FAST MOVING TECHNOLOGY

STÄUBLI

Dairy industry

Robotics | Experts in Man and Machine

Editorial

The food production sector is a key growth market for Stäubli. And there is no segment of this industry in which our robots are more prevalent than in dairies. The reason for this success goes back around 10 years to the launch and continuous development of Stäubli's HE range of robots. With their pioneering hygienic design, these splash-proof machines paved the way for automation in cheese production.

The ability of our wash-down compatible HE robots to withstand the frequent and intensive cleaning processes that are common in the industry makes them extra durable. They can simply be hosed down with a cleaning lance. They also meet all EHEDG recommendations and guarantee low-germ, hygienic operation. Our complete solutions for hard and soft cheese production lines include AGVs as well as four- and six-axis robots. You can find out more about them in this brochure.

Impressive examples from real-life scenarios

Here you can also read about the enhanced efficiency and hygiene with which our large six-axis robots handle the de-rinding of cheese wheels. Two TX200 HE robots work in tandem to achieve a 400% increase in output compared to the manual process in place before.

The immense advantages HE robots can offer in cheese production are demonstrated by an Emmental cheese dairy. Here, one of the world's first fully automated cheese care systems washes, brushes and salts the Emmental cheese wheels. This procedure is repeated up to 50 times during the maturation of the cheese – a complex and expensive undertaking that is carried out reliably, quickly and economically thanks to the use of a Stäubli TX200L HE.

We hope you enjoy reading!

Sincerely,
Christophe Coulongeat
Executive President Stäubli Robotics

Complete solutions for the dairy industry

The dairy industry is the food sector in which automation with robots has achieved the greatest penetration. The development of Stäubli's splash-proof HE (humid environment) robot series has played a significant role in these advances. With their wash-down compatible hygienic design, which complies with all EHEDG recommendations, these machines offer ideal conditions for use in this sensitive production environment.

Whether in the preparatory stages, such as curd processing and the cutting of gelatinous mass, or in the various process steps carried out on production lines for hard or soft cheese, HE robots are the ideal choice for every workstation.

And they can do even more: The four-and six-axis HE robots also perform demanding tasks during the ripening process, such as washing, care and coating of cheese wheels. They handle cheese wheels and blocks weighing 80 to 100 kg with safety and precision.

Even with the obligatory use of NSF H1 class food-grade oil, these robots make no compromise on performance and retain their full dynamic range. Their outstanding hygienic properties, combined with their operational excellence, make them the benchmark for the modern dairy sector. Users benefit from decades of Stäubli experience in the food industry, including over 10 years with HE robots.

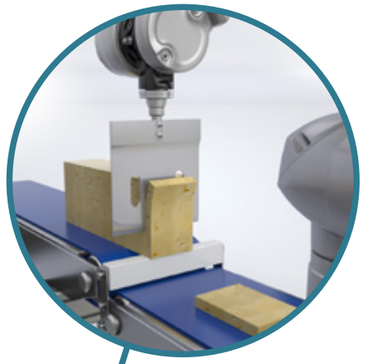
HARD CHEESE PRODUCTION

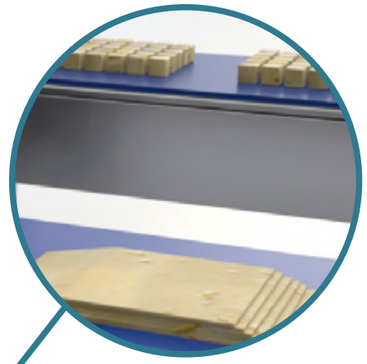
Fully automated, low-germ and process-safe

Their performance, as well as their exceptional hygienic properties in terms of dynamics and precision, make Stäubli HE robots the first choice for the production of hard cheese. The extensive portfolio of four- and six-axis robots ensures that every process on a hard cheese production line can be systematically automated with Stäubli robots.

From the infeed of "Euro blocks" or cheese wheels through all processing steps such as dividing, cutting and portioning, to primary and secondary packaging with subsequent stacking on pallets, Stäubli robots ensure ultra-efficient hard cheese production.

Additionally, Stäubli WFT's highly flexible AGV solutions convey the finished pallets to the warehouse or directly to the shipping department without human intervention.





1 The process begins with a TX200 HE lifting the cheese blocks from a pallet and depositing them on the conveyor belt.

2 A TX2-160 HE then unpacks the cheese block and removes the foil.

3 After the block has been cut, a second TX2-160 HE places the half blocks on two parallel belts.

4 Next, a TX2-140 HE divides them into portions with an ultrasonic knife.

5 A fully automatic cutting station.

6 A TX2-90 HE handles the primary packaging of the hard cheese portions.

7 Two TS2-100 HEs are responsible for the secondary packaging.

8 Finally, a TX200 stacks the filled and sealed cartons on pallets.

9 An autonomous counterbalanced stacker from Stäubli WFT takes the pallets to the warehouse or directly to the shipping department.

