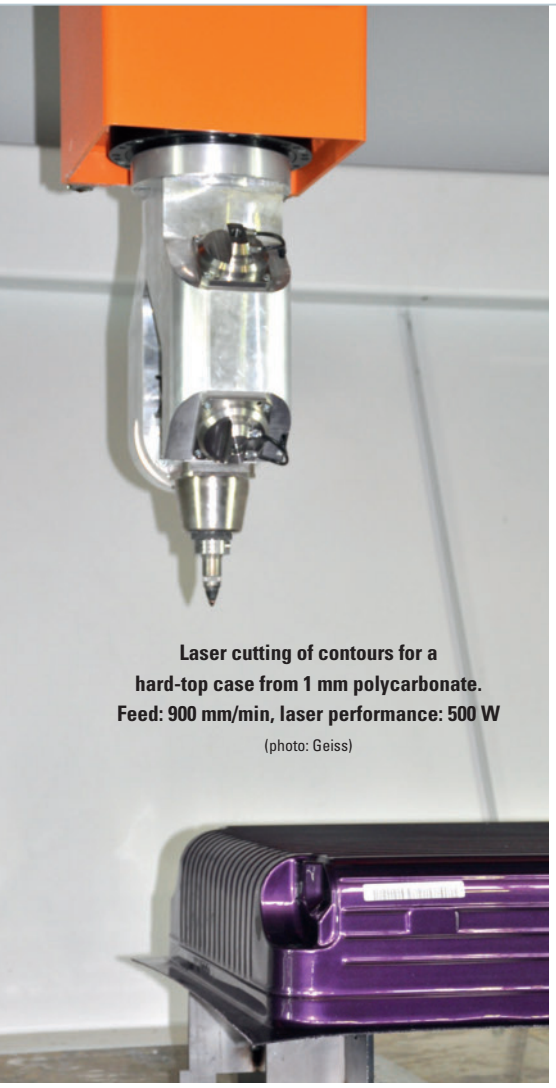

Laser cutting of contours for a hard-top case from 1 mm polycarbonate. Feed: 900 mm/min, laser performance: 500 W (photo: Geiss)

Light Forms Contours

Laser Cutting. Hitherto offering facilities for milling and ultrasonic cutting, Geiss AG in Sesslach, Germany, has recently introduced laser cutting as a third option of plastics processing on their CNC machines. In mid-December, the enterprise situated in Franconia presented the first such plant, developed and built in co-operation with laser specialist Trumpf GmbH + Co. KG, Ditzingen, Germany.

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With no finishing required, the plants can process thermoplastics such as ABS, PET, PMMA, PC, as well as polyolefines and composites, but also wood and glass materials with edges, in a polished quality. Further processing can be dispensed with. According to company information, this facilitates and accelerates non-contact cutting of workpieces. While causing no chips, laser cutting can be used for Class A workpieces, and to process components under cleanroom conditions.

Thin-walled Structures Processed with Precision

Unlike milling, laser cutting is also able to cut edges precisely at particularly small radiuses, and without causing burrs. CEO Manfred Geiss stresses another major application, and that is the processing of very thin workpieces of less than one millimeter thickness, which would be destroyed, if submitted to milling. This is due to the laser applying no pressure to the part which only needs to be exactly positioned – it does not have to be exactly stressed all-over. Manfred Geiss assumes that the application of very thin plastics will increase in the future, in order to reduce the weights of components and to save costs, not only in the automotive and aviation sectors. As an example, he quoted a polycarbonate sheet designed to cover a keyboard. It is currently milled out of a 0.5 mm material, but can be cut by laser from a 0.2 mm material in the future.

Cooperation Product

All of the Geiss AG's fully cased 5-axle and 3-axle CNC machines are suited for laser cutting, and are supplied, including the complete range of components, ready for operation. They are equipped with compact Trumpf TruCoax CO_2 lasers, with performances from 500 W to 5,000 W. The required gas is stored in an integrated tank, and is due to be sufficient for up to 30,000 machine hours.

Optical components such as mirror, lens and laser including cooling unit, are provided by Trumpf GmbH, which has worked together with Geiss for many years. The necessary exhaust system is supplied by Keller Lufttechnik GmbH + Co. KG from Kirchheim unter Teck, Germany. The machine frame, online control unit, and laser head come from Sesslach, which is where the plants are tailored to the respective customer requirements,

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and where the components coming from suppliers are integrated.

