Today, the automation of machine tools with robots is standard, but with a diverse range of parts it can quickly become a challenge. An experienced system integrator can offer optimum solutions for difficult cases – as evidenced by the path-breaking automation of the machining centre of a leading electronics manufacturer.

Wieland Electric GmbH is a medium-sized family business with headquarters in Bamberg and is among the pioneers in electrical connectivity solutions. In the course of its more than 100 years of existence, the company has grown into an international group with a global workforce of more than 2,200 on all five continents. Today it is seen as a medium-sized global player with a clear commitment to its location in Germany, where the majority of products are still manufactured. The Franconian city of Bamberg is where robust housings for the well-known series of revos industrial connectors are made. A Müga S500 machining centre now drills holes and cuts threads in the upper and lower sections of the housing. In bygone days, the machine tool were loaded and unloaded manually.

This very aspect had been a thorn in the side of Frank Hennemann, production planner at Wieland, for some time: “Employees who were urgently needed for other, higher-level tasks were engaged with simple, monotonous activities. Besides that, manual loading was less than optimal for reasons of productivity. In order to remedy this situation we contacted EGS automation technology. We knew that the company had acknowledged expertise in the automation of machine tools.”

Indeed, EGS has already implemented hundreds of automation solutions for machine tools and can draw on a wealth of experience. Nevertheless, the assignment at Wieland proved to be a real challenge, as EGS Sales Manager Heiko Röhrig quickly realised: “The concept was complicated by two factors: firstly, the large number of housing versions, and secondly the processing of bulk material to bulk material. In other words, the housing components are delivered in a disorderly manner in metal bins and leave the system again as bulk material.”

Highly flexible feed system offers the solution

Although the parts were supplied in a disorganised form on workpiece carriers or pallets, a suitable feed system was identified in the standard EGS program. With a few modifications it was seen to represent the optimum solution: the SUMO Flexiplex. In this highly flexible loading system, the workpieces are transported on multi-lane belts.

Major advantage for this solution: all versions of the connector housing have a common characteristic: their width is always between 42.5 and 43.5 millimetres. The lane width of the Flexiplex does not need to be adjusted in the case of retooling, which is why the infeed at Wieland dispenses completely with this adjustment option. With the different parts lengths, which depending on the version vary between 60 and 140 millimetres, and the housings heights, which range from 24 to 90 millimetres, the EGS feeding
solution has absolutely no problem with the many special housing shapes, some of which have a stainless steel bracket or locking pins. Only a clamp arm had to be additionally installed.

In contrast to the infeed, deciding on the right robot was easy. Röhrig: “Although the customer had not expressed a preference when it came to the robot manufacturer, the choice was made in favour of Yaskawa – with good reason. Due to their robust design, Motoman six-axis robots are especially well suited to the tough conditions on and in machine tools. Furthermore, they are characterised by an impressive degree of precision, excellent dynamism and a good price-performance ratio."

In this particular case, EGS opted for the Motoman MH12 for all handling tasks within the cell protected by a wire cage. The correct positioning of a total of eight lanes of the Flexiplex with blank parts remains the task of the system operator, as is the placement of empty metal bins for collecting machined parts. The bins are brought to cell workspace on a driven roller conveyor, and when filled they are discharged onto a buffer segment. A major advantage is that these tasks can also be carried out during the machining process.

**Brief description of the workflow**

After the start of automatic operation the workpieces are fed by the supply belt to the robot’s workspace. The MH12, which on account of the identical width can handle the entire range of parts with one gripper, picks up the parts and inserts them one by one into the machine’s clamping fixture. Once all the nests of the clamping fixture have been loaded, the robot applies tension to the blanks and gives the enable signal to the machine. The machine then rotates the loaded side of its swivel table into the machining area and transfers the finished parts to the loading and unloading zone of the robot. The six-axis robot then picks up the finished parts and places them into the waiting metal bins. Then a new cycle can start.

JJürgen Eisinger is extremely satisfied with this solution: “Our particular concern was the process reliability of the infeed and robotics. Stoppages or even extended disruptions are unknown to this automatic machine tool. In addition, the system has set a benchmark in terms of cycle times, currently four parts per minute.” The Wieland team was also impressed by the attainable autonomy, which may be several hours depending on the component variant. Crucial factors for longest possible autonomous operation are the maximum possible stockpiling of blanks by the feeder system and provision of the maximum number of empty metal bins in the system.

**Focus on employees**

But for Jürgen Eisinger, Group Leader Production Planning, autonomy and productivity are not the only aspects that speak in favour of the automation solution. Employee welfare is a priority for the production strategist: “Permanent contact with the connector housings in manual handling involves certain risks. The parts are contaminated with cooling lubricants that can cause skin irritation. For this reason we ensure that our employees perform the pleasant tasks, while the robots take on the monotonous and dirty work.”

In contrast to its human colleagues, the Yaskawa six-axis robot is unaffected by cooling lubricants or swarf. Thanks to the design of its hand axes in protection class IP 67, the MH12 is unimpressed by rough blowing off of parts and clamping fixtures in the machine. EGS has equipped the robot with a blowing device to enable it to perform these cleaning tasks.

There was a further valid reason for selecting the Motoman MH12, as Röhrig points out: “We also chose the machine due to its excellent working range. It enabled us to position the robot at an adequate distance from the machine tool, so it can be operated manually if needed. Wieland wanted to keep this option open for manual machining of small series.”
The machine tool automation solution developed by EGS in close cooperation with the decision-makers at Wieland has met all expectations placed in it. “The system operates reliably with high availability, the employees have been relieved of dirty tasks and they have learned new, fascinating robotics work content. Productivity has improved significantly – and our goals and expectations have been completely fulfilled,” sums up Eisinger.

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