TORNADO POWER!

Mechanical engineering firm Bergmann & Steffen creates a mini whirlwind around the scanner optic, thus boosting the performance of remote laser welding.

What works twice as fast as a scanner optic? Two scanner optics. But when they weld side by side, one of them can easily blow traces of powder in front of the lens, thus disrupting the welding process. Normally, a crossjet blows a horizontal current of air perpendicular to the laser beam in order to keep the scanner's work area free from vapor and welding spatter. More and more often, however, we are seeing that the area to the left and right of the scanner unit is not occupied by empty space, but rather a second optic. Mechanical engineering firm Bergmann & Steffen has found an elegant solution to the problem of excess powder. And did so almost by accident, because they were actually working on something completely different.

EASING THE PRESSURE CEO Uwe Bergmann is one of the pioneers of remote laser welding. For 20 years now, he has been providing automotive suppliers with laser systems of this kind. And a thought has been preying on his mind the whole time: "The compressors for the crossjet consume too much energy. And this unnecessarily drives up the system's operating costs." Crossjets work at pressure levels of between 2.5 and 10 bar. "Over the service life of our systems, the compressed-air costs for our customers mount up." What's more, the crossjets still don't prevent every single splash from fogging up the optic, despite the energy-intensive airflows. As a result, the protective glass eventually becomes so dirty that it has to be replaced, which, of course, interrupts the production process and results in further costs. "All in all, I was of the opinion that it had to be possible to achieve better results at less expense," says Bergmann.

IN A SPIN In partnership with TRUMPF, Bergmann & Steffen spent three years examining the issue. The underlying idea is beautifully simple: instead of a lateral jet of compressed air from a compressor, a simple, ring-shaped swirl around the protective glass keeps excess powder at bay. Bergmann: "We have extensive experience of airflows in our systems." Therefore, it soon became apparent that the secret to solving the problem lay in a whirlwind. The system of airflows creates a mini tornado along the working axes of the optic, thereby diverting the spatter downward at the sides. Bergmann & Steffen aptly named their new product "Tornado Blade." And because the distance between the optic and the workpiece is considerable, a mere 0.3 bar is required to divert the excess powder.

GOOD NEIGHBOR "Our tornado ensures that the laser always operates in a clean environment. Not only are the weld results optimized, but we were also able to increase the processing speed, as the whirlwind encloses the working beam and thus keeps up with every movement of the optic," says Bergmann, explaining the benefits of the tornado, which is compatible with all TRUMPF scanner optics and can also be retrofitted. Moreover, it considerably increases the service life of the protective glass. And without even intending to, it also solves the problem of excess powder for neighboring optics. Thanks to the tornado, their work area is also kept free from powder residue. ■

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The circular jet around the optic generates a tornado-like swirl that encompasses the working beam. This keeps vapor and spatter away from the optic and facilitates a clean and speedy welding process.

"The compressed-air costs mount up. I was of the opinion that you could achieve better results with less expense."

Uwe Bergmann, CEO

Uwe Bergmann, CEO of mechanical engineering firm Steffen & Bergmann, based in central Germany, is one of the pioneers of remote laser welding.

Bergmann & Steffen provides automotive suppliers with remote welding machines. The system shown here welds seat structures and is one of the firm's best sellers.