HARD CHEESE PRODUCTION

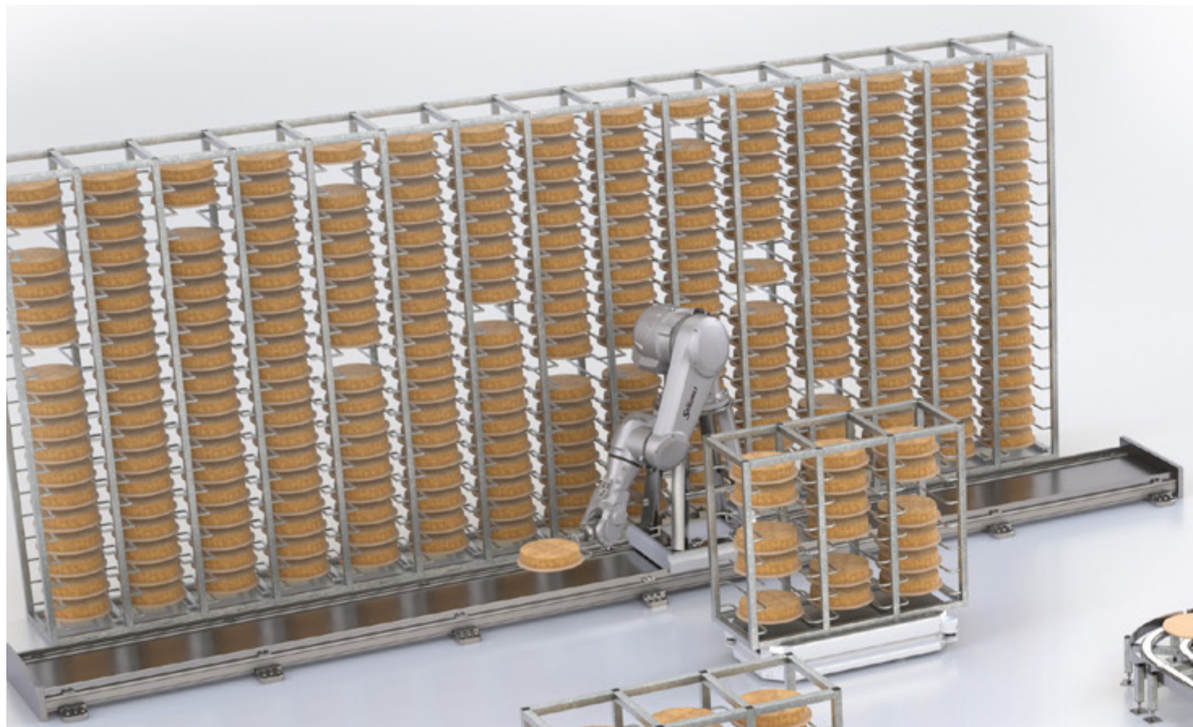
The use of robots and AGVs in cheese care and processing

The Stäubli HE robots prove their worth not only in the execution of all process steps along the way from basic cheese wheel to sales packaging, but also in a variety of other tasks.

For example, these highly versatile machines automate cheese care systems, de-rind cheese loaves with laser cutting, and coat them with seasoning. In this way, they relieve human employees of strenuous tasks and become valued work colleagues of the future.

One major benefit for users is that Stäubli WFT's advanced AGVs provide a full range of solutions, in which even the transport of cheese loaves between storage, process stations and the shipping department is automated.

More info about AGVs



A TX200 HE takes responsibility for the loading and unloading of a cheese care system. The transport of the cheese loaves is performed by an AGV.

1 A TX200 HE collects the cheese loaves from storage and places them on an AGV, which then takes them to the production line.

2 Another TX200 HE unloads the AGV and places the loaves on the infeed system to the de-rinding station.

3 A TX2-90 HE then shaves off the rind of the cheese with high-precision laser cutting, keeping waste to an absolute minimum.

