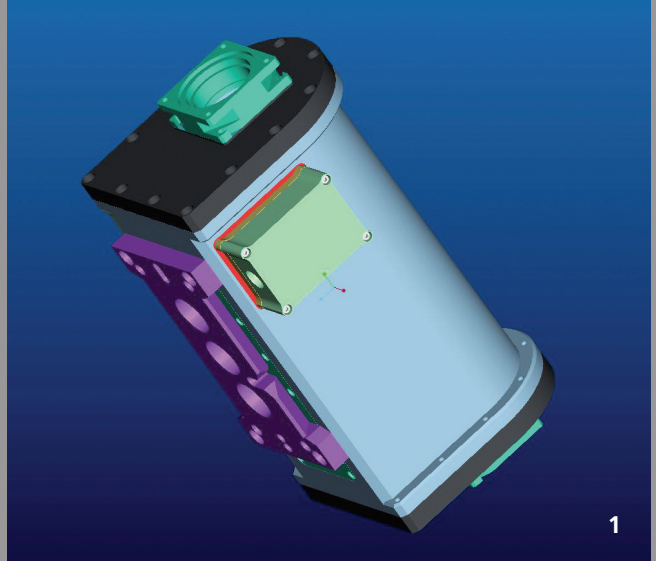

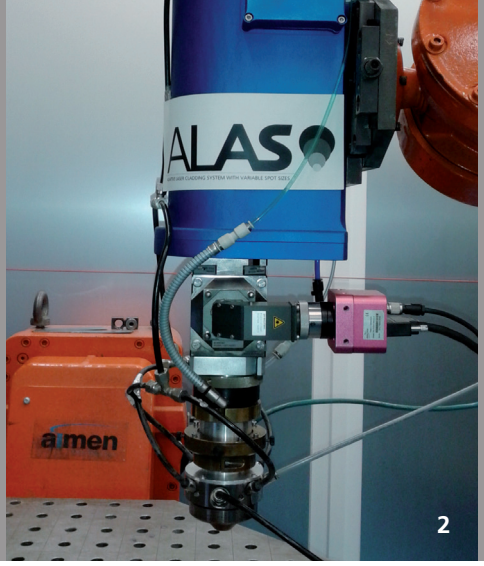

MODULAR ZOOM OPTICS

Task

Laser Metal Deposition has established itself as a process that can functionalize surfaces, repair and modify components and produce (generate) new parts. Its main areas of application encompass machine, tool, jet engine and motor construction. During this process, a material layer is created by melting the workpiece surface and the molten powder material. A variation of the track width during processing enables complex geometries to be built in a single track.

Method

For the controlled adjustment of the track width and thus the build-up rate, a modular optical zoom system has been developed. Via motor-controlled lenses, the laser radiation can be expanded in a stepless manner. At the same, the optical design allows the beam parameters to be preserved over the entire magnification range. This way, »top-hat« distributions of the laser power can also be used to adapt it to the tab width to be built. In contrast to beam expansion where the focus position is shifted relative to the workpiece, a targeted and defined energy input can be achieved and, thus, defined melting and cladding. The various components – such as collimation, beam splitter and focusing optics – can be easily adapted to the modular zoom optics, providing a clear advantage.

Result

With the modular zoom optics, a processing head can be easily built with existing beam guidance components for cladding with laser radiation; this head allows track width to be controlled or regulated dynamically during processing.

Applications

Among the areas of application include all activities in the field of cladding with laser radiation in which an adjustment of the track width is advantageous.

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1 CAD view of the zoom module.

2 ALAS prototype.

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