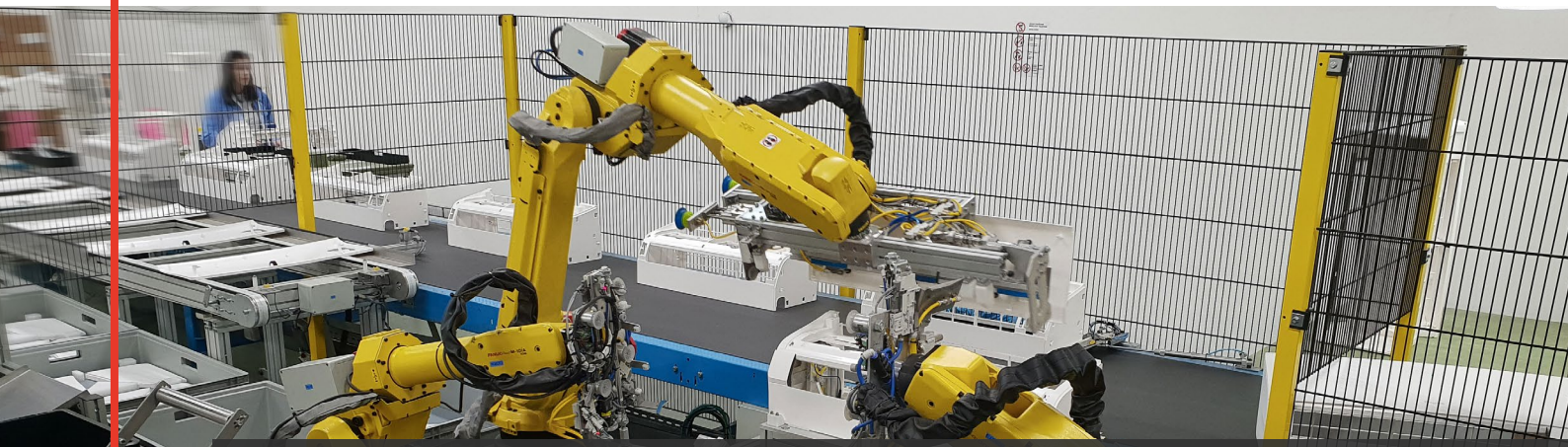
Case Study

A Robotic Work Centre for Assembling Air Conditioning Covers

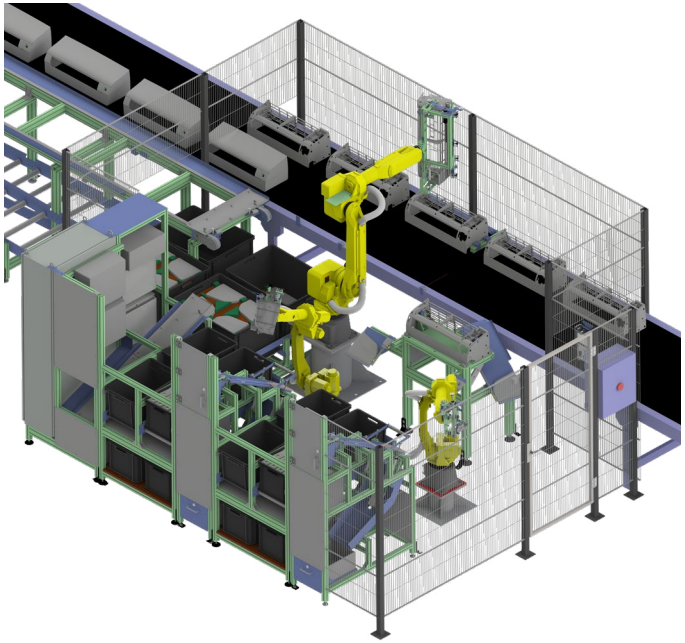


"In our plant, we are constantly striving to automate our production processes. This project, implemented in cooperation with DESSEQ, is one proof of that. This supplier fully met all of our equipment requirements. We thus could eliminate monotonous manual labour, meet our own obligations towards customers and supply them with high-quality components."

Roman Šmíd, Manufacturing Engineering Manager, Daiho Czech

Baseline situation

The Pilsen plant sought to **automate the production of plastic covers for air-conditioning units**. They were originally assembled on a production line, upon which basic components – skeletons – were transported. Operators had to manually mount individual plastic parts onto these skeletons. Specifically these were two side pieces, a tiltable lid, a control panel and a decorative panel. The operators also glued on a pair of adhesive insulation pieces – these were first pulled off of a sheet and then glued onto precisely defined spots. This meant a large number of manual operations, which the management decided to reduce, and thus it turned to DESSEQ. **They then designed an automated robotic work centre for air conditioning cover assembly, including the automated gluing of self-adhesive insulation by robots.** This cooperation occurred in early 2018, and **the construction of a robotic welding work centre** for control-panel manufacturing took place alongside it.



