Saab interior trim, Collins & Aikman, Sweden
Case study: Laser Cutting

At the Skara plant in Sweden, automotive industry supplier Collins & Aikman produces interior trim for the trunk of Saab models 9-3 and 9-5 on a fully automated production line. A robot supported laser cutting cell made by ABB partner Robot-Technology handles and laser cuts the parts made of needle felt and plastic.

Dress-up artists for the trunk
American Collins & Aikman is one of the largest international suppliers for the automobile industry. Specialized in the areas of cockpit modules, interior trim and acoustics systems, the company supplies leading automobile manufacturers worldwide from its plants in Europe, and North and South America.

At the Skara plant in south Sweden, Collins & Aikman also manufactures interior trim for the trunks of models 9-3 and 9-5 made by automobile manufacturer Saab. Since January 2005, a completely automated system with robot supported laser cutting cell has been manufacturing the parts made of needle felt and plastic, which was planned and realized by ABB partner Robot-Technology Germany, who specializes in robot supported automation technology.

Turnkey from one source
Robot Technology was limited to only five months after receiving the order during late summer of 2004 to completely engineer, install, and begin operation of the new product line. Not a simple task for Stefan Maier and his 32 employees: “The requirement was a fully automated system that does not directly bind a worker to the machines”, emphasizes the managing director of Robot Technology. “In addition, space was very limited. The complete system had to be accommodated on a space of only 15 x 5 m.”

Fully automated from felt roll to finished part
Base material for trunk interior trim is needle felt that is supplied at the beginning of the production line on two fabric rolls. The machine pulls needle felt off the rolls alternating between the two rolls in the fabric supply, which is then cut lengthwise and across. An infrared unit then heats the material to 80°C to warrant easier ductility. The heating station is divided into six zones for which the heat supply can be adjusted separately. This heats the felt, which is formed with different strengths during formation of the trim parts in the different areas, completely through. The hot cut felt parts are handled by an IRB 6650 ABB robot with a handling capacity of 125 kg and a reach of 3.2 m. The robot uses four adjustable grippers to pick up the needle felt and set them into an injection moulding machine. There, the parts are back sprayed with plastic and thereby receive their contour and
stability. After inserting the felt the robot takes a finished part directly out of the injection moulding machine and sets it onto a cooling stretch. To do this, the IRB 6650 picks up the trim part on the plastic side and sets it onto a work carrier. Prior to cutting, the trim must be cooled defined and turned 180°. After setting it onto the cooling stretch, the robot moves its position and removes an already cooled part.

**Special laser cutting robot**

The robot moves to the laser cutting device with the cooled part and sets it onto a rotating table with two stations. The rotating table brings the uncut part into the laser cutting chamber and transports an already cut part out at the same time. In the cutting chamber, a special laser cutting robot designed by Robot-Technology handles the cutting process. The basis for the laser robot, which was submitted for patenting, is an IRB 4400. A complete upper arm carrying the laser in a special housing is mounted onto the lower three axes of the ABB robot. In addition, the robot is equipped with another axis on which the laser beam is diverted via four mirrors. The laser chamber at the Skara plant is laid out for two robots. However, it is currently operated with only one single laser cutting robot. The second robot may be retrofitted to shorten the cycle time at any time and without problems.

While the laser robot is cutting, the handling robot takes up a finished cut part including remnants from the second station of the rotating table and sets both onto a conveyor. The conveyor at the end of the system has a sufficient length to buffer finished trunk trim. The IRB 6650 moves back to the material supply after putting the parts down and picks up new needle felt to insert it into the heating station and start the cycle over.

**Flexibility inclusive**

Compared to other cutting processes such as punching, the robot based system provides significantly more flexibility. Changes on components, especially not a rarity in automobile manufacturing, can be implemented very quickly and cost effectively. In addition, a system like the one at Collins & Aikman in Skara can process several different components right away, which also saves cost. The IRB 4400, which performs the laser cutting, offers high process security and path accuracy during laser cutting because of its kinematics with connecting rods. Both robots of the system are controlled via the proven ABB robot controller, with which workers at Collins & Aikman have already gained extensive experience. “After the initial startup, we only had to provide a quick training session that was specifically focused on the system”, says Stefan Maier. “Since then, the system has been working smoothly and our customers produce independently without further support. Our concept has proven itself.”

In addition to the cutting station with the laser robot based on the IRB 4400, Robot Technology provided the fabric supply, complete heating station, IRB 6650 robot for handling including four grippers, robot controllers, stacking conveyor including protective grating, and master SPS controlling the entire system. Stefan Maier sees a deciding success factor for the implementation of this and other projects in the close partnership of his company with ABB in the areas of laser technology and injection moulding. “In addition to our competence in laser cutting, positive experience already gathered with ABB robots at Collins & Aikman was also an important factor speaking for our overall concept.”

**FACTS**

**Robot-Technology**

The product range comprises roboter-aided automation systems and laser cutting equipment for plastics and metal-working industry. Several main product categories, like laser cutting of plastic parts, clips assembly into plastic parts, automatic adhesive tape application as well as compact systems for various problem definitions.

**ABB and the Plastics Industry**

ABB’s wide range of plastics robots can handle most of the tasks involved in and around injection mould machines, regardless of required cycle time or size of the machine. Together with our partners, we provide automation solutions for most manufacturing processes in the plastics industry.

**ABB Robotics**

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