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PRESS RELEASE

Clean lungs thanks to laser process exhaustion

"CleanRemote" protects work environment against hazardous micro dust

(Dresden, June 18, 2019) In sectors such as the automotive industry, components can be processed at extremely high speed using the laser remote process. However, this can result in harmful emissions which may cause lung damage. Scientists from the Dresden Fraunhofer Institute for Material and Beam Technology IWS have studied the issue as part of the IGF research project "CleanRemote". They reduce particles and gases in the air by means of a suction device.

Mechanical engineering, shipbuilding, aviation – laser remote processing has been increasingly gaining ground in the industry for several years. Whereas in the past it was only possible to laser machine one part after the other, this process now allows parts up to one meter in size to be cut, welded, ablated or structured at different points virtually simultaneously. Nevertheless, although this works well, there is a problem: "The process operates with a high intensity of several kilowatts within a few seconds. This produces harmful emissions such as small particles and gases," explains Annett Klotzbach from Fraunhofer IWS in Dresden. As part of the IGF research project "CleanRemote", the Group Manager Bonding and Composite Technology has been working on the topic in recent years. Concrete results are now available.

Suction reduces health risks

With a particular suction device the risk for plant operators will be reduced. They are especially endangered when a production line is reloaded and therefore has to be opened. Particles can then escape and damage the operator's lungs. The research was initiated by the question in which direction the small particles move, hardly visible to the naked eye. "This can be quite different because some particles are larger than others. The large ones generate more kinetic energy and therefore fly higher," says Annett Klotzbach. In addition, the laser moves from one position to another within milliseconds by means of tilting mirrors, thereby complicating the calculations. "Our partners from the Chair of Inorganic Chemistry at TU Dresden have therefore developed a flow computer model to enable us to understand the particle trajectory.

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LASER World of PHOTONICS
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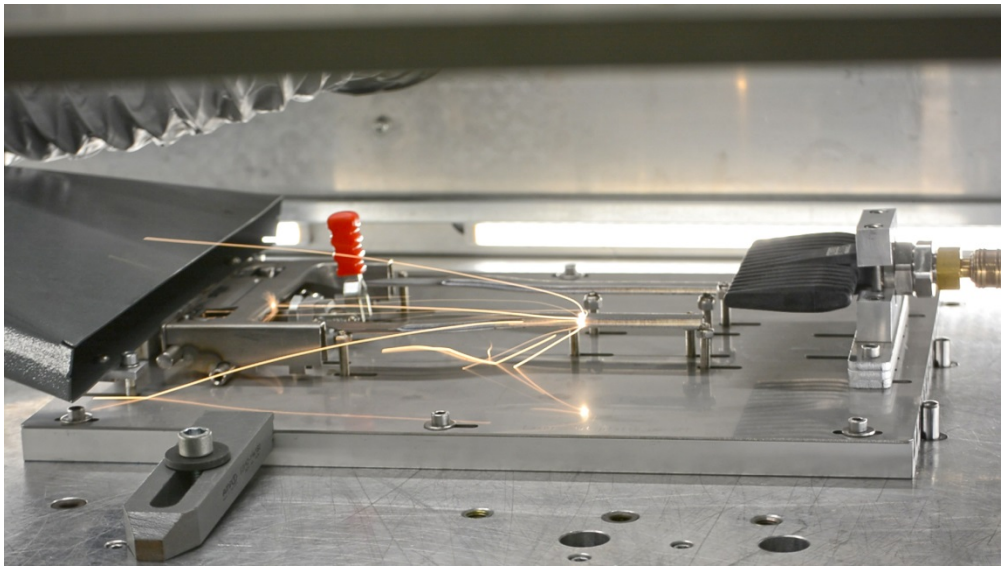
With this data, we finally optimize the suction devices," says Annett Klotzbach. In addition to specifically arranged suction hoods, the scientists also installed a so-called transverse jet. "For particles located far from the suction hoods, it is necessary to use such a device. They are blown from one side to the other and then sucked out." Residual soiling will also be removed by CO_2 snow blasting, explains the scientist.

Meet occupational safety and environmental protection requirements

Annett Klotzbach and her team have worked for two and a half years on the project together with the cooperation partner. The results will now benefit those industries, in which laser remote processing is of particular importance, for example in those cases, in which the steel frame of a car seat is welded or a metallic surface has to be cleaned and roughened in order to bond carbon parts. "Laser remote processing with high-performance lasers will continue to find its way into the market, especially among small and medium-sized companies. You can benefit from our research results in order to meet the requirements of occupational health and safety and environmental protection law in the best possible way," says Annett Klotzbach. In mid-June she will present the process to a specialist audience for the first time at the "LASER World of PHOTONICS" trade fair in Munich.



