Protection for Cap Tip Dressers

Turck's BL ident RFID system enables the electrode cap tip dressers of AEG SVS Schweisstechnik to reliably detect the correct cutting head for the electrode cap

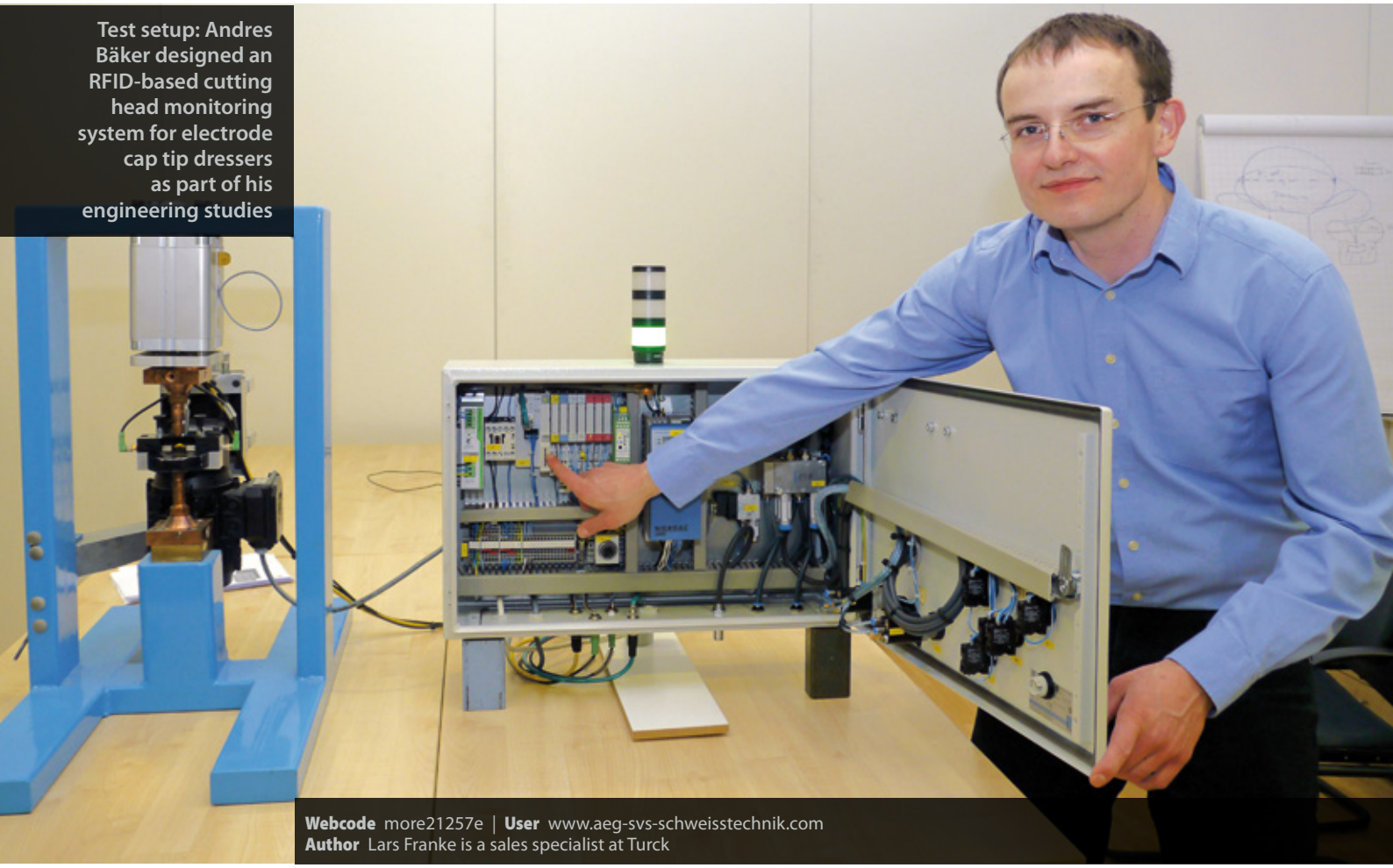
In spite of all the progress made in bonding and joining technology, spot welding continues to be the most cost-efficient joining process for stressed connections, particularly in industrial mass production such as in the automotive industry. The welding tongs operating in the fully-automated assembly lines use electrodes to exert pressure and heat on the sheet metal parts to be connected.

After a specific amount of time, known as the tool life, the working surfaces of the electrodes widen and collect impurities. This prevents the reproducibility of the individual welding results, and the quality of the welded joint is impaired. In order to ensure absolute process reliability and the reproducibility of the welding result, the electrodes have to be reworked according to empirically calculated values by using a dresser to restore the original tip geometry of the electrode cap.

Challenging cutter identification

AEG SVS Schweisstechnik from Mülheim produces the electrode cap tip dressers required for this process, as well as electrode caps and around 200 different cutting heads. If a dresser is fitted with the wrong cutting head, this can lead to critical faults in the production process.

