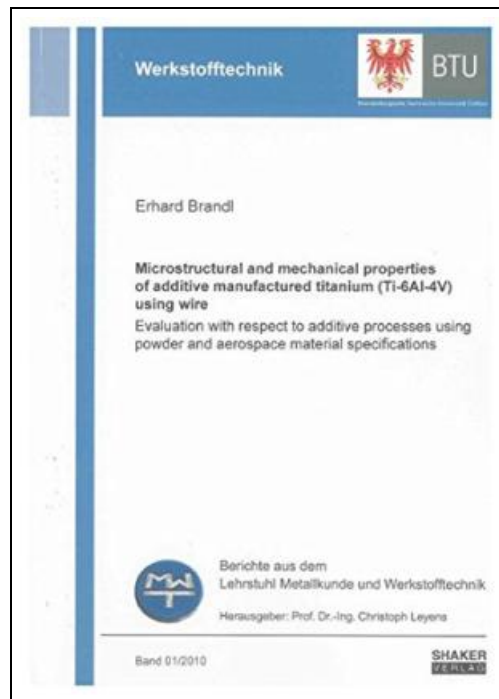


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Shaker Verlag Nov 2010, 2010. Buch. Condition: Neu. Neuware - Manufacturing components in a layer-by-layer fashion offers a high geometrical flexibility and great potential of time and cost savings in comparison to conventional manufacturing technologies. The technology is known under many names, such as rapid prototyping or additive (layer) manufacturing. Different processes offer possibilities for manufacturing components of polymers, metals, and ceramics. Additive processes are currently not used for the manufacture of serial production parts for space or aerospace applications. This is primarily due to outstanding issues regarding material properties and repeatability. Small and medium-sized parts made of titanium (Ti-6Al-4V) represent an interesting application in the future. Wire-feed deposition is discussed as a promising technology in this area. The generally lower contamination of wire than powder is an advantage regarding material quality. The technology seems to offer higher repeatability levels, due to its simpler process setup and operation. However, experience and development activities regarding wire based manufacturing of Ti-6Al-4V components are relatively limited to date. This thesis aims to address this point. Its focal point is comprehensive characterization of a specifically developed wire-feed deposition process using Ti-6Al-4V wire and a Nd:YAG laser. The process is discussed with respect to its feasibility for manufacturing aerospace components and with respect to powder based additive processes. Metallographic, electron microscopic, and chemical analyses as well as static tensile, high cycle fatigue, and fracture toughness tests are performed for this purpose. In general, wire-feed processes are suitable for the manufacture of aerospace components. However, the process parameters, post build-up heat treatment, and load direction should be adapted to the specific application. The substitution of presently cast parts with high cycle fatigue or fracture critical purpose may be beneficial applications. The advantages of the wire-feed technology, compared to the powder-based technology, are low contamination of the...



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