Robot sorts and stacks packaged door frames

Starting point / Task definition

Ligmatech, a German specialist for automation systems in the wood processing industry, received an order for an automatic palletizing and sorting system for door frames. Previously, the customer who ordered this system had packaged the door frames after they left the production shop, stacked the cardboard boxes manually, and then merely brought them to an intermediate storage area. When an order was received, the goods were retrieved and prepared for shipment. In looking for a new system, one requirement was that the door frames would be manufactured to meet the current demand and would be sorted and palletized by order immediately, without any intermediate storage. The user wanted to achieve a considerable improvement in cost-effectiveness through the use of significantly quicker and more flexible processes.

Implementation / Solution

Robot sorts and stacks packaged door frames

These goals are fulfilled by the KUKA KR 180 PA, a palletizing robot which guarantees short cycle times, despite the fact that it has to tend thirteen pallet positions, and that its adjustable suction gripper can be adapted flexibly for any size door frame.

The robot picks up the door frames, which are packed in cardboard boxes, from a transfer station by traversing on a linear unit. On one side of the linear unit there are seven stacking positions, while on the other side there are six more and a feeding position for special pallets measuring 2500 mm x 800 mm. The robot first places a special pallet on each of the stacking positions. It then palletizes the cartons, utilizing the full width of the pallet. If the box dimensions are such that gaps remain in the middle of a layer, the KR 180 PA fills the gaps where necessary using pieces of styrofoam. In addition, to stabilize the individual layers the robot can insert up to three strips of cardboard as slipsheets.

The KUKA robot is equipped with a 1600 millimeter long suction gripper, whose width can be adjusted from 200 to 600 millimeters by means of an electric motor. The suction cups on the gripper are arranged in three rows, and are switched on and off in accordance with the goods to be handled. The two outer rows are used for picking up pallets and boxes, while the inner row is for the styrofoam. When the maximum effective stack height of 1200 mm is reached, the pallet is transferred to a transverse shuttle, and from there to a further conveyor system which transports the goods to the shipping area.

System components / Scope of supply

KUKA KR 180 PA palletizing robot
PC-based KUKA robot controller, including control panel with Windows interface
Adjustable suction gripper
Linear unit with a length of about 14 meters
Robot programming
Commissioning

Results / Success

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. Its arm is made of carbon fiber composite material (CRP), which thanks to its smaller mass moment of inertia provides truly remarkable acceleration rates. The KR 180 PA can stack loads weighing up to 180 kg to heights of up to 3000 mm. It is also more economical