The laser remote system moves the laser beam at up to 10 m/s over the component. The metal surface is cleaned and provided with a groove structure. During subsequent thermal joining or injection molding, the plastic can penetrate into these grooves and anchor itself. This creates stable plastic-metal hybrid joints.
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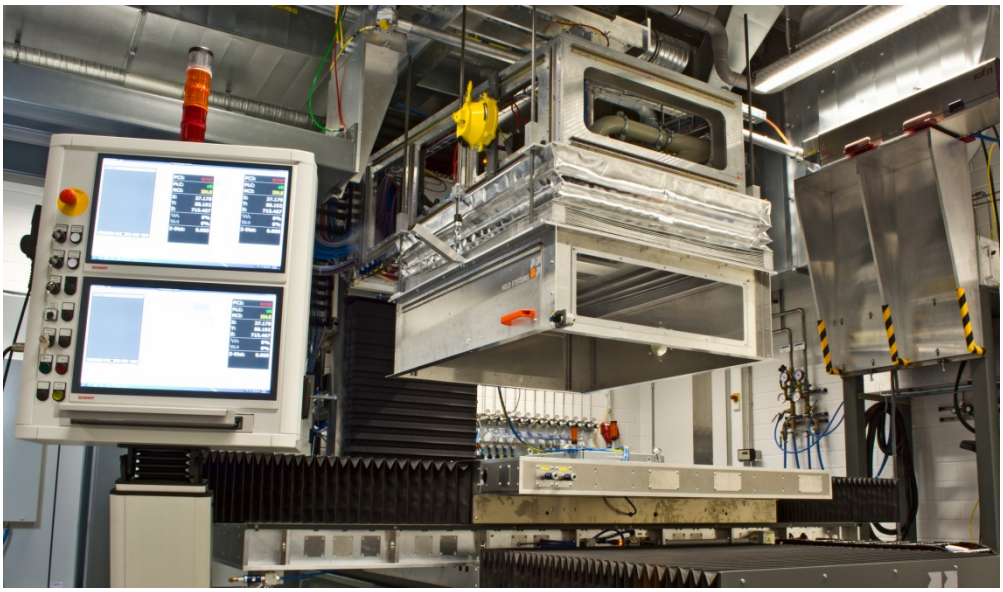

The Multi Remote System (MuReA) by Fraunhofer IWS welds, cuts and structures components on a large scale and productively with high-power lasers. The resulting particles and emissions are safely extracted. CO_2 snow blasting automatically cleans the machined surfaces directly after the laser process.
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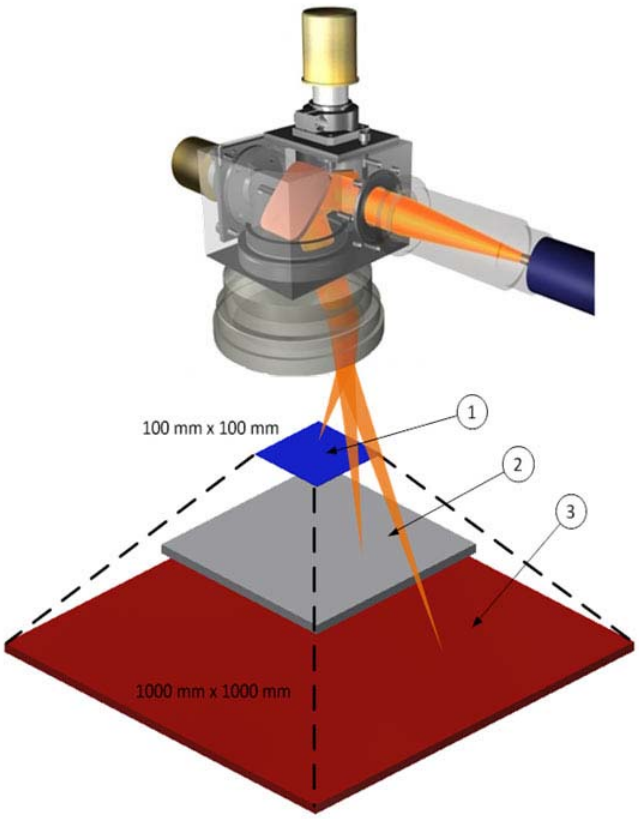

The laser remote system can be used for many applications: 1. Cutting of metal foils. 2. Welding of heat exchangers. 3. Structuring of surfaces.
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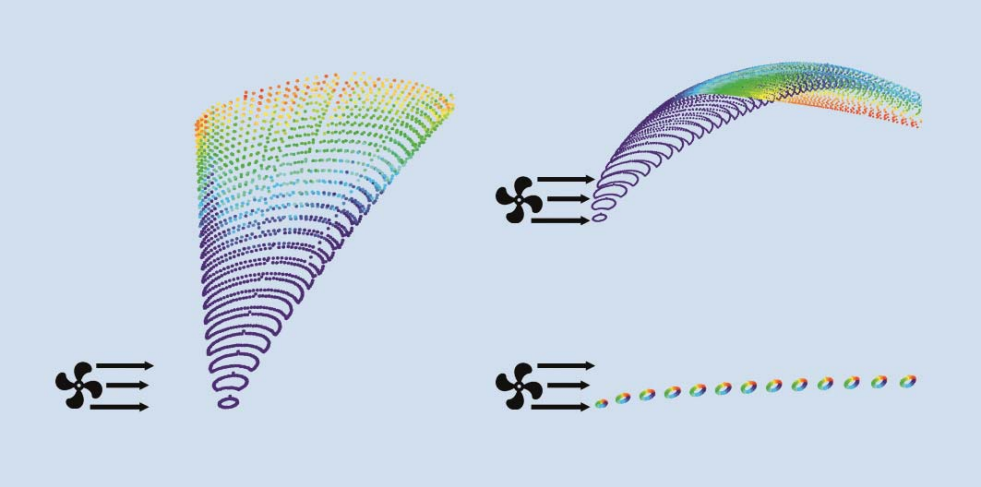

The emissions resulting from the laser remote process are composed of different particle sizes. Therefore, the particle trajectory is determined size-selectively at given flow conditions.
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