As the cutting heads are very difficult to identify visually, AEG Schweisstechnik in 2010 looked for a method of automating the identification process. The aim was also to create a test application in order to determine the optimum settings for the cutting parameters for speed, number of cutting strokes and pressure. The company approached the Mönchengladbach College for Technology and Media with these questions. Andres Bäker, who at that time was completing the last stages of his engineering studies, was keen to take on



Test setup: Andres Bäker designed an RFID-based cutting head monitoring system for electrode cap tip dressers as part of his engineering studies

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Author Lars Franke is a sales specialist at Turck

the challenge together with two fellow students as a final course project.

Bäker and his team first examined the possibility of optical barcode identification directly at the cutting head or cap tip dresser. However, the idea of optical identification was quickly discarded since metal swarf can cover or scratch the barcode and lubricant grease could restrict legibility. The team then focused instead on wireless identification using RFID.

Support from Turck

Supported by Turck, the budding engineers used the BL ident RFID system to develop a solution that detects the cutting head during fitting. A read/write head with an 18 millimeter diameter is fitted diagonally above the cutting head. It does not prevent the cutting process and is nevertheless close enough to the tag to ensure identification in spite of the fast rotation. The engineers have integrated the tag directly in the cutting head. The mini tags used are only 1 millimeter high and 7.5 millimeters in diameter. The 128 byte memory is entirely sufficient for basic identification tasks. It is only necessary to write the eight-digit identification number on the tag so that it can be identified uniquely.

The read/write head is connected to a BL ident I/O slice module on Turck's BL20 I/O system. The Codesys-programmable BL20 gateway implements the control of the entire application. In addition to identification tasks, the engineers also developed a solution for detecting the speed and rotation direction of the cutting head. For this, they fitted two inductive sensors in the swarf extraction system, which detect two recesses in the cutting head. An appropriate control logic is used to determine the rotation direction and the speed of the cutting head from the switch pulse of the rotating disc. If the incorrect cutting head is fitted, a yellow LED signal is output and the plant is prevented from starting up.

The test plant can display all cutting parameters via the Codesys user interface: speed, pressure and number of cutting strokes can be defined individually via the controller in order to test the optimum configuration for cutting on different caps. "The result of the engineering study project is more than satisfactory for us since we can include the RFID solution directly in our product portfolio nearly without any additional requirements," Jürgen Rosendahl, product manager at AEG SVS Schweisstechnik, explains. "The engineering study was always of a high technical standard. I also found the collaboration with Turck to be very productive since they took the prospective engineers under their wing and left none of the students' questions unanswered."

For Andres Bäker contact with Turck has also proved to be worthwhile after the successful project work was completed. He now works as an engineer in the RFID support area at Turck in Mülheim. If AEG SVS wants to develop its idea to market maturity, Rosendahl knows who to turn to: "We are particularly pleased that Andres Bäker was able to join Turck directly after his engineering studies were completed successfully." ■

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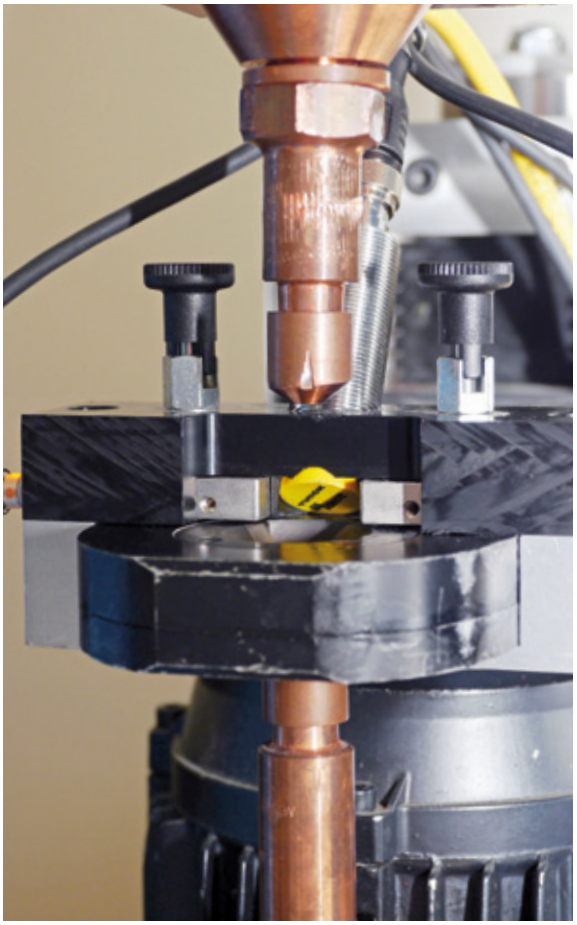

The yellow read/write head reads the tag in the cutting head during rotation

The integrated compact tag could be well protected in the cutting head (right)

Quick read

As specialists for welding system accessories, AEG SVS Schweisstechnik from Mülheim primarily produces electrode caps, electrode cap tip dressers and the associated cutting heads. In order to ensure that the correct cutting heads are used for the corresponding welding cap geometry, the company searched for a reliable identification solution, which Andres Bäker developed with two students as part of the final project work of their engineering course – with excellent support from Turck.