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HIGH-SPEED LASER BLANKING

Task

The industrial series production of car body parts can reap great economical benefits when the metal blank is cut directly from the coil by means of a flexible laser cutting process, in comparison to a tool-based cutting one. These benefits include, in particular, investment costs savings for tools and their storage, the simple optimization or modification of the cutting contour in product development or conversion phases, and the flexible distribution and nesting of the production program. For high-productivity large-scale production, there are clear specifications regarding the cutting speeds and cutting qualities required in various coated and high-strength car body grades. Fraunhofer ILT assumed responsibility for creating a laser-based blanking plant for an automotive OEM; it designed the laser system and developed the cutting process.

Method

Using the customer's specification sheets, Fraunhofer ILT designed the system as to its beam power, beam quality and cutting optics on the basis of simulation calculations. It conducted an experimental demonstration of the feasibility on an appropriately laboratory system. By optimizing the nozzle design, the cutting gas parameters and the laser modulation characteristics, the institute ensured that the process could be applied reliably.

1 *Laser blanking plant.*

2 *High-speed cutting of car body sheet metal.*

Results

As a result, a robust process with high, burr-free cutting quality and cutting speeds of up to more than 100 m/min was qualified for the customer's entire body panel range. The system demonstrated impressively that punching processes can be replaced by laser cutting, something that has often been attempted in the automotive industry. 18,700 body parts are produced every day in this plant and, thus, the new system fulfills the user's expectations to the highest degree: tool-independent production, material savings, problem-free processing of even high-strength steels and the ability to change designs during ongoing production.

Applications

Thanks to this industrial development project, automobile manufacturers can cut blanks from coils with lasers with great flexibility and high productivity. Moreover, it has reached a status which enables manufacturers to economically produce mass products made of sheet metal materials in constantly changing variants. Since this system has higher laser power at a moderate cost, its technology is becoming increasingly interesting even for larger sheet thicknesses above 3 mm.

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