GeKu Automatisierungssysteme GmbH, Germany

Exceptional Automation

A complete, reliable, and efficient system of robots and peripheral machines taps the full potential of an injection molding machine.

GeKu Automatisierungssysteme implements individual solutions for the automation of processes for the manufacture of plastic, rubber, and metal. The handling of parts is usually accomplished with three-axis robots that GeKu builds itself in all required sizes and variants using very robust and hence low-vibration steel or aluminum designs. In collaboration with Siemens, new automation standards were recently created that make development easier.

Complex injection molding processes simplified

How important the control of peripheral processes is for successful automation is shown in the example of a horizontal injection molding machine with quad tool. Using such a machine, the Lübbecke-based Alhorn company manufactures contact sockets. The complete process execution goes far beyond just the handling of parts.

In the automated manufacturing process, the contact plates are first removed from the hasp using a feed device and separated at a precisely defined position using a punch. “The contacts must not be bent in the slightest in the process. The grippers must also not leave any marks, particularly not on the tin-plated or gold-plated areas of contact pins,” points out Joachim Winter, chief designer at GeKu. The contact plates that have been punched free are conveyed to an intermediate receptacle using a motor-driven linear axis.

“We designed the intermediate receptacle so that both three-contact and four-contact sockets could be manufactured without major retooling,” explains Winter.

It is not until this point that the actual handling robot comes into play. It retrieves the positioned contact plates from the intermediate receptacle and
For its parts handling, GeKu primarily uses three-axis robots with Simotion control which it designed itself.

inserts them into the injection mold. The robot’s gripper is designed as a combination gripper in this machine. As a result, it can immediately retrieve the socket that was manufactured in the previous process cycle and transfer it to a test station.

At this point, the machine operator first requires that the contact resistance and the dielectric strength be tested. These and the following product tests are also part of the automation solution supplied by GeKu. From this electrical test, an additional gripper transports the socket for a mechanical checking of the contact pin symmetry, during which the contact socket continues to be held by the gripper. The good parts are marked with a punch device mounted directly on the gripper and placed onto the output belt for packaging. The gripper discharges rejected parts by dropping them into trays sorted according to the cause of the defect.

**Standard application for handling robots**

In contrast to the application-specific process periphery, the handling tasks carried out by the robot are largely independent of the application. It therefore made sense to develop a standardized control and drive solution for handling robots. In conjunction with the Siemens Application Center in Cologne and using the Simotion motion control system as the basis, GeKu developed a handling application for which all parameters can be set using the HMI panel. This allows the parts handling of the GeKu robots to be put into operation immediately without any additional programming – something that works for a wide variety of processes, machines, and products.

The new standard application includes the complete hardware and software for robotic automation and is used for all handling tasks in the production processes developed by GeKu. In fact, this solution represents a robot control system for which all parameters can be set. This allows the company’s developers to save time on every order. They can now focus their attention more intensively on the important tasks in the process periphery – with a time advantage that can be decisive for an order when deadlines are tight.

Since the Simotion CPU is usually not using its full capacity for robotic control with parts handling, it can also take over additional tasks. These primarily include the control of modules and stations of the process periphery, which often have a large number of sensors and actuators. For efficient connection of the I/O signals, GeKu uses Simatic ET 200 peripheral stations, which are connected with the controller using Profibus.

“In the automation of manufacturing and production systems, the collaboration with Siemens gave us the ability to always use the same system structure, one that was uniform in terms of both hardware and software. In the process, we were able to concentrate from the beginning on the most demanding application-specific processes in the process periphery,” summarizes Winter. “This very much suits our strategy of offering robots and peripherals from one source – if nothing else, for the benefit of the end user, to whom we can offer what is needed for efficient and profitable production.”