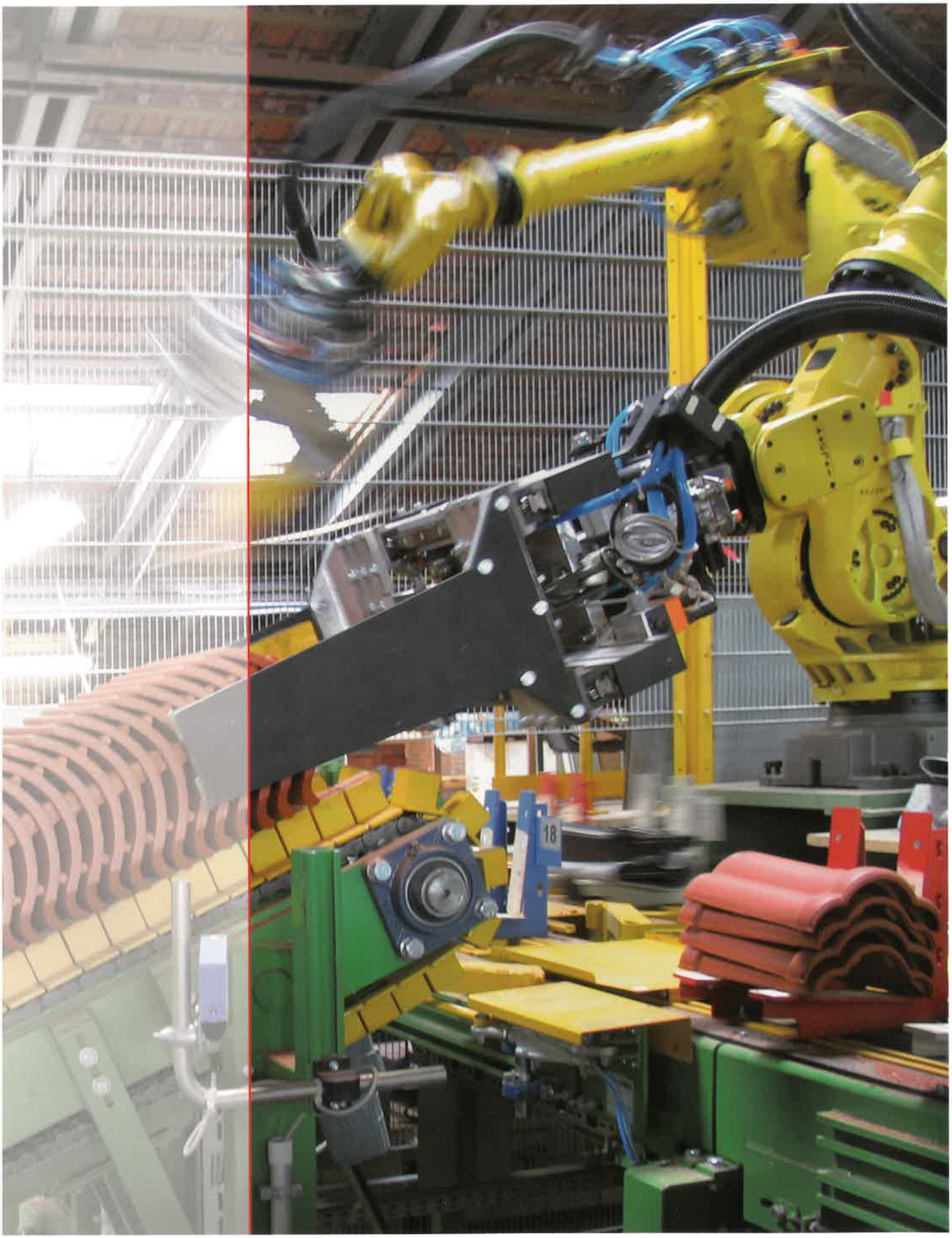
*Characteristics of the KELLER robot plants for packaging and shipping:*

- *Combined gripper and suction devices for gripping pallets, intermediate paper layers and bricks*
- *Suction of the intermediate paper layer and gripping of bricks in one working step*
- *Servo motor grippers for size changes of facing bricks and common bricks without interruption*

