

Palletizing of dairy products

Starting point / Task definition

TINE Meieriet Øst decided to introduce greater automation in order to achieve a significant increase in palletizing capacity. The company, a subsidiary of TINE BA, Norway's largest producer of dairy products, thus wanted to move away from manual palletizing downstream of a TetraPak filling machine. In addition to this, older systems were also earmarked for replacement. Another reason for greater automation was the lack of space available. The solution considered was jointed-arm robots with short cycle times, long reach, repeatability, flexibility, high payload capacity and gentle handling.

Implementation / Solution



TINE invested in three KUKA KR 180 PA palletizing robots, which can load a combined total of 1,000 to 1,200 pallets a week. This corresponds to ten pallets an hour. The robot grippers can each be controlled as two additional robot axes. The resulting adjustability of the end-effectors means that all of the products in the filling lines can be handled. The jointed-arm robots palletize milk-based soft drinks, UHT and fresh milk, and desserts.

The goods arrive from the production area on six roller conveyors. Each of the robotic cells is fed by two of the conveyors. The KR 180 PAs take the loaded trays from their respective pair of conveyors by reaching between the rollers with their forks. They then stack the products by

type up to 1.3 meters high on europallets. These are kept ready under the corresponding product conveyors on a floor-level roller conveyor. In order to achieve high stability, the robots change the stacking pattern from layer to layer. They also insert slipsheets as required.

The KR 180 PA used in robotic cell 1 is equipped with a servoelectric gripper which can extend its fork to varying lengths. This makes it possible to set down trays in a defined position, even if they have different widths and depths. The forks of the two other grippers are only capable of moving out to a single, defined end position. All three end-effectors move their forks downwards and away from the load after setting it down. In this process they use a hold-down device to press down on the goods so that none of the cardboard sheets inserted vertically between the products sticks out, for example. The grippers must be able to operate the hold-down devices with variable pressure. Otherwise additional articles, such as spoons and drinking straws, which are included with some products, would be pressed by the robots into the packages, damaging them.

System components / Scope of supply

- :: Three KUKA KR 180 PA palletizing robots
- :: Three PC-based KUKA robot controllers, including control panel with familiar Windows interface
- :: Preparation of the robot controllers for their integration in a production planning and control system
- :: Grippers
- :: Roller conveyors
- :: Conveyors leading from the filling lines to the cells
- :: Robot programming
- :: Vertical conveyor downstream of the filling machine of the TetraPak line
- :: Safety facilities
- :: Automatic wrapping machine
- :: Commissioning

System supplied by KUKA Svetsanläggningar + Robotar AB, KUKA's Swedish subsidiary.



Number of report:
258

Industry:
Foodstuffs, beverages

Application:
Handling
Palletizing and order
picking

Product:
Palletizing robots
KR C (Robot Controller)

Implementation:
01.12.2003

Customer:
TINE Meieriet Øst,
Brumunddal, Norway

■ Results / Success

:: Significantly increased performance

The conversion increased TINE's production by more than five percent. At the same time, personnel costs have been reduced, since in three-shift operation the company can use six fewer employees in the TetraPak line alone. The company is thus counting on a short payback period.

:: Flexible stacking patterns

The robot grippers allow flexible stacking patterns. Examples include two rows of eight trays lengthwise and one row of eight crosswise in the first robotic cell, and two rows of eight trays lengthwise and one row of three crosswise in the second robotic cell. In order to vary the stacking patterns despite the required short cycle times, KUKA has equipped the roller conveyors with equipment for turning and separating. Thus in cell 2 the eight packages which are to be palletized at the same time are turned 45 degrees while they are still on the roller conveyor; the remaining three packages move to their end position without rotation. The roller conveyor stops, however, and separates them by the intervals corresponding to the programmed stacking pattern.

:: Advantages of the "palletizing expert"

The KR 180 PA "palletizing expert" is a four-axis robot with a passive fifth axis, whose application-specific, FEM-optimized kinematic system guarantees particularly efficient palletizing processes.

:: Gentle handling

To ensure gentle handling, all robot motions can be precisely programmed. When handling certain products, the robot starts slowly, then accelerates in order to achieve the specified cycle time. At the end of the motion, it also sets the goods down gently.

:: Jobs secured

The KR 180 PA has not cost anyone his or her job. On the contrary, the growth has guaranteed new jobs in the company. For this reason, employees have accepted the robots. They are even glad that they no longer have to carry out this monotonous and physically stressful work.



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