4 For special types of cheese, a second TX2-90 HE can apply seasoning to the surface of the cheese wheel.

5 A TX200 HE then picks up the cheese wheels from the conveyor belt and stacks them on a pallet.

6 Finally, an autonomous counterbalanced forklift from Stäubli WFT drives away with the pallets.

FRESH CHEESE PRODUCTION

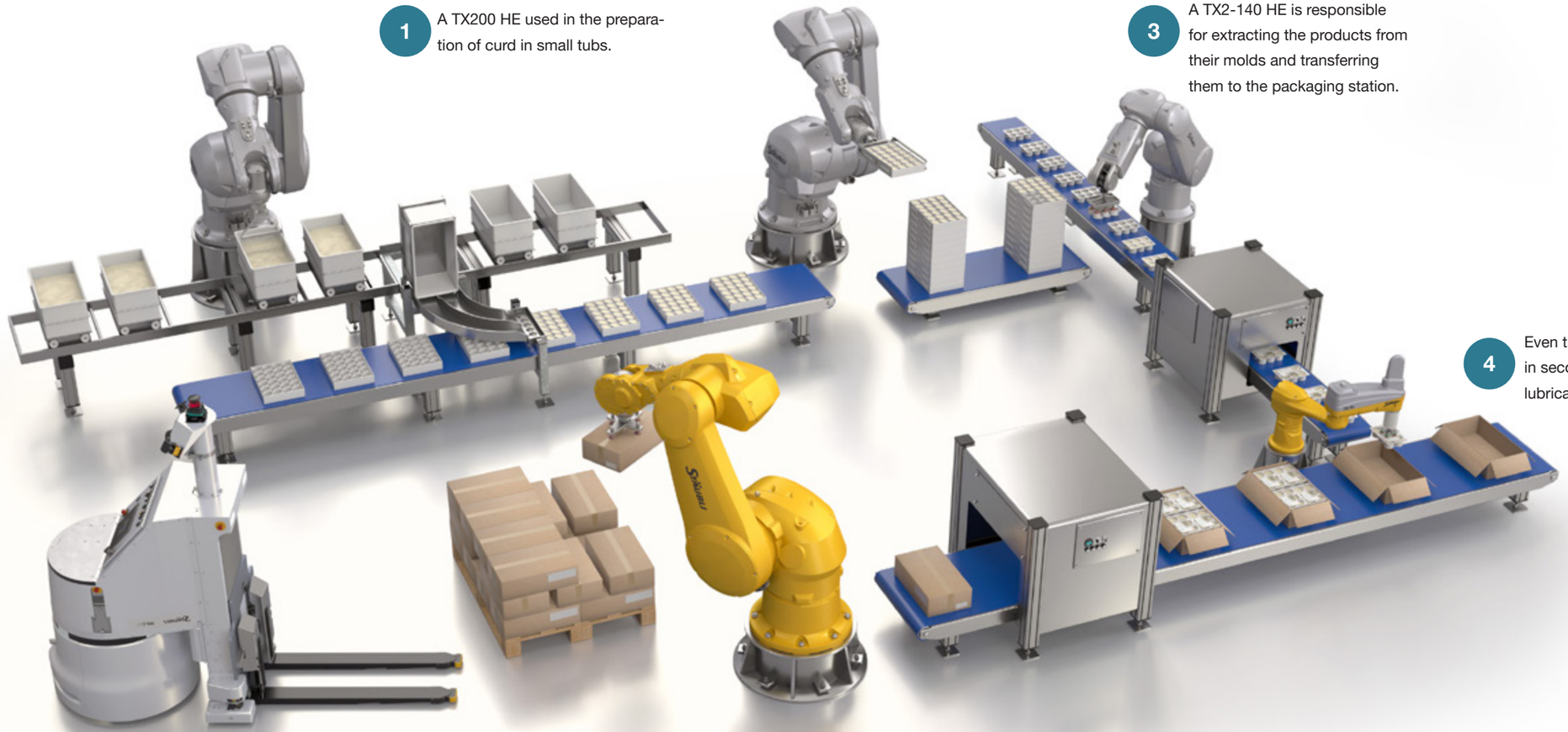
Robots for enhanced product safety and flexibility

Stäubli robots in the HE series also meet the stringent requirements for the production of fresh cheese. Users all over the world appreciate these unique machines not only for their excellent hygienic properties, but also for their dependability. For cheese producers, the deployment of robots delivers a high degree of flexibility combined with maximum product safety. The use of the highly dynamic Stäubli four- and six-axis robots lubricated with food-grade oil ensures the elimination of harmful contaminants.

2 Handling of the filled molds and packaging is the task of a TX200 HE.

1 A TX200 HE used in the preparation of curd in small tubs.

3 A TX2-140 HE is responsible for extracting the products from their molds and transferring them to the packaging station.



4 Even the SCARA TS2 models in secondary packaging are lubricated with H1 oil.

6 An autonomous Stäubli counterbalanced forklift delivers the finished goods to the warehouse or directly to the shipping department.

