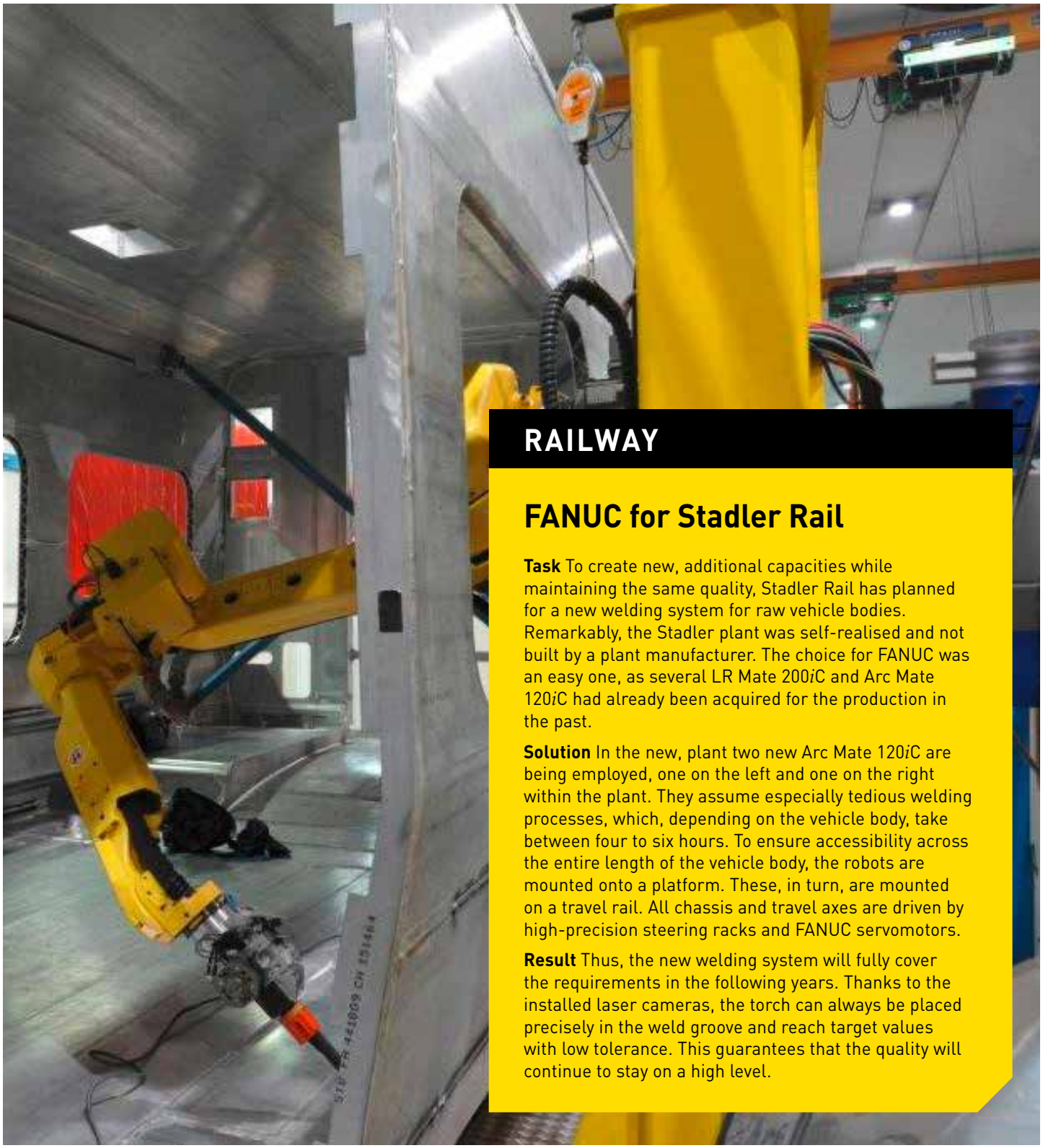
FANUC



RAILWAY

FANUC for Stadler Rail

Task To create new, additional capacities while maintaining the same quality, Stadler Rail has planned for a new welding system for raw vehicle bodies. Remarkably, the Stadler plant was self-realised and not built by a plant manufacturer. The choice for FANUC was an easy one, as several LR Mate 200*i*C and Arc Mate 120*i*C had already been acquired for the production in the past.

Solution In the new, plant two new Arc Mate 120*i*C are being employed, one on the left and one on the right within the plant. They assume especially tedious welding processes, which, depending on the vehicle body, take between four to six hours. To ensure accessibility across the entire length of the vehicle body, the robots are mounted onto a platform. These, in turn, are mounted on a travel rail. All chassis and travel axes are driven by high-precision steering racks and FANUC servomotors.

