

CASE STUDY

ALMARAI AL KHARJ, SAUDI ARABIA



FRESH FOOD – QUICKLY AND EFFICIENTLY DISPATCHED THANKS TO AUTOMATED DISTRIBUTION LOGISTICS

Almarai manages complex flows of goods on a daily basis. The Saudi Arabian group is one of the largest vertically integrated dairy company in the world. It also produces fruit juices, baked goods, poultry products and infant formula – fresh foods and refrigerated foods as well as long-life foods. Almarai has a large factory in Al Kharj, a good hour and a half's drive from the Saudi capital city of Riyadh. Here, the complete distribution logistics is being automated: a multi-million US dollar project, which Swisslog Warehouse & Distribution Solutions, a KUKA Group company, has undertaken. The automation and plant engineering specialist is being assisted by experts from KUKA Industries, who are contributing their system experience in the field of robot-based cells to the project.

LEADING FOOD&BEVERAGE COMPANY

The history of Almarai began in 1977, when Prince Sultan bin Mohammed bin Saud Al Kabir, a member of the royal family, founded the company. His goal was to make the traditional agricultural economy of the region more productive by introducing modern processes and technologies, and to make it better able to serve the growing domestic market. By the turn of the millennium, the group had already conquered several sectors: the baked products business, bottled juice business, the marketing of poultry meat and the production of infant formula. This allowed Almarai to further broaden the scope of its operations across the Gulf region. The food group continued to grow.

"By optimizing the logistics processes we can create a clear competitive advantage for Almarai."

Urs Hofer, Project Manager at Swisslog
Warehouse & Distribution Solutions



A monorail suspension system conveys the pallets within the extended Almarai production complex. 40 monorail trolleys are in use in the logistics center alone.

KEEP COMPETITIVE POSITION THANKS TO AUTOMATION

In order to continue its success and expand on its competitive position, Almarai needed to perform a complete strategic reorientation of its logistics. Swisslog is providing help in this respect. Automation of the flow of goods makes it possible to boost the efficiency of logistics. Processes run more quickly, transit quantities are increased and costs are reduced. In addition, laborious and unergonomic working operations are eliminated, which in turn benefits the employees.

The automation specialist Swisslog is providing Almarai with several warehouses for palletized finished goods and a fully automated picking and goods distribution center. Swisslog is also managing five subprojects which implement the internal logistics systems within the various factories; this is being done step by step so that the company can continue to operate at the same time. The multi-million US dollar project includes supply and installation of storage and retrieval systems, conveyors, Automatic Reefer Loading System (ARLS), automatic picking modules supplied by KUKA, together with electric monorail suspension systems. The overall package also includes SAP's warehouse management system SAP EWM to control the material flows and data intelligently and efficiently.

HIGH-VOLUME PICKING SYSTEMS

The hub and pivot of the automation is the newly built logistics center (Consolidation Facility), which will become operational in stages over the next months. This provides space for intermediate storage of entire pallets containing a single product, picking goods onto customer pallets and preparing them for dispatch – for the most part without laborious manual work. The Consolidation Facility is immediately adjacent to the production buildings, and each area of the logistics center is cooled so that all goods – fresh or long-life – can be processed without delay. Here, three KUKA systems at six stations carry out the tasks of layer picking and palletizing customer orders.

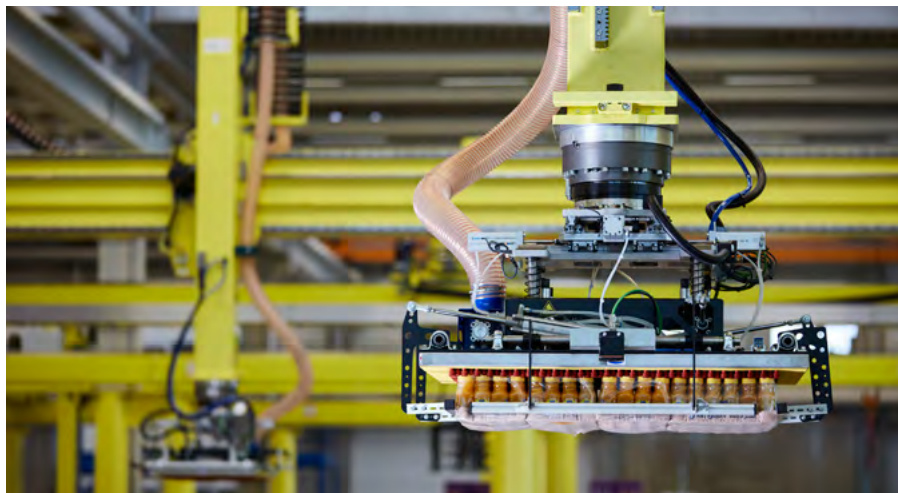
The picking stations are central to build store-ready, mixed SKU pallets. All the pallets containing one type of item pass through the KUKA systems where they are picked and placed on dispatch pallets according to the customer's order. The KUKA systems each have two robots responsible for the cases with smaller Tetrapaks and bottles, while four other robots handle the larger crates. The cases are stacked in layers within reach of the respective robot, using the transport technology designed by Swisslog. The crates are picked by the robot using a mechanical gripper – a task demanding great sensitivity to minimize the wear on goods. The robot

picks up an entire layer and places it in a position in the buffer area specified by the SAP EWM software. Thanks to an area portal with two independent portals, the robot can work from several positions, from a height of 2.5 meters as well as rotating through an axis of 180 degrees to reach the individual layers.

