Selective Laser Melting of Hot Gas Turbine Components: Materials, Design and Manufacturing Aspects

Selective Laser Melting (SLM) allows the design and manufacturing of novel parts and structures with improved performance e.g. by incorporating complex and more efficient cