Battery assembly and check in 70 seconds with Omron robotics

Jonas & Redmann automates assembly of small primary lithium batteries for medical devices based on Omron eCobra Pro Scara Robot and camera technologies. Great worldwide demand requires reliable automation. Holistic support accelerates project success.

The European medical technology market is estimated to make up 29% of the world market, as the second largest medical technology market after the US with approximately 43%. In Germany , the industrial health industry has been growing continuously and faster than the German economy since 2009. This includes, for example, the production, distribution and wholesale of medicines and medical technology.

Berlin-based engineering company Jonas & Redmann focuses on medical technology, in addition to other business areas of assembly automation, energy storage and photovoltaics. Jonas & Redmann relies on the technology and expertise of Omron to automate the assembly of primary lithium batteries for a medical device application of a US-based client. The eCobra Pro Scara robot, in combination with powerful camera and visualization technology and a triple gripper, supports accurate layering and precise assembly.

Robots, grippers and configuration options needed to allow fast and reliable handling of highly sensitive materials.

„All solutions are completely assembled by us and go through thorough quality and performance testing before delivery," explains Elke Beune, Team Leader Corporate Communications at Jonas & Redmann. „After the ramp-up of the machines on site, in this case in the USA, we take over the on-demand employee training as well as technical consulting services, and the long-term support of finished systems." Fully automated assembly, handling and functional testing systems are core business of the mechanical engineering experts. Highly efficient automation systems and absolute reliability come first for both the client, doctors and patients. Until now, the American customer manufactured the small batteries manually. However, high-volume demand for the final medical device product has made automation a must.

Challenge: Automated assembly of small and sensitive parts

The large medical technology client handled the production process manually and in small quantities - this was because the production of the devices had to be very precise and accurate, as well as meet stringent quality control requirements. In addition, it was very difficult to assemble three different tiny and sensitive parts at the same time. „Particularly challenging in terms of design were the many standards and regulations that had to be taken into account," adds Tobias Gensicke, Team Manager Mechanical Design at Jonas & Redmann.

Goal: Reliable automation in mass production

Through automation, the American customer now aims produce the batteries in large volumes, while increasing efficiency and accuracy, enabling the industrial production of the sensitive product. The automation solution from Omron also includes feeding and positioning of the main components (anode and cathode) with four joint robotic units, including machine vision. In addition to the positioning, high-resolution quality inspection with machine vision is carried out after the punching process.

Jonas & Redmann has been relying on the robots, solutions and expertise of Omron for more than 15 years. „The overall concept combining robotics and image processing was crucial in the selection process," explains Frank Neumann, Field Sales Engineer Sensing, Safety and Components at Omron. However, also the relationship and trust between customer and supplier played a central role.

Preventing metal abrasion during battery mounting

Preventing metal abrasion within the machine posed a particular challenge. „The entire production process of the battery cells had to take place without any formation of metal particles," reports Tobias Gensicke. The handling of the specific lithium metal used in the production of the batteries also required special attention in the robot selection process. Robots, grippers and configuration options needed to allow fast and reliable handling of very sensitive materials. Another requirement was the perfect adjustment of robot and gripper technology. During the project, the eCobra Pro was configured to handle extremely small components. In addition, the robot had to utilize an integrated camera to ensure that no relative movement of metals could occur without full encapsulation.

Executing stacking, punching and pressing processes safely and precisely

The stacking and punching of the electrodes are at the heart of the triple gripper application. The robotic arm first picks up the lithium and the anode, which are joined together in the next step. This is followed by the sealing of the anode and the cathode and, in a last step, the juxtaposition of the two battery components (anode and cathode). Four camera units monitor the entire assembly process.

In the final stage of the project, the machine will assemble and check each battery in 70 seconds.

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Camera systems control assembly quality

„Software also plays an important role in the interaction of the various components," adds Beune. The camera systems from Omron contains a comprehensive software package that includes, for example, algorithms for the correction calculation, ie the exact filing of the electrode sheets. Both assembly and quality are controlled by the cameras, including the precise punching contour that is crucial for the reliability of the final product.

Thorough training support

„Omron provided professional and comprehensive support during implementation. Jonas & Redmann and Omron colleagues have worked closely together in this project. The training prior to the start of the project was also important, „explains Beune. The participants of the robotics and camera training expressed that they enjoyed the workshop, thanks to contents but also because of the training staff. „The people responsible for software and implementation really felt cared for," says Beune.

Jonas & Redmann solution for the assembly of a lithium-ion battery cell in a stacking process

About Jonas & Redmann

Jonas & Redmann - The Automation Company: 30 years of innovation in future technologies. Founded in 1989, the engineering company Jonas & Redmann has developed into the largest special machine manufacturer in Berlin with in-depth technical know-how and the claim to perfection. The group currently employs 500 people worldwide. The most important fields of competence are medical technology (since its founding), photovoltaics (since 1999) and energy storage technology (since 2009/2010) as well as cross-departmental assembly automation. Jonas & Redmann has many years of experience in the automation of complex, innovative production processes. The technical solutions for the Battery Technology business segment show Berlin's extensive know-how in the handling of highly sensitive materials. This knowledge brings them into the business area and adapts the proven concepts to the specific requirements of customers in the field of battery technology. Further information: www.jonas-redmann.com

About Omron

Omron Corporation is a leading industrial automation company that leverages its core sensing & control technologies to expand into businesses, such as control components, electronic components, automotive electronic components, social infrastructure, healthcare, and the environment. Omron was established in 1933, and has around 39,000 global employees, offering products and services in over 110 nations and regions. In the industrial automation business, Omron is contributing to making an affluent society by offering automation technologies which drive innovation in manufacturing as well as products and customer support.
For more detail, industrial.omron.eu.