5 A typical application for the long-reach TX200: Stacking of cartons on pallets.

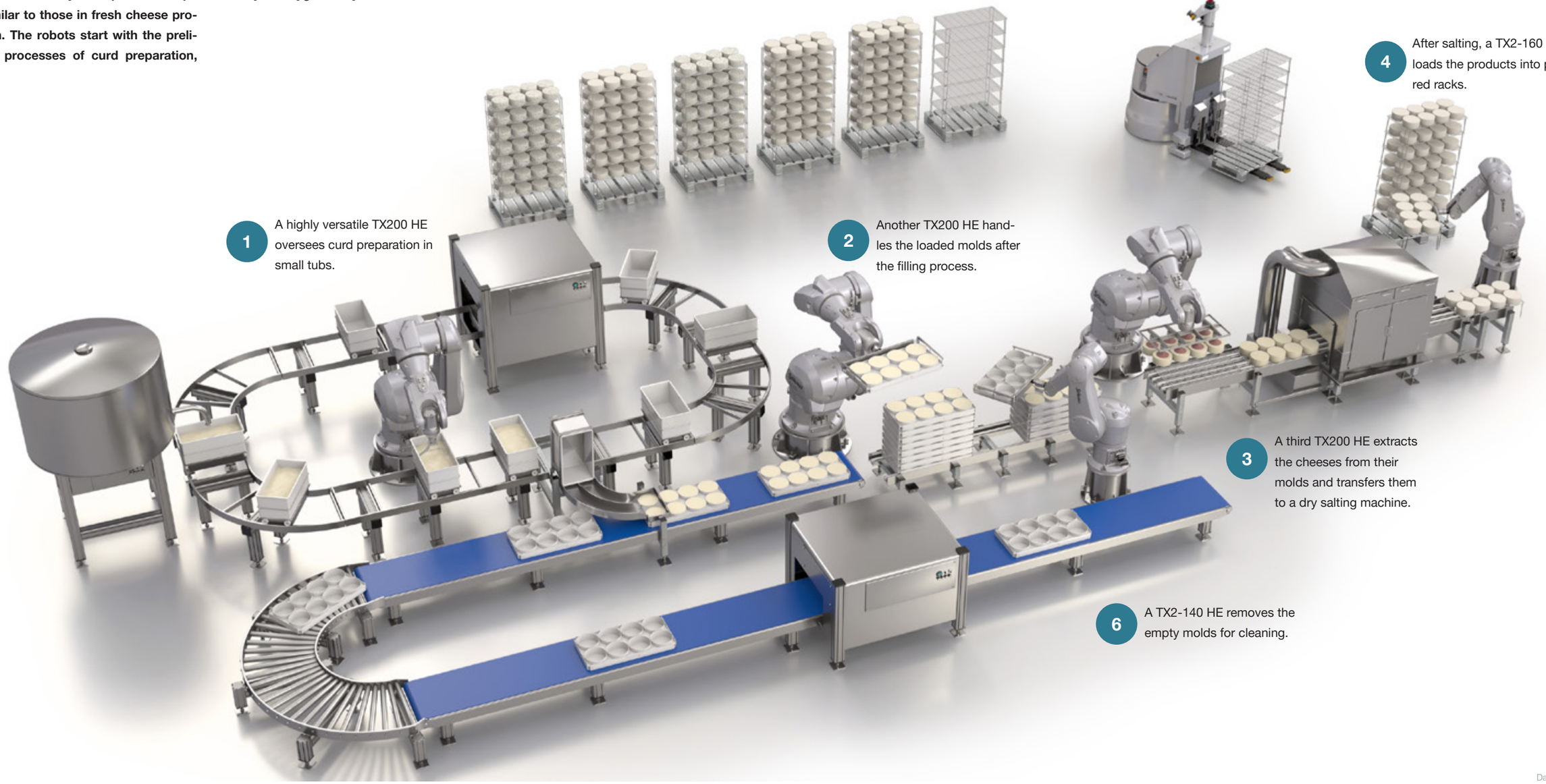
SOFT CHEESE PRODUCTION

Hygienic and reliable automation

In the manufacturing of soft cheese products, too, more and more standard processes are being automated with Stäubli HE robots. The reasons for this are clear: greater flexibility, increased output and maximum reliability. The process steps are similar to those in fresh cheese production. The robots start with the preliminary processes of curd preparation, take on the handling operations along the line, and manage the storage of the products in racks for further processing as well as loading the mold-washing machines – all of this being done safely, precisely and hygienically.

"We have installed Stäubli HE robots in our lines because they have a unique hygienic design, they're easy to clean, and they precisely fulfill our requirements."

