

# Eight Million Brake Light Switches per Year

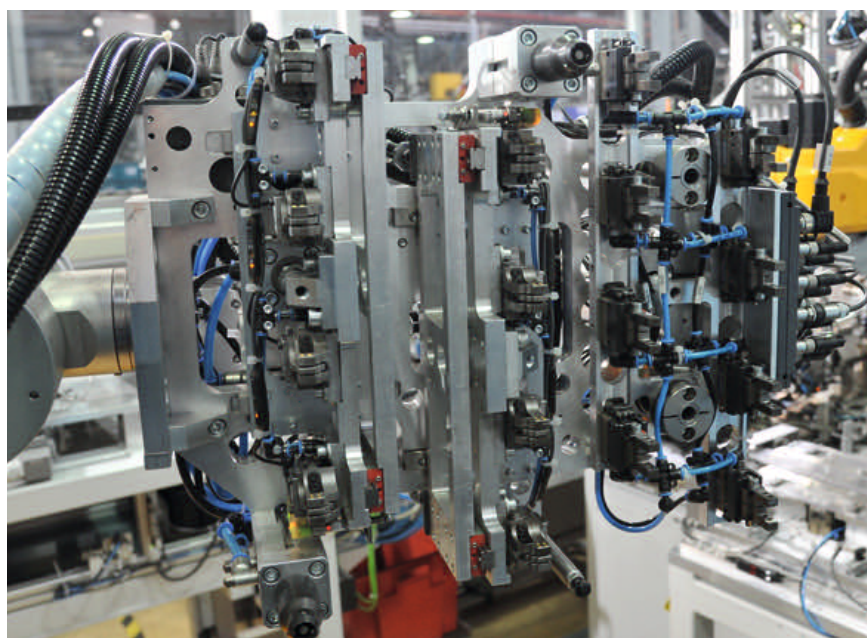
**Automated Mass Production.** The production of eight million brake light switches annually is subject to its own set of priorities. Flexibility is less important here than other factors such as maximization of output and reliability of process. A pioneering plant with an efficient precision injection molding machine and two precision robots at its heart is taking care of those jobs where cycle time is critical.

**RALF HÖGEL**

**W**hen a car manufacturer nowadays relies on just one provider for the mass production of a component, that amounts to both an honor and a responsibility for the chosen supplier. Body Control Systems (BCS), a subsidiary of worldwide automotive supplier TRW, is responsible for the production of eight million brake light switches annually for the Volkswagen Group. As a global company with more than 4,000 employees in 12 countries, BCS supplies all the major automotive original equipment manufacturers worldwide and therefore has the expertise and organizational structures necessary for such operations.

## More than 98 Percent Availability for Each Single Component

The serial production of brake light switches is now purely routine for BCS. But just how sophisticated this whole process would turn out to be only became apparent as the plant was being designed. That task fell to M.A.i GmbH, an experienced manufacturer of automation technology. The company has made a name for itself in recent years with complex and demanding automation projects. Managing Director Arthur Schwab looks back: “We had to guarantee an overall availability of 95 percent, which meant that the



Multiple sensors monitor each individual gripper within the entire complex insertion/extraction gripper system designed by M.A.i

availability of each individual key component such as injection molding, robotics, stamping unit and so on had to be higher than 98 percent. It was clear that only the equipment that reliably delivers high performance could be used. The very short overall cycle time represented a further headache for us.”

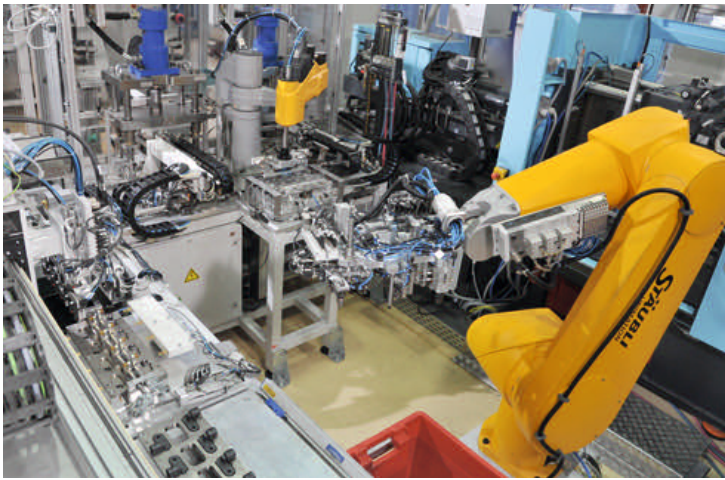
But the eventual outcome was that all requirements were met thanks to the joint development work (Info box on p. 40) between the client BCS, the plant constructor M.A.i, the machinery suppliers Sumitomo (SHI) Demag and Stäubli Robotics. Since June 2011 the system has been in operation at the BCS production facility in Radolfzell, Germany.

A Systec 130 hydraulic injection molding machine (manufacturer: Sumitomo (SHI) Demag) is at the heart of the cell. Four contact pins per brake light switch are molded using an eight-cavity mold. The standard linear guide of the moving platen ensures a highly precise closing movement and reduces tool wear considerably. This is a major concern in the mass production of eight million units annually since there are just 5.7 s during “mold-open time” when all loading and unloading operations have to be completed – a real challenge when you consider the entire production process.