*Two 6-axis articulated robots with combined gripper and suction device form packs with accessory tiles with an intermediate paper layer*
*Customer: Walther Dachziegel, Langenzenn (Germany)*



*Facing bricks are stacked on dispatch pallets with intermediate paper layer by a 4-axis palletizing robot with combined gripper and suction device*
*Customer: Röben Tonbaustoffe, Bannberscheid (Germany)*



*Two 6-axis articulated robots form homogeneous pack bars in diagonally arranged collecting conveyors*
*Customer: Jacobi Tonindustrie, Bielshausen (Germany)*

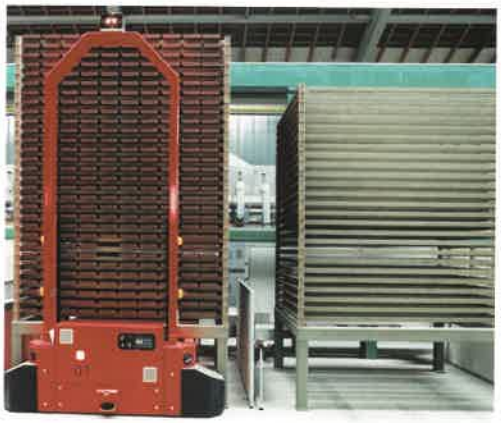
## Automatically guided transport systems

In 1999 KELLER was the first manufacturer of plants and machinery for the heavy clay industry using the driverless transport system (FTS) for internal transport in a roof tile factory.

Transport systems without driver can be adapted optimally to the frequently changing requirements of in-plant transport. In contrast to fixed installations they allow easy change and extension of functions and transport ways.

The driverless transport system can be integrated into the control of the entire system to communicate with the central computer by radio data transmission or WLAN.

In order to allow free access to the work area of the driverless transport system, the system can be equipped with contactless impact protection.



*First driverless transport system FTS in a brick factory (1999)*
*Customer: F. v. Müller Dachziegel, Görlitz (Germany)*


*Handling of glass tubes with special grippers during test run at KELLER in Ibbenbüren-Laggenbeck*

## Robots in other industries

Also in other industries outside of the heavy clay industry KELLER implemented various innovative robotic solutions. The customers are from completely different areas - and mostly it was not the famous coincidence, leading them to KELLER, but the good reputation KELLER robot plants enjoy in the heavy clay industry.

The solutions developed together with the customers go completely new ways for the most part and solve challenges that, up to now, have been considered as non-solvable with industrial robots. Therefore, most projects are subject to a comprehensive customer protection and may neither be published with the name of the customer nor with the specific task.

The adjacent overview of industries gives an insight into the variety of applications, in which robotic systems from KELLER work reliably every day.

*KELLER robot systems in related industries:*

- *Refractory industry*
- *Porous concrete industry*

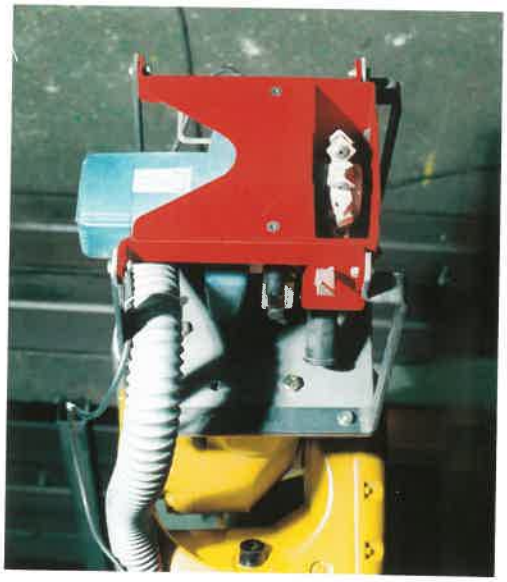
*KELLER robot systems in other industries:*

