

Robots automate slaughtering system

Starting point / Task definition

When discussion arose about the possibility of automating the manual slaughtering system at WESTFLEISCH eG's Fleischcenter Coesfeld, the first step taken was to test two KUKA robots in the process steps "removal of rectum" and "opening pelvic bone and belly". In these tests, the robots were able to impress, particularly by the quality and cost-effectiveness of their work.

Implementation / Solution



Following these successful tests, WESTFLEISCH had four six-axis KUKA robots integrated into the production line: two KR 30s and two KR 60s. They are protected against moisture, contamination and cleaning agents by hygienic protective suits. Alongside the robots, the principal components of the automation solution are a 3D laser measuring system and PC evaluation software package, both from Banns, and a KUKA conveyor software package.

An overhead conveyor keeps the carcasses moving continuously through the slaughtering line at a speed of 170 millimeters per second. As the robots have to track this motion, they are synchronized with the conveyor by means of the conveyor software. Parallel to this, the laser measuring system, which works in three dimensions, generates precise data of the entire surface of the carcasses. This is necessary, as the pigs are all of different weights and sizes and have differing anatomical features. The calculated coordinates are sent to the robot controller by the PC evaluation software, which generates individual cutting data for each carcass. The controller then calculates the corresponding robot trajectories. The first robot in the line, a KR 30 equipped with a double shackle, then cuts off the pigs' front feet at a defined position. The second KR 30, suspended from the ceiling, uses a special cutting tool to remove the rectum. Following a renewed 3D laser measurement, a KR 60, also installed in the inverted position, breaks the pig's pelvic bone with a cutting tool resembling a cleaver and scores the abdominal wall. The second KR 60 pulls the abdominal wall of the carcass forwards with a pin and opens the belly and chest with a circular cutter. The sternum is cut completely and precisely through the middle.

System components / Scope of supply

- :: Two KUKA KR 30 robots and two KUKA KR 60 robots
- :: PC-based KUKA robot controllers, including control panel with familiar Windows interface
- :: 3D laser measuring system
- :: PC evaluation software
- :: Conveyor software
- :: Tools: double shackle, rectum cutter, cleaver-type cutter, circular cutter
- :: Robot programming
- :: Hygienic protective suit for the robot
- :: Overhead conveyor
- :: Start-up

The system was supplied by Banns Schlacht- und Fördertechnik GmbH, Biedenkopf, Germany.



Number of report:
R 279

Industry:
Foodstuffs, beverages

Application:
Cutting
Handling
Machining

Product:
Medium payloads (30-60
kg)

Implementation:
25.08.2006

Customer:
WESTFLEISCH eG,
Münster, Germany

■ ■ ■ Results / Success

WESTFLEISCH was able to reduce the labor costs per pig. This is because the yield of intestines with the rectum cutter is over five percent higher than was possible with manual cutting. Furthermore, because it would not be possible to supply most customers with an entire sternum, the central cutting of the sternum, which only the robots can master, is an economical benefit. Apart from all this, the long service intervals of the robots – compared with usual values for the slaughtering industry – help to reduce the payback period significantly. Moreover, the service life of the tools has also increased considerably. The tool life of the rectum cutter is over 35,000 carcasses, while that of the double shackle and the pelvic bone cutter is in excess of 200,000 pigs. Even the circular cutter is good for over 35,000 carcasses.

The robots ensure sterility by disinfecting their tools in water heated to 82° Celsius after every process step.

Due to the low space requirement of the robots and their flexible installation options – they can be floor-, ceiling- or wall-mounted – it was possible to install them during normal plant operation, i.e. without interrupting production.

The robots operate with an availability of nearly 100 percent, with maintenance intervals of over 10,000 operating hours. They also have a positive effect on the availability of the overall system. This is because the conveyor can continue to run even during robot maintenance. The robot's tasks are then taken over by a human worker in this case. With other technologies, this would be difficult, if not impossible.

This automation has not caused WESTFLEISCH to shed a single member of the workforce. The company is expanding and thus needs its employees in other areas. Furthermore, this automation at WESTFLEISCH has prevented jobs from moving abroad.



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