

Huge potential for innovation

Bernd Burbaum has developed a revolutionary process for laser welding.

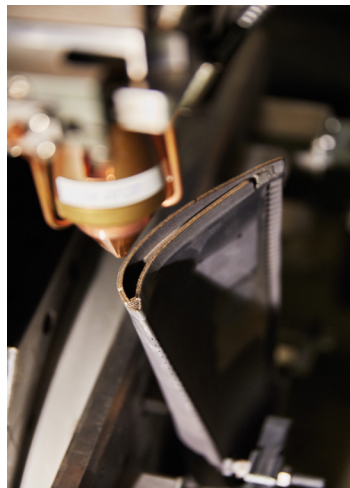
Lasers and everything about them have intrigued Bernd Burbaum since he was a kid. The Inventor of the Year award-winner in the Talents category developed a new laser welding process that makes it possible to repair expensive gas turbine blades so they are as good as new.

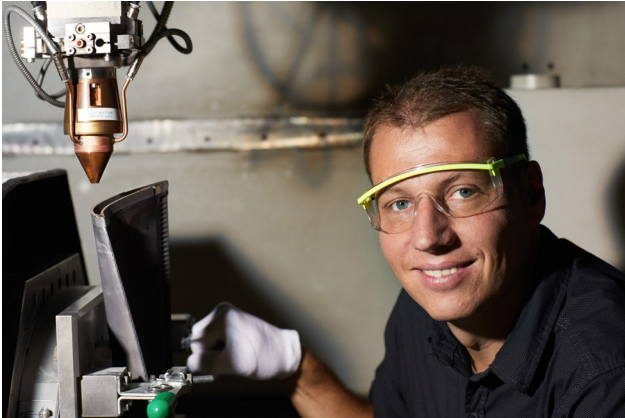
Burbaum, who works in Berlin at Power and Gas, sees a positive future ahead for laser welding: "New welding processes offer tremendous potential for innovation."



Dr. Bernd Burbaum

Advisory Key Expert in Berlin, Germany





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Inventor of the Year 2017

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The blades in the hot gas path of a gas turbine are not cheap: Each one costs around as much as a mid-sized car. As a result, innovative repair processes are very important. “We want to extend the life of each blade so it can play a role in producing energy for as long as possible,” the inventor states. During the time a blade does its job within the 1400-degree interior of a gas turbine, the wedge-side surfaces and the tips oxidize. This robs a turbine of its ability to function at full capacity. When this happens, affected blades are dismantled and then sent to Berlin. Once there, the blades are stripped – that is, the ceramic thermal insulation layer is removed – and then inspected for other damage such as cracks.

Damaged sections receive attention and are rebuilt with the help of laser cladding. As a development engineer, Burbaum is responsible for keeping abreast of new welding techniques and materials as well as for deciding which repair processes should be considered.

This work led him to develop a new approach to laser welding that offers many advantages over standard welding techniques: The blades don't have to be pre-heated to the standard 1000 degrees Celsius; instead, welding takes place at room temperature.

The newly developed process also makes it possible to boost the build-up rate even more, which, in turn, reduces the time needed for processing and, as a result, lowers costs for repairing each individual blade.

Using this welding process, more than 1,400 blades have been repaired so far. The inventor collaborated with the Fraunhofer Institute for Laser Technology in Aachen to develop the technique, which involves a particularly high-quality welding admixture.

Using a special laser-welding technique, this new type of material can be applied in such a way that the repaired sections are considered like new – that is, there is no loss of quality. Use of the process as the standard approach for repairing turbine blades is set to begin worldwide next year.

Dr. Bernd Burbaum studied mechanical engineering at RWTH Aachen University, majoring in manufacturing technology. He has already registered 431 inventions, 65 of which are patents protected in 162 patent families. “I get most of my ideas when I'm out jogging or working in the garden,” Burbaum says. He's a practical-minded person who loves all sorts of technical and manual challenges, which is why he likes to tackle repairs at home as well. “I just like to leave the heating system for the pros to take care of,” he explains with a grin. “Even if it, too, runs on gas.”

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