Centralized data management prevents errors during the packaging of microbatteries

**Varta Microbattery:**
Integrated data transfer connects blister packaging machine to the ERP system

With its centralized data management system, Varta Microbattery is able to package large volumes and numerous variants of its products with reliability and flexibility – all while keeping in accordance with modern Industry 4.0 concepts. It created the basis for this information transfer from its microbattery blister packaging machines to the ERP system with open, PC-based control technology from Beckhoff.

The button cells must be separated before being placed in blister packs.

Microbatteries are increasingly being sold in individual blister packs.
Varta Microbattery specializes in the production of microbatteries, which are shorter than AA batteries and have a diameter less than that of C batteries. With its annual output of 700 million individual batteries, the Ellwangen-based company is the world’s leading supplier of these so-called “button cells”, most of which are of the zinc-air variety for hearing aids. The packaging technology for Varta microbatteries is characterized by the multitude of different battery shapes and sizes, as well as the need to accommodate the requirements of Varta’s many customers.

Their customer’s needs range from custom packages for small lot sizes, to blister packs for standard products with annually changing expiration dates. The greatest challenge in mastering these requirements is the prevention of incorrectly printed blister packs, as well as making sure that each job is assigned to the correct packaging process.

**Openness of PC-based control technology brings about integrated communication**

Varta Microbattery has employed PC-based control technology from Beckhoff since 2002, implementing a wide range of products including EtherCAT Terminals, AX5203 Servo Drives, C6640 control cabinet PCs, and particularly the TwinCAT automation software. Simon Ziegler, Production Engineer at Varta Microbattery, explains: “With its openness, TwinCAT offers so many advantages that, in the beginning, we even added Beckhoff controllers to our traditional PLCs in order to ensure efficient and secure data communication with our printers. As we built up our software expertise, we came up with the idea of extending the data chain down to the visualization and ERP systems.” Lean-Production Manager Klaus Schoebel adds: “In addition to its performance, PC-based control technology is characterized especially by its outstanding communication capabilities with other systems, in our case through a standard TCP/IP connection. The resulting integration options are most important for us.”

Before Varta implemented a centralized data management system, a separate CAN-bus-based database was the only option available to supply the printers with information. While this was state-of-the-art at the time, according to Klaus Schoebel, it was cumbersome and could not be linked to the ERP system. “In the beginning, we only wanted to solve the problem of having a printing system that was completely separate from the packaging machine and the ERP system. The solution was to have the operators enter the job data via membrane keyboards – with lots of errors, of course.” As a result, entire batches had to be unpacked and repacked. To prevent this, linking the job data with the printing data was a must. Fortunately, the open Beckhoff control technology eliminated this problem, because the data could now be easily downloaded over Ethernet lines from the ERP system, which was still quite small at the time. This interface ran on each machine as a local application in the background, so that the data could be correctly combined with the respective article number, via a classification in the ERP system, and sent to the printer.

**Central interface links controller and ERP data**

Today, Varta Microbattery’s ERP interface runs centrally as a multi-threaded application that can simultaneously serve multiple clients. As soon as a production job is scanned in, all necessary information is instantly available on the packaging line. This not only eliminates typing mistakes, but makes the entire packaging process much more efficient, as Klaus Schoebel explains: “While
the lot sizes have stayed more or less the same, we were able to almost triple our output in the last five years, even as we navigated a multitude of setup changeovers. Last year alone, we changed our setups 2,800 times on our three main packaging lines. Without integrated communication from the controller to the ERP system, this would have been impossible."

**Data communication via the ERP interface**

Due to the long list of requirements regarding batch codes and the complex printing of expiration dates on the blister packs, Varta Microbattery has developed a proprietary solution for the ERP interface. It is based on dual encryption in hexadecimal code which transmits the data with only 16 characters, making it possible for the protocol to easily separate it from special or control characters. This string is implemented in the TwinCAT TCP/IP server, and the controller simply converts the data string, processes it, and returns the result directly to the ERP interface through the TwinCAT TCP/IP server. The basic idea, according to Klaus Schoebel, is to have a truly open communication system where it does not matter whether the control information is transmitted to a SQL database, a printer, or the ERP system.

Another interesting feature, according to Simon Ziegler, is the next step, currently in development at Varta: "A new visualization and operating data collection system is slated to use this data transmission protocol as well. As far as the controller is concerned, the only interface left will be the one to the ERP system, which forwards the information to the relevant entities, or collects information from them and sends it to the controller. The codes are then processed in the interface itself, based on the encoding type stored in the SQL database, and the ERP system uses the classification of the respective material number to supply the necessary information such as quantities, graphics, EAN (European Article Number), and even the appropriate camera program. Based on local order scanning, this provides the majority of line settings from the control technology to the label color to optimized lighting. We can also collect machine run times and govern access authorizations for the machine controls." Schoebel adds: "TwinCAT even transmits all the information needed for an OEE analysis. It collects the required data such as trouble messages and warnings at several points in time and transmits the data packet to the ERP interface. The transmission protocol is also capable of handling longer data streams.

**Open communication adds potential**

The capabilities provided by the open communication approach also offer significant potential for future developments. For example, Varta plans to integrate the robotics technology for setting up the printers into the system so that the printing data can be optimally coordinated and controlled between robots and printers. Varta also wants to use PC-based control and Scientific Automation, which are implemented with Beckhoff power measurement terminals, to make its systems more energy-efficient and reduce power consumption peaks in its factory.

Further information:
www.varta-microbattery.com
www.beckhoff.com/TwinCAT