Nadim Harb
Area Sales Manager
ALPMA Alpenland Maschinenbau GmbH



1 A highly versatile TX200 HE oversees curd preparation in small tubs.

2 Another TX200 HE handles the loaded molds after the filling process.

3 A third TX200 HE extracts the cheeses from their molds and transfers them to a dry salting machine.

4 After salting, a TX2-160 HE loads the products into prepared racks.

5 A Stäubli AGV stacker subsequently takes the racks away.

6 A TX2-140 HE removes the empty molds for cleaning.

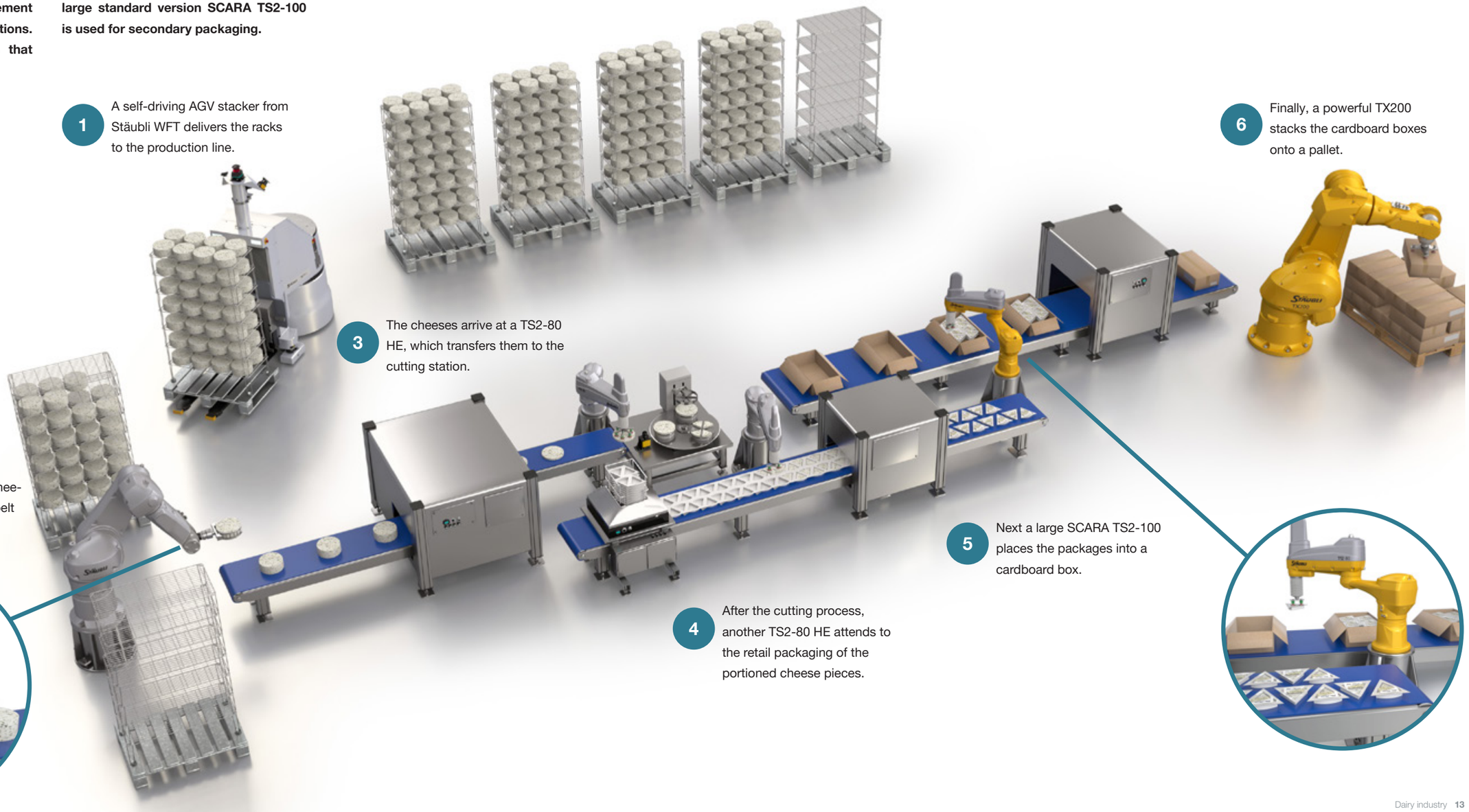
SOFT CHEESE PRODUCTION

Robots cut and pack blue cheese

A production line for blue cheese offers yet another prime example of how the finely tuned Stäubli portfolio of AGV stackers along with four- and six-axis robots in the Humid Environment (HE) specification can be used to implement groundbreaking automation solutions. The production line also shows that Stäubli Robotics can provide a precisely matched robot for every task. While SCARA robots equipped to HE specification are used directly upstream and downstream of the cutting process, a large standard version SCARA TS2-100 is used for secondary packaging.