A cycle begins with the feeding of two different-sized contacts via two stamping →

Translated from *Kunststoffe* 3/2014, pp. 68–70

Article as PDF-File at [www.kunststoffe-international.com](http://www.kunststoffe-international.com); Document Number: PE111597



**A Scara robot and a hinged bracket robot work hand in hand in a confined space to produce eight million brake light switches annually**

(figures: Stäubli)

lines. A Stäubli Scara TS60 first fetches four short and then four long contacts from the appropriate transfer station on the stamping line and passes them to a buffer store. “The Scara robot is stretched to the limit carrying out this task, especially as the handling processes require extremely high precision,” says Schwab. “After the successful completion of optimization work, the ultra-fast and extremely precise Scara now copes well with this task.” Eight trips are necessary to completely fill the buffer with a total of 32 contacts.

This buffer store is located within the working range of the large Stäubli six-axis robot. The RX160 fetches the 32 contact pins from the store and starts a cycle that is optimized down to the last detail, since the work of loading and unloading

the injection molding machine must take place within a timeframe of just 5.7 s.

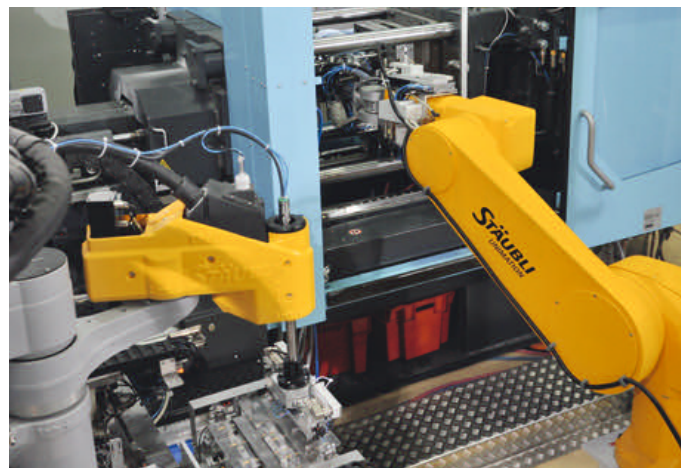
### Six-Axis Robot Places 32 Contact Pins in Eight Cavities

To reliably comply with this cycle time specification, the Stäubli RX160 must fulfill a complex set of requirements. Jochen

feed the mold with the total of 32 contact pins required for eight finished parts per cycle. Thanks to special indexation and a floating mounting, the robot centers exactly on the mold, making the highly accurate insertion process a reliable and fast operation. The RX160 has yet another major advantage: compact design and internal wiring. With its slender arm, it can safely reach into the injection molding machine without any external cables to get tangled up.

### Close to the Zero-Fault Production

After removal, the six-axis robot places the finished molded parts into groups of eight in a workpiece carrier. A linear system then picks up the brake light switches and passes them to the subsequent work stations for the prescribed quality checks, including a continuity test and measurement of the length of the contact pins. The tested brake light switches subsequently leave the plant on small load



**While the Scara places contact pins in the buffer, the big six-axis robot operates the injection molding machine**

## i Project Partners

**TRW Automotive Electronics & Components GmbH**

**Body Control Systems**

**D-78315 Radolfzell, Germany**

→ [www.trw.de/body\\_control\\_systems](http://www.trw.de/body_control_systems)

**M.A.i GmbH & Co. KG**

**D-96317 Kronach, Germany**

→ [www.m-a-i.de](http://www.m-a-i.de)

**Stäubli Tec-Systems GmbH Robotics**

**D-95411 Bayreuth, Germany**

→ [www.staubli.com/de/robotik/](http://www.staubli.com/de/robotik/)

**Sumitomo (SHI) Demag Plastics Machinery GmbH**

**D-90571 Schwaig, Germany**

→ [www.sumitomo-shi-demag.eu](http://www.sumitomo-shi-demag.eu)

Ley, molding specialist at BCS summarizes: “The robot must be very fast whilst sacrificing nothing in terms of accuracy. We are working to tolerances of a few hundredths of a millimeter when loading the tool. In order to fulfill these requirements also the gripper technology makes a huge contribution.”

A look at the hinged bracket robot makes clear what Ley means. The six-axis robot is equipped with a combined insertion/extraction gripping system produced by M.A.i, which is a marvel of complexity. Multiple sensors monitor each individual gripper, thereby ensuring reliable loading and unloading of the mold one hundred percent of the time. A unique feature is the use of an insertion piston to

carriers that have been already placed in position. The plant operates in three shifts around the clock.

“Over 10,000 brake light switches leave the production cell per shift. With only two to three defective parts per 10,000 units, we are close to having zero-fault production”, summarizes Jochen Ley. “In addition, the plant meets all of our requirements, producing parts reliably, quickly and economically. With the large-scale production of eight million switches annually to contend with, we could not have it any other way.” ■

### THE AUTHOR

DIPL.-ING. RALF HÖGEL, born in 1960, owns the Industrie Kommunikation Högel, Stadtbergen, Germany.