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Vibration-assisted additive manufacturing using electron beam

Description

In additive manufacturing of transformation free alloys (Cu, Al, Ti, austenitic steels), one often has to deal with excessive grain growth over large areas of the built structure, resulting in pronounced anisotropy and reduced mechanical properties. For conventional welding processes, there are studies that show that the grain size can be reduced by vibration of the workpiece during solidification.

In this master thesis, based on a literature study, a concept is to be developed to implement a vibration source into the electron beam machine. After the design phase, the necessary components are to be procured and implemented in the existing system. The functionality is to be demonstrated on test welds. In a follow-up work, the effect is to be investigated with systematic tests.

1. Literature research on mechanism and process variants
2. estimation of working parameters
3. design of an experimental setup
4. procurement of the elements
5. setup and integration into the existing electron beam welding system
6. functional tests and documentation
7. preparation of the master thesis and preparation of a publication

Organisation

Supervisor: Assoc.Prof. Dipl.-Ing. Dr.techn. Norbert Enzinger Enzinger, norbert.enzinger@tugraz.at
Duration: Sep. 2023; 6 months
Location: Joining group, Kopernikusgasse 24, 8010 Graz
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Weitere Informationen

For further information please contact the secretary of the institute or the supervisor.

Tel: +43 316 873 7181, office.imat@tugraz.at, <http://imat.tugraz.at>