- *Automotive industry (e.g. spark plugs)*
- *Feed industry*
- *Food industry (e.g. confectionery, frozen food)*
- *Glass industry (e.g. glass tubes)*
- *Paper and packaging industry (e.g. cardboard boxes)*

*Characteristics of all KELLER robots and grippers:*

- *Optimum integration into any production process*
- *High reliability even in continuous operation*
- *Gentle handling of products*
- *Maximum flexibility with product changes*
- *Easy programming*
- *World-wide remote diagnosis and remote maintenance with the KELLER application* ***Teleservice K-matic ► TS***

*Refractory material handling with suction gripper*
*Customer: Didier-Werke, Duisburg (Germany)*



*Milling robot for milling handholds in porous concrete blocks*

The heavy clay industry in Europe is one of the highly automated industries.

The continuous automation from the field to the management level has become standard in most of the brick factories. The most modern plants realized by KELLER can be controlled not only by a Smartphone – furthermore, already today they comply with many requirements on intelligent factories (smart factory), which are characterised by flexibility, resource efficiency and ergonomics as well as by the integration of customers and business partners in the business and value-added processes.

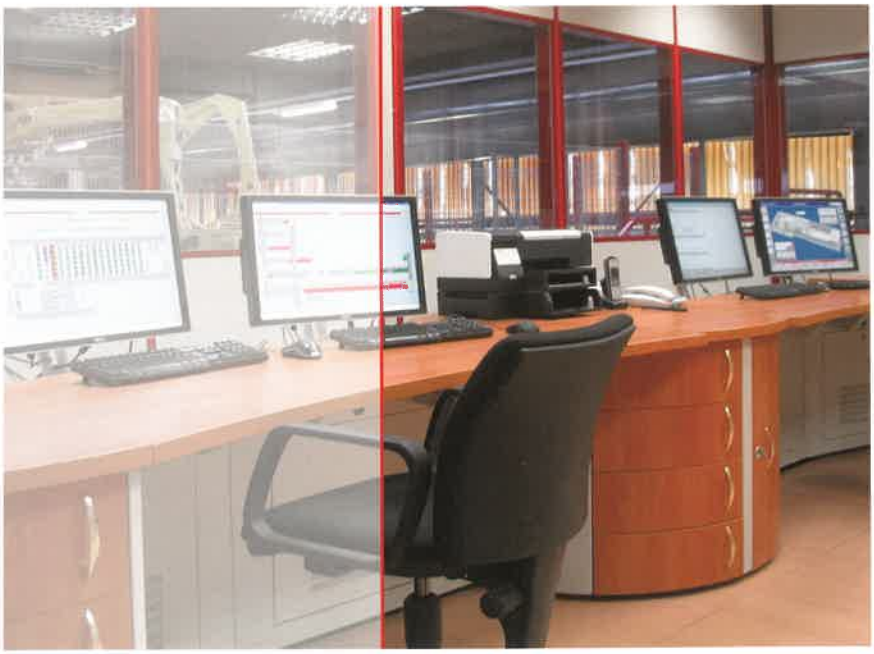
Most applications of the ***K-matic*** family KELLER has developed for the heavy clay industry can be adapted quickly and easily for the use in other areas.

With KELLER Industry 4.0 is therefore already within reach for you and your system.

The demanding as well as extensive automation tasks in a modern industrial manufacturing company require a fully integrated and continuous system from the field level up to the management level. The solutions offered by KELLER in the automation and process technology are therefore based on the organization concept "Totally Integrated Automation (TIA)" by Siemens.