All over its production sector, the Geiss company relies on the principle of parametrics, which is why customers have free choice of size, degree of automation, and options of equipment for their machines purchased. The company uses its own software to automatically adapt each component and all dimensions, in case one variable is altered, which means that every machine leaving the Geiss works is virtually unique. To provide for this high degree of flexibility, the company uses no standard profiles. For the frames of their plants, they rather employ steel and aluminum sheets formed and tailored to the respective machine at their own factory. While machines are customized to the specific requirements, door-to-door times are short nevertheless, and the company is proud of the time from order to delivery being only six weeks. The company from Frankonia also developed a special laser head, which can be exchanged very easily. With its two hundredth millimeter precision in calibration, it can quickly be used after exchange. Geiss applies control technology based on the Siemens "Sinumetrik 840 D" units, which can be easily programmed by "teach in".

180 Meters per Minute

With its linear motors, the laser cutter accelerates by up to 15 meters per second, and reaches a feed maximum of 180 meters per minute. A "look-ahead" function detects irregularities automatically, correcting the feed independently, and controlling the required laser performance related to the cutting speed.

For special manufacturing requirements, e. g. cutting perforated sheets, there is a "high-speed" option available. With this function, the laser beam proceeds at constant speed, while the laser signal of cutting/no cutting is switched on and off. For small spaces, the laser head is available with an optional 90 degree reflector.

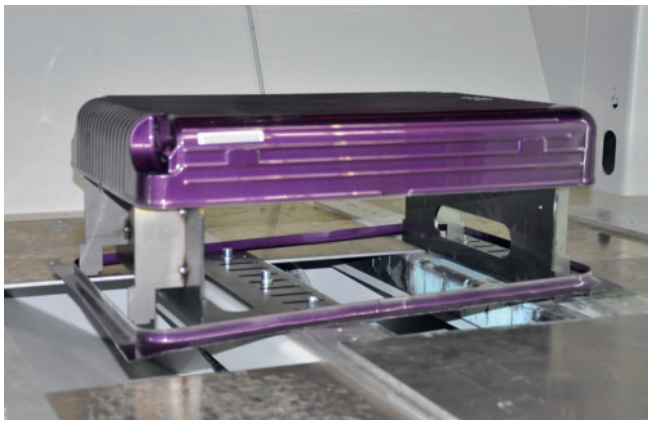
Unsuited for some Plastics

Laser cutting is not feasible for halogenated plastics. When cutting PVC, hydrogen chloride is produced, which leads to dioxin, when compounding with exhaust air. Also, for thick workparts – starting from approx. 15 mm, related to the type of material – the technique is applicable only to a restricted extent, because edges are not always cut properly.

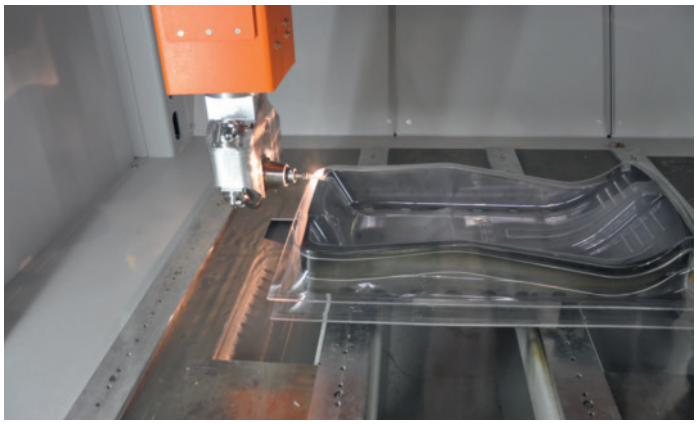
To avoid smoke residues and color changes when laser-cutting ABS, PET and PC, Geiss recommends to pre-heat the parts, cover them with a protective film, and suck the smoke right at the cut. Geiss offers potential customers to have their used materials tested on the laser cutting plant at the Sesslach site, to find out if they are suited for this technique.

Three to Four Machines per Year

According to sales director Klaus-Peter Welsch, the cost of the demonstration machine is approx. EUR 400,000. This is a capital investment significantly above the price for a CNC milling machine, which is available from only EUR 100,000. According to a cautious estimate by Welsch, the company expects three or four machines to be sold per year of this new laser cutting machine. By thus extending its range of products, the company wishes to offer customers comprehensive solutions for plastics processing. The enterprise's 150 employees reached approx. EUR 31 million turnover in 2008, with no more recent figures available. Geiss sees itself as a world market leader in thermoforming machines. Following company information, Geiss has sold roughly 650 of them to all continents – with 122 in 2008 alone – which the company had produced almost entirely on its own. CEO Manfred Geiss states that the new laser cutting machine is due to underline the company's claim to be among the top players of the plastics sector in terms of performance and precision. ■



Precisely cut edges: it takes the laser 69 seconds to cut the 2,480 mm contour



Laser cutting of contours for a sledge from 4 mm PMMA sheets, with 10,000 mm/min feed and 950 W laser performance

THE AUTHOR

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