"Their EHEDG-compliant hygienic design with food-grade NSF H1 oil makes our robots highly efficient. This increases the productivity and efficiency of the system while reducing contamination to a minimum."

Didier Piffet
Global Food Market Leader
Stäubli Robotics



1 A self-driving AGV stacker from Stäubli WFT delivers the racks to the production line.

2 Unloading and placing the cheeses on the infeed conveyor belt is handled by a TX2-160 HE.

3 The cheeses arrive at a TS2-80 HE, which transfers them to the cutting station.

4 After the cutting process, another TS2-80 HE attends to the retail packaging of the portioned cheese pieces.

5 Next a large SCARA TS2-100 places the packages into a cardboard box.

6 Finally, a powerful TX200 stacks the cardboard boxes onto a pallet.

THE HE INDUSTRIAL ROBOT SERIES

Key factors for the use of robots in the food industry

Five prerequisites for robots to meet user needs:

1. Hygienic design
Reason: Contamination with bacteria must be avoided, especially in the case of direct contact with unwrapped food.

2. Food-grade oil
Reason: Due to the risk of contamination from lubricant leakage, the oil used must therefore be of food grade.

3. Pressurization
Reason: Microorganisms. By pressurizing the robot arm, the ingress of microorganisms can be prevented.

4. Wash-down compatibility
Reason: Daily intensive cleaning of all system components is a vital factor in ensuring food quality.

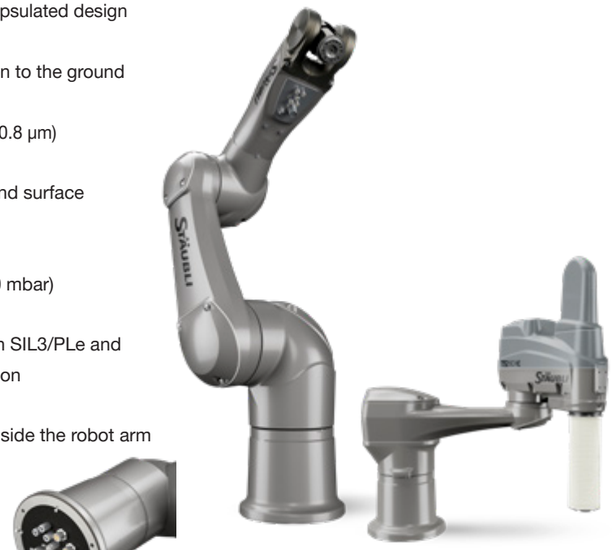
5. Robot portfolio
Reason: The manufacturing process. In food production, there is not just a single process, but a complex workflow from the first step through secondary packaging.

More info

Stäubli's answer to these key factors

A complete range of hygienic food robots: The HE robot portfolio complies with EHEDG recommendations as well as the Machinery Directive 2006/42/EC (DIN ISO 14159).

- ✓ IP65/67 fully encapsulated design
- ✓ Liquids drain down to the ground
- ✓ Smooth surface (<0.8 µm)
- ✓ Special coating and surface treatment
- ✓ Pressurization (50 mbar)
- ✓ TX2 HE robot with SIL3/PLe and current UL certification
- ✓ All connections inside the robot arm



- ✓ Wash-down compatibility: chemical resistance to detergents and disinfectants (pH 2 - 12)
- ✓ Use of food-grade NSF H1 oil with no loss of performance
- ✓ Heavily stressed parts made from stainless steel
- ✓ Ready access to important components, enabling fast replacement
- ✓ Complete portfolio of SCARA and six-axis robots with HE specification

Product range

MODEL	TS2-40 / 60	TS2-80 / 100	TX2-60 / 60L	TX2-90 / 90L / 90XL	TX2-140 / 160 / 160L	TX200 / 200L
Max. load capacity	8.4 kg	8.4 kg	4.5 kg / 3.7 kg	14 kg / 12 kg / 7 kg	40 kg / 40 kg / 25 kg	130 kg / 80 kg
Reach (between axis 1 and 6)	460 mm / 620 mm	800 mm / 1000 mm	670 mm / 920 mm	1000 mm / 1200 mm 1450 mm	1510 mm / 1710 mm / 2010 mm	2194 mm / 2594 mm

Fully automated cheese care system with a robot

Image 1 left:
The large six-axis TX200L HE retrieves a cheese wheel from a shelving unit.

Image 2 left:
To handle the wheels, the six-axis robot is equipped with a giant special gripper resembling the tines of a forklift.

Image 3 bottom right:
The TX200L HE transfers the wheel to the cheese care system conveyor belt.

Image 4 bottom right:
Some 80 cheese wheels per hour pass through the innovative system, which meets the strictest hygienic standards.