*The 3 most important arguments for automation and process technology by KELLER:*

- ***Engineering, project management, project completion, assembly and service from one source***
- ***Long-standing and extensive know-how (not only in the heavy clay industry, but also in many other industries)***
- ***Future-proof solutions with perfectly coordinated components from the K-matic family***



*Control room*
*Customer: Röben Tonbaustoffe, Bannberscheid (Germany)*

*Swivelling control panel with touch screen*
*Customer: Röben Tonbaustoffe, Brüggen (Germany)*

### Programming server K-matic ▸ PGS

- Central server for all PLC projects in the plant
- Access to all networked PLC systems via Ethernet
- Central filing of PLC software and backups
- Access of all employees to current projects

### Teleservice K-matic ▸ TS

- Worldwide remote diagnosis and remote maintenance
- Process computer handling, PLC programming, data transfer, video and audio transmission
- Safe connection via VPN/Firewall

### Data backup and storage K-matic ▸ BU

- Complete data backup of process computers and PLC sources on central server
- Backup of history files in multiple depth
- Direct recovery of data or complete systems on client systems

### Wireless network K-matic ▸ WL

- Wireless programming, troubleshooting and service in the factory
- Mobile services with notebook, tablets or handheld devices

## K-matic Process control and maintenance:

### Alarm management system K-matic ▸ AMS

- Sending of operating and fault messages via SMS
- Message selection, preparation of escalation charts, shift tables, acknowledging of messages, etc.

### Maintenance manager K-matic ▸ MM

- Configuration, monitoring and logging of maintenance jobs
- Release of maintenance according to time, event, etc.
- Structuring according to machine, plant, factory, etc.
- Filing of maintenance documents

### Datamanager K-matic ▸ DM

- Production data acquisition
- Acquisition of consumption, consumables, production volumes, production times, counter values, etc.
- Overview of the production by target-actual-comparison
- Issue of shift-depending production reports and measurement protocols
- Logging and archiving of collected data

## K-matic Process control systems:

### Tunnel kiln process control system K-matic ▸ K

### Tunnel dryer process control system K-matic ▸ CD

- Freely configurable process control system
- Included graphic designer, editor for continuous online calculations, history player, comprehensive import and export functions, networking with external systems

### Chamber dryer process control system K-matic ▸ TD

- Individually adaptable graphics, integrated production planner, storage of loggings, measuring values and messages
- Automatic extension and compression of the drying process
- Variable chamber start
- Optimum energy utilization of the kiln waste air by Delta-T control

### Material tracking K-matic ▸ CT

- Presentation of material flows in the factory
- Visualization and archiving of car protocols
- Integrated history player for graphic analysis of the production process
- Markings and comments for cars
- Pre-programming of operational cycles

## K-matic Material processing:

### Material preparation K-matic ▸ PREP

## K-matic Automation technology:

### Generation of robot load K-matic ▸ VR

- Graphic creation of setting patterns for robots in the setting and unloading stations
- Automatic generation of robot applications from the data of the stored setting load

### Modular configuration of setting patterns K-matic ▸ SP

- Sequence planning with graphic configuration of setting and unloading installations
- Control of the stability of the car setting load
- Transfer of pre-configured setting patterns to the setting and unloading device by LAN or WLAN

## *Cella* Applications of KELLER MSR

In many areas of industrial production temperature and humidity must be recorded and controlled accurately for quality assurance. In addition to the ceramic industry, for example, this includes the plastics production, steel roduction/processing as well as the glass and paper industry.

For more than 35 years KELLER MSR has developed highly sensitive measurement systems and processes – from measured value recording to process automation.

Just as long is the experience KELLER MSR made in the automation of weighing, mixing and dosing processes. Whether applications from the ***Cella*** family or turnkey plants with robot solution – KELLER MSR is well established in all industries in which liquids or solids must be weighed and dosed and convincing automation solutions are required.

***CellaControl***

*Process control system for control and supervision of process engineering plants*

***CellaTrace***

*Production control system for the storage and management of all process-relevant data*

***CellaTrace Report***

*Application for filtering, analysis and printout of CellaTrace data in report form*

***CellaTrack***

*Application for automatic tracking in the stored data of the CellaTrace database according to routing slip/delivery note number, period, cell, etc.*

***CellaWeb***

*Web-based application for the presentation of cells and their contents and filling levels from both the CellaTrace database as well as from level sensors and scales*

***CellaBatch***

*Management system for mixing processes*

***CellaLab***

*Management system for laboratory analyses*

*Cella application for mixing plants and mills*


*KELLER pyrometers for non-contact temperature measurement for temperature ranges between -30° and +3.000°*

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