



MACHINERY | EQUIPMENT

FANUC for RAU AG

Task Together with its system partners, Robotec Engineering, Rau AG in Bülach has automated two tooling machines in the smallest of spaces, while at the same time ensuring the automation itself took up as little space as possible.

Solution A robot with a vision system in the gripper, mounted at a 90° angle on a 7.5m beam above the machines, so as not to limit the range of motion and to allow for the automation to be as innovative and efficient as possible.

Result During the unmanned night shifts, the M-20iB/25 takes on the tasks of the workers and is able to achieve 1.5 times the amount of work practically in its sleep.



Robots with an overview – two complex turning centres share the same automation

Rau has now commissioned an additional facility. Its development is quite typical for the close trusting relationship that exists between Wagner and Adrian Albiez, CEO of their system partner, Robotec Engineering. The two have been working together for more than 20 years, when Robotec Engineering installed the first robots at Rau. FANUC was their system of choice, even back then.

There was already a plan, even at the beginning of the project - in principle - as, for all intents and purposes, the focus was always on the task and the solution. Instead of a comprehensive, and technical specification, Wagner and Albiez threw their time and creativity into finding the optimum design for the required solution.

Albiez: *"We develop the systems during discussions. It's normally a process."* Wagner knows what he's letting himself in for: *"Without Robotec Engineering as our systems partner, we wouldn't be able to do it."* The facility was developed with the support of Roth Technik, Sulgen. The owner, Markus Roth: *"We offer all sub-disciplines of automation and also build turnkey solutions. The small mechanical engineering company has distinguished itself, above all, with the development of the gripper. We start with standard components that we adapt to the specific task and then develop it further. For example, by integrating a camera, as in the case of Rau."*

The result of this joint project was a system with two double-spindle processing machines, interlinked by a robot with a 1,835 mm reach and a 25 kg loading capacity. To ensure easy access to the machines, a 7.5 m long track was mounted above them, upon which

When it comes to equipping his production facility, Herbert Wagner takes an Oscar Wilde like approach: "I'm a man of simple tastes. I'm always satisfied with the best."

the robot was mounted at a 90° angle. The relatively low ceiling meant it wasn't possible to suspend the robots.

Placing the robots over the machines resulted from the requirement to maintain unrestricted access to the space between the machines. The safety software Dual Check Safety, DCS for short, was installed to maintain this accessibility while the machines are in operation. The software is able to define the robots' range of motion and, if required, also lock it. If the operator in the cell needs to access the machine, this area is designated as "inaccessible" for the robots. They can continue to work on the other machine.

Strong value creation

At both double spindles, fully variable processing is possible from 20 mm in diameter for bar materials, and from 65 mm in diameter for bar sections.



The machines are currently fully utilised for the next two months. 4K projector optic components are to be manufactured within this period, with which Rau is achieving global success. An impressive part of the Bülach-based family company's success also comes as a supplier to manufacturers of pick-and-place machines in the semiconductor industry. The company achieved a third of its entire turnover in Asia. Herbert Wagner: *"We don't have any problem at all with the costs."* Rau AG, founded in 1955, has gradually established this strong position. Time and again, they have focused on components with a strong opportunity for value creation.

Low-machining materials are a main focus. In general, however, Herbert Wagner takes a close look at whether a new component fits into his "formula". And what makes Rau so special? Wagner: *"If you want a good service at a fair price, then we're the partner for you. We are a complete service provider for parts and components and are able to use our experience to also support customers in the development of parts."*



One of the specifications for the development of the system was to be able to produce a large range of parts. A rigid automation was, therefore, out of the question. That is also why a vision system was integrated in

addition to the robot. Or, more precisely: a vision system was integrated into the gripper. The task: to automatically recognise the position and orientation of the blank in the container. The "container" here is a cardboard box with compartments in which the blanks are found and the finished parts are also stored. The orientation of the parts in these compartments has a tolerance of plus/minus 20mm. Using a cardboard box to carry goods is one of the customer's specifications, also known as transport packaging. *"There is no such thing as a defined grip position in this scenario"*, says Albiez.



Instead, a camera provides the solution. As the gripping positions and the required conveying devices are located between the machines, the camera could have been placed very high up, underneath the robot's track. Alternatively, it would have been necessary to install a camera on each side. The first option, however, would not have provided satisfactory results and the second option would be too costly with the need for the additional camera. Because the gripper also reaches into the machine with all the chips and cooling lubricant, the camera would have quickly become "blinded". As a result, the camera was installed in the gripper, but in a box that is opened by a pneumatic cylinder. Adrian Albiez says of the



advantages of this solution: *“The camera can be set for an optimum range, it is not in the way and it is always protected.”* And Robotec Engineering: provided yet another constructive experience here: all the cables and hoses are guided inside the gripper. *“This prevents premature wear of the energy and media lines.”*

How often and when the system is retrofitted depends, as with everything, on the orders. In any case, the changes have to be quick. From the very beginning, quick changeovers stood at the very top of the priority list. Wagner: *“For one well-known item, the changeover time for this system is less than 15 minutes.”* This is mainly due to a potentially required mechanical jaw adjustment to the gripper. For a new yet similar item, it still doesn't take longer than an hour.

If an order comes with a new workpiece, the machining program is created at its own programming station. Albiez: *“We're moving away from teaching the robots, as that costs time and is error prone.”* The robots are parametrised instead. This works quite well with turning. Programs that already exist can be retrieved directly by the machine and any entries that are potentially required can be made directly on the clear touch screen.

Making money in the unmanned shifts

The aim is always to set up the orders in such a way that they can run in the automated unmanned shifts straight away. As the time between 5:00 p.m. and 7:00 a.m., the following morning is more than one and a half times the length of the manned day shifts, which have correspondingly higher staffing costs. It can, therefore, make economic sense to have one additional retrofit, so that the night shift can run through automatically.

In order for that to work in practice, however, Wagner needs to be able to rely on both the machines and the

automation. High availability and reliable operations are required – criteria that make the decision to go for FANUC robots and CNC an easy one. Herbert Wagner, who is also responsible for quality, says: *“It may be that these components are not easier to integrate, but we know and value the reliability of FANUC.”* As an example, he tells of the 35-year-old controls of a machine that needed a new circuit board. It was no problem whatsoever to get the corresponding replacement part from FANUC: *“Even after decades, I got the replacement part I needed.”*



At the same time, the machinery is expanded and updated on a regular basis. This doesn't mean, however, that the robots are off to the scrap heap once



their work is done. There is always a humble task to be done, even for an old robot.

The flexibility of Rau is such that they once went so far as to sell a system that was actually working well to the previous client. Rau had operated this system “quite profitably”, as Wagner puts it, for three years. Then the project for the automotive supply industry was abandoned in favour of new market opportunities. Clearly to mutual satisfaction.



About RAU AG Bülach

Herbert Wagner is the Head of Production at Rau AG, Bülach, a manufacturing company with 80 employees and a high proportion of trainees. The company has just shy of 50 CNC machines, which produce component parts for customers from a variety of industries. Their production range is extensive and that is why, as Herbert Wagner emphasises, in addition to quality and precision there was one other requirement: *“With the exception of surface technology, we make everything in-house. That’s why, for me, it was important to have trouble-free components, such as the robots.”*