Project goals

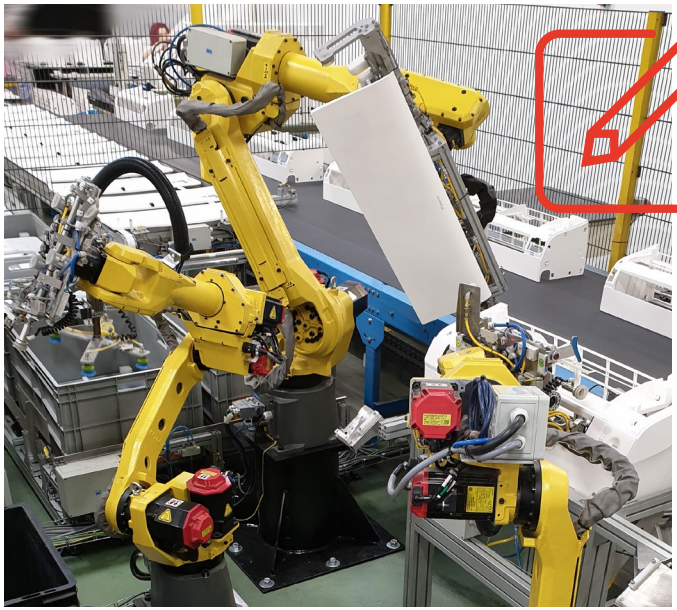
1. Setting up an automated work centre.
2. Increasing the precision of air conditioning unit manufacturing.
3. Achieving the demanded takt time for the line.
4. Replacing routine labour by the operators and eliminating the impacts of the human factor.
5. Gaining new automation experience and knowledge.

Solution

The core of this comprehensive solution are **three six-axis industrial robots** produced by FANUC. Each has its own clearly defined task. The existing conveyor belt, down which the base components are transported, has been supplemented with **four conveyors for moving materials**. Three of them are roller-based – two smaller identical conveyors and one larger side conveyor. The fourth is chain-based. The delivery also included **two devices for separating self-adhesive insulation directly from the customer's paper sheets ("separators").** The robots remove the individual components from the box using a camera system and suction pads and then mount them directly onto the base component. Most components are picked directly from the customer's internal standardised packaging. Meanwhile the robots remove the (already automated separated) insulation from the sheet and stick it to the interior sides of the skeleton.

During standard operations, the work centre **runs automatically, without operator intervention**. The operators simply supply materials as needed to the individual conveyors and separators. Thanks to this, the centre could have an enclosed design. The entire assembly space is fenced off to ensure maximum safety for workers and for the production process itself.

The sub-assemblies for the work centre were tested and produced – including the robots' programming – **at DESSEQ**. Everything was then transported, assembled and brought into operation at the Daiho Czech production hall in Pilsen. Operator training and the provision of operational documentation were a part of the delivery as well. However, DESSEQ remains in charge of essential maintenance tasks, including any structural-design adjustments throughout the facility.



Project's specifics

- The new solution is incorporated into the existing manual-assembly line.
- One novelty here is the inclusion of camera checks of correct print positioning for one component within the assembly.
- The automatic cycle is fine-tuned based on customer requirements.
- The robots collaborate within the highly restricted space of their work centre. One fundamental special aspect of this project was thus their mutual synchronisation so as to entirely eliminate collisions and needless downtime.
- Each robot is equipped with a camera system for correct picking and assembly of individual components.

The benefits of the solution

- Insulation is adhered more precisely.
- Parts are produced at high quality.
- Camera checks have eliminated a problem where the printing on parts was sometimes missing.
- Assembly errors have been eliminated – there is now no need for reworking (extra assembly) at the exit from the line.
- Production does not require operator intervention, letting Daiho save on personnel costs.
- The problem of constantly having to train new personnel has been resolved.

DAIHO CZECH s.r.o.

Daiho Czech produces and sells pressed plastic parts – specifically air conditioning units, TV components and components for the automotive industry. Founded in 2001 in Pilsen, it is also headquartered there. It is a subsidiary of the Japanese firm DAIHO INDUSTRIAL Co. Ltd., which is its majority owner. This concern also owns the DAIHO Schenk s.r.o. plant in Liberec – however, most of its activities are in Asia.