“The cheese loaves should be cared for about three times a week for optimum quality. With an average ripening period of four months, the wheels need to be washed, brushed and salted around 40 to 50 times – an immense amount of time and money.”

Achim Baumgärtner
Executive Assistent
Allgäuer Emmentalerkäserei Leupolz e.G.

Proper care of cheese while it is ripening is critically important to the quality of the end product. This is precisely why the Leupolz Emmental cheese dairy in the Allgäu region of Germany relies on an innovative cheese care system in which a large Stäubli six-axis robot handles the 80-kilogram cheese wheels.

The Leupolz farm cheese dairy processes around 45 million liters of milk annually, equivalent to about 125,000 liters per day. One of their specialties is 80-kg round wheels, of which some 6,000 units leave the dairy annually, around 10% of which are of Demeter quality.

For optimum quality, the cheese wheels require care three times a week. During the average ripening time of four months, the wheels must be washed, brushed and salted 40 to 50 times, at considerable expense in terms of time and money. It is no wonder that Leupolz sought an efficient and cost-effective solution for cheese care.

SOLUTION: Hygienic robots handle 80 cheese wheels per hour

Today, a robot-assisted system built by Lemmermeyer, a proven German system integrator, handles cheese care completely automatically. The system meets strict hygienic standards and offers impressive performance. Some 80 cheese wheels pass through the system in an hour. The HE (Humid Environment) version of the TX200L is tasked with loading and unloading the four- and eight-shelf racks where the cheese wheels are stored. These shelves are brought to the system by forklift and transported back to the ripening room when care is complete.

To handle the wheel, the six-axis robot is equipped with a special gripper, which it uses to pick up the cheese wheel positioned on a wooden board and place it on the system’s conveyor belt. In the next step, the board and cheese wheel are separated from one another. This is followed by cleaning the board and washing and brushing the cheese, which is then sprayed with salt and dried. In the final step, the cheese wheel is placed back onto its board and the two travel on the conveyor belt to a defined transfer point. Here, the TX200L HE grips the board together with the cheese wheel and returns them to the correct shelving compartment.

The six-axis robot is mounted on a pedestal so it can easily approach all stations. The TX200L has a reach of nearly 2.6 meters, and with an operating weight of 100 kilograms – an 80-kg cheese wheel, 5-kg wooden board and 15-kg gripper – it reaches its maximum payload. Nevertheless, the TX200L HE runs absolutely trouble-free. The same is true of the entire system. Even the daily cleaning procedures cannot damage the system or the robot. Stäubli HE version robots are designed for rigorous cleaning procedures with aqueous media and pH between 2 and 12.

Higher quality – more satisfied employees

From an economic standpoint, the use of the robot has been a winner: In the past, three people were needed to attend to the cheese. Today it is done by “half” an employee. This saves personnel costs and eliminates the need for employees to work weekends and overtime. The work environment and workload have improved significantly thanks to the higher level of automation.

Another important aspect has to do with the care of the cheese itself. The enormous capacity of the robotic system makes it possible to significantly shorten washing intervals, which means more intense care. Thanks to the robot, the wheels can be attended to up to three times a week. The more intensive care positively impacts cheese quality and increases product yields. And consumers can taste these benefits. Emmental from Allgäu has never been better.

Customer benefits:

- Employees freed from weekend work and overtime
- More cost effective and highly efficient system operation
- Meets the highest hygienic standards
- Increase in product yields
- Intensified cheese care for even better quality