FULLY CONTROLLED BY SAP EWM

When maintenance is required, each portal can take over the work of the other. In addition, a manual working area is linked to the automated stations. For instance, an Almarai employee removes the protective film or takes items from individual cases if less than a complete layer is to be loaded onto the pallet. Completed orders are taken from intermediate storage or directly transported to be loaded onto trucks for delivery. The entire process is performed fully automatically and is controlled by SAP EWM Warehouse Management software. This allows precise tracking of the location of any article within the logistics center, so that the highest regulatory requirements are satisfied regarding processing and handling of food.

In the initial system design, the automation experts from Swisslog also had to take into account the complex climatic conditions. While the components may be installed at



"The Close cooperation with Swisslog allowed us to incorporate the aspects of the climatic conditions from the very beginning."

Peter Petana
Project Manager at KUKA Industries

Using a vacuum gripper the KUKA robot picks up the layers of fruit juice cartons and places them in a specified position in the buffer area.

extremely high temperatures, the systems subsequently have to work in a refrigerated environment at three to five degrees Celsius when the logistics center is in operation. These differences must be accommodated, especially with respect to the coefficients of thermal expansion.

QUICK RESPONSE WITH INNOVATIVE SERVICE CONCEPTS

All the storage and picking systems need to be exactly coordinated with each other. Almarai relies on Swisslog as a long-term SAP partner to seamlessly integrate controllers for storage and retrieval machines, monorails, conveyors, robots etc. Dynamic simulations allow all

data, from goods throughput to system performance, to be visualized and optimized.

To ensure that the new logistics center runs smoothly, Almarai uses the Swisslog System Operation service concept. This provides on-site support of the Almarai maintenance team by Swisslog service technicians, seven days a week, around the clock.

FACTS AND FIGURES

Project scope

Total volume: 50 million USD

1 Consolidation Facility

Production logistics at 4 plants

Implementation in phases during 3 years

Solutions & Technologies

Storage and retrieval systems for pallets

Conveyors for pallets

Electric monorail systems for pallets

Automatic Reefer Loading System (ARLS)

Automatic layer picking modules supplied by KUKA

Software

SAP EWM customized and integrated by Swisslog

SAP EWM includes all the material flow logic in SAP EWM MFS

SAP EWM integrates with SAP ECC (ERP system) and SAP TM (transportation management system) and with the controls of the mechanized subsystems

Customer Service

On-site support with Swisslog System Operations after implementation

Remote support via Augmented Reality HoloLens



Flexible pallet transport with the ProMove transport technology from Swisslog.



The KUKA robot is able to pick up an entire layer of drink cartons using its mechanical gripper.

In the future, there may also be a direct line to trained Swisslog specialists using HoloLens hologram glasses, as a tool to maintain the system. This allows a video chat window for communication with the technician to be shown within the field of view of the worker. The technician thereby obtains a view of the system and can guide the worker accordingly. Using this tool, Almarai will have direct contact to the world-wide Swisslog Service network for even quicker response times and even more reliable troubleshooting and fault correction.

READY FOR INDUSTRY 4.0

With this job – one of the largest in the company's history – Swisslog Warehouse &

Distribution Solutions has further expanded its market position in the Middle East. "The project shows that thanks to our solutions and our powerful network we can offer a tailor-made solution for the requirements of all our customers in the Middle East", says Urs Hofer, Project Manager at Swisslog Warehouse & Distribution Solutions. Swisslog and KUKA Industries have experience in the region, which is a great advantage. An additional benefit is the expertise of the two companies, which are united within KUKA Group. "The customer benefits from a solution which enables future growth and embodies the age of Industry 4.0 with state-of-the-art, robot-based automation supported by big data management."



The Vectura automated storage and retrieval stacker crane from Swisslog provides reliable handling of pallets in the Almarai high-bay warehouse.

BENEFITS

- Robot-based intralogistics, seamlessly integrated into Almarai's overall material flow within various factories
- Implementation in phases so that Almarai can continue to operate at the same time
- Software integration and the latest augmented reality service features ready for the age of Industry 4.0
- Significantly faster material flow with reduced costs
- Reliable, uninterrupted and trackable cold chain to comply with the latest food regulations

SWISSLOG SERVICE

- System design, engineering, simulation, implementation and integration of the entire intralogistics system
- Warehouse management and material flow control integrated with SAP EWM
- Facility visualization, user training, after-sales service
- System Operations service concept with permanent Swisslog experts on site