



## SUPPORT DESIGN FOR WET CHEMICAL SUPPORT REMOVAL OF LPBF COMPONENTS

### Task

A considerable manual effort is required to remove the supports needed in the laser powder bed fusion (LPBF) process, thus posing a major obstacle to the process' widespread use in series production. One approach to automate this is wet-chemical removal: The support structures are dissolved by means of a chemical etchant. For the supports to be removed completely, however, their design has to be adapted. According to the current state of the art, the support structures are essentially adapted to the LPBF process and not to potential post-processing steps. While vector supports (single scans) can be completely and quickly chemically dissolved, volume supports, which are essential for faultless production, can only be dissolved with a delay. To resolve this issue, Fraunhofer ILT has been testing porous volume supports, which are just as resilient as conventional solid volume supports, but can be dissolved as quickly as vector supports.

- 1 *Twincantilever with supports that have been wet-chemically removed (left: vector and porous supports, right: vector and conventional solid supports).*
- 2 *Prepared flat porous tensile specimens.*

### Method

Within the framework of an ongoing research project, Fraunhofer ILT has been investigating how various LPBF process parameters influence the porosity and strength of the supports. Moreover, it is examining the chemical material removal using the material AlSi10Mg. The results were then transferred to a supported component (twincantilever).

### Results

From the results, Fraunhofer ILT has identified LPBF process parameters allowing the production of porous supports that can be dissolved much faster and that have almost the same strength as conventional solid supports. By applying the results to a supported twincantilever, it demonstrated that the process parameters could be transferred to supported components.

### Applications

Due to the simple plant technology, the wet chemical process can be used both on a small scale and for industrial series production. Since the support design is easily adapted, the wet chemical support removal can be transferred to many applications and can, therefore, be made available to a wide range of industrial applications.

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