Watch video

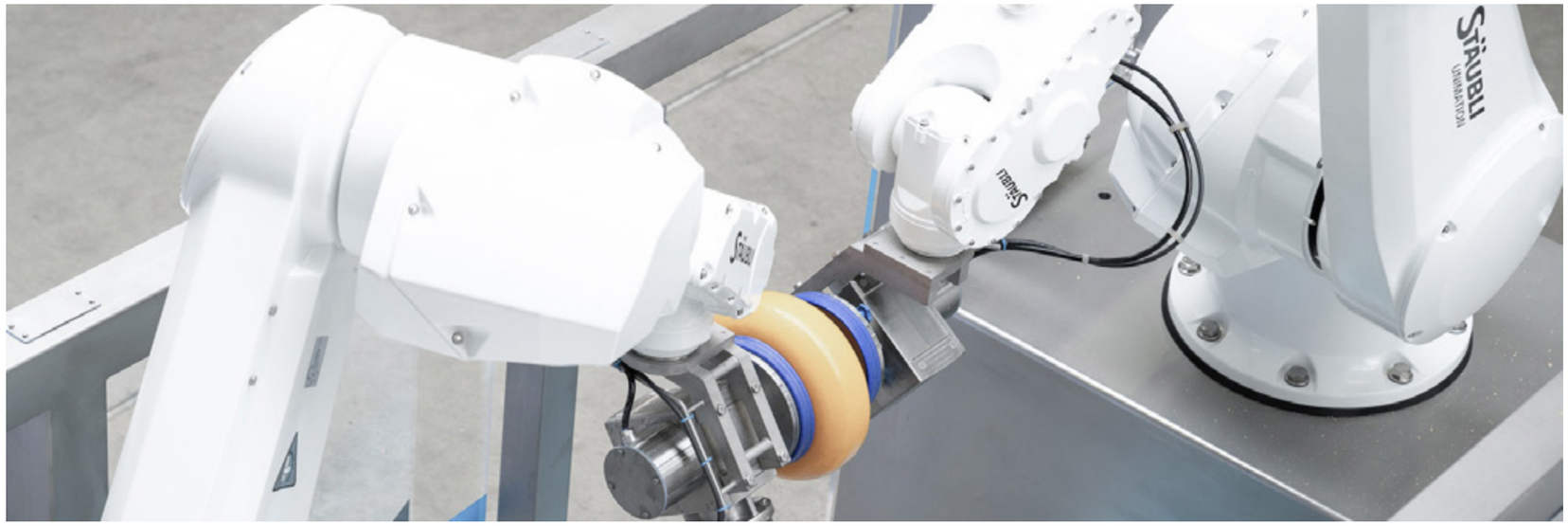


Image left:
The transfer from one robot to the other takes place in the air for hygienic reasons.

Image right:
The two TX200s in the cell developed by DERO are the flagship models of the Stäubli six-axis range.

AUTOMATICALLY DE-RINDING CHEESE WHEELS

Making cheese dairies more efficient

Even in the most modern cheese dairies, the de-rinding of naturally ripened cheese is often done by hand. Dutch company DERO GROEP has now automated this process. Two Stäubli six-axis robots work hand in hand to remove the rind in less than 30 seconds – a real milestone in industrial cheese production.

It takes a strong employee about two minutes to de-rind a cheese wheel. Manual de-rinding is difficult work. Because of this, cheese dairies have a hard time finding personnel for the task.

Manual de-rinding should also be viewed critically in terms of hygiene, since bacteria is responsible for the ripening process. Consequently, contamination must be prevented at all costs. It is for this reason that “Hands off the cheese!“ is the ground rule in cheese dairies. Apart from the increase in efficiency, this is an important driver for the automation of cheese production.

But there was a good reason why this particular process has not yet been automated to any great extent: Cheese is a natural product. The wheels differ in size and consistency. Therefore, the automation has to be flexible. In addition, the rind is the hardest part of the cheese, so de-rinding requires a high degree of force.

SOLUTION:

Two robots work in tandem

DERO has developed a system that carries out de-rinding in a process that is as simple as it is impressive. A conveyor belt deposits a cheese wheel onto a transfer station. A Stäubli TX200 HE six-axis robot then picks up the wheel with a suction cup that almost completely covers the top of the wheel. Because the cutter-like tool used to remove the rind is fixed-mounted, the robot performs a multi-axis movement that includes rotating the cheese wheel. This de-rinds half of the cheese wheel in only 15 seconds.

The robot arm then moves to a transfer position far above the tool. A second identical robot arm reaches into the air and grabs the half-de-rinded wheel, allowing the process to be repeated with the other half at a second station. Because both robots can work simultaneously, the cycle time for de-rinding a cheese wheel is about 30 seconds. The processes are designed to be fully visible and hygienic. The rind waste falls directly into plastic containers that are then easily replaced.

Recipes for various cheese types and age groups

Not only is the system impressive for its processing speed, but also in its flexibility and ease of use. DERO has stored recipes in the control unit for the shape, type and age of the cheese wheel. Whether it’s a six-week-old Gouda or a 100-week-old Edam, the robots know what they have to do. The benefits for cheese dairies are clear: They save time and money while minimizing the amount of waste, all with improved hygienic conditions in production.

The DERO designers chose to use the TX200 HE, the flagship of the Stäubli’s six-axis range, because the robots require need both an extended reach and a very rigid construction in order to apply the necessary contact forces against the tool. In addition, the solid stainless steel motor, which is mounted on the robot arm and generates the rotating motion of the vacuum gripper and the cheese wheel, increases the total weight beyond what a smaller robot could handle.

Customer benefits:

- High flexibility
- Simple operation
- Hygienically designed robots that can be washed down
- Less waste
- 400 percent greater output compared to manual de-rinding

Watch video

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● Stäubli Units ○ Representatives/Agents

Global presence of the Stäubli Group

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