Result Thus, the new welding system will fully cover the requirements in the following years. Thanks to the installed laser cameras, the torch can always be placed precisely in the weld groove and reach target values with low tolerance. This guarantees that the quality will continue to stay on a high level.

The robot is precise – Stadler builds a new in-house welding system

You are travelling by train. Are you comfortable? Is your experience of the design light and friendly? If so, you may well be sitting in the wagon of an underground, tram, a regional or InterRegional train built by Stadler.

Stadler has been building trains for 75 years. The system supplier offering solutions in rail vehicle construction is based in Bussnang, eastern Switzerland. Counting all locations, Stadler employs over 7,000 people. The bestseller FLIRT has sold over 1,400 times in a total of 17 countries. FLIRT stands for Fast Light Intercity and Regional (multiple unit) Train.

Low floor wagons: the company's speciality, which are located at any rail track. The passenger should be able to step into the train and not have to climb into it. To create additional capacities and keep quality at the Stadler level, the company has actuated a new welding system for raw vehicle bodies.

Remarkably, the plant was self-realised by Stadler. Do you have your own equipment construction of this magnitude? Early on, discussions with plant manufacturers were held, but it was soon discovered that their own concepts could not have been realised with external ones. An example: Anyone can build on a green meadow. However, building on an existing, historically grown building complex requires precise knowledge of the individual processes. Furthermore, for economic reasons, the plant should be built while the operation continues and the new plant should be integrated into the production. Stadler has abundant expertise in welding technology, meaning that the procedural concept already exists. It was predominantly constructed under own direction. For individual areas of expertise, external expertise was sought, just like FANUC with the robots.

In May 2018, Stadler celebrated the roll-out of the low floor, high-speed train Giruno with Federal President Doris Leuthard, in the presence of the Swiss Federal Railway SBB. After only two and a half year's development and construction time, the train went on its first trip. From the end of 2019, the Giruno will pass through the Gotthard tunnel, the longest railway tunnel in the world.

Aluminium profiles, which are continuously cast according to guidelines by Stadler, serve as raw material for the vehicle bodies. Prefabricated assemblies are placed in the welding system using an indoor crane. Then they are aligned, riveted and welded. The welding is prepared using offline programs so that the plant can be used productively. The fine-tuning of the program, however, is executed on site. Multiple-pass welds are, not least for quality

reasons, welded automatically. The burning time of the electric arc depends on the type of vehicle body and takes between four to six hours. As there are mechanical limits to the deployment of robots, welding works, which must be executed manually, remain. Furthermore, some welding works do not have the discussion between "manual work or the employment of robots" in the foreground, but rather have economical criteria turn the scales. As in any production, profiles that are automatically welded are subject to respectively high requirements regarding manufacturing tolerances. Production planning and quality control take charge of this aspect in an intensive manner.

In this way, scrutinising individual work steps in the production of the subassemblies, always being on the lookout for optimisation potential or different points that influence the automated process were part of the project team's planning phase. So long as welding was done by hand, less precision in the prefabrication was easier to make up for. Now that the robots are fabricating, it is a lot easier if the components are delivered already precisely made. Because: The robot is precise.

Bussnang's site experience with robot technology goes back to the year 2005. Since then, two technical areas in particular have changed the software and the component communication via Profinet. One advantage the digital communication protocol renders is that fewer cables must be laid. In addition, changes are much easier to manage, as with additional sensors or an additional signal, only the protocol must be adjusted.

The choice of the first robot in 2005 was still a lengthy process until the decision for FANUC was made. The main decisive factor was its compact design and the

various possibilities associated with the package of the Arcwelding Software. FANUC robots are deployed "off-the-shelf." The LR Mate 200*i*C and Arc Mate 120*i*C with different software options are currently deployed. In the new plant there are two Arc Mate 120*i*Cs currently working, one on the left and one on the right.

The robots are mounted on a platform, which is in turn sitting on a travel rail. Thus, the entire length of the vehicle body remains accessible. All chassis and travel axes are driven by high-precision steering racks and FANUC servomotors, which are easily integrated into the robot control as axes.

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For quality control, a software integrated into the welding power source by Cloos is used for monitoring the process. Furthermore, a laser camera always positions the torch precisely in the weld groove, ensuring that the target values are met with very low tolerance.

The entire equipment is chosen according to a simple principle: What's good is what's tried and tested.

The plant is designed for all raw vehicle bodies produced by Stadler. Stadler is convinced that it will cover the entire demand in the coming years. This is because the so-called structure gauge on vehicle bodies is stipulated. Here, the European, western standards are identical. The plant also covers the larger structure gauge in CIS countries to a maximum. During the planning stage, different tram, train and underground wagons were depicted in the 3D simulation and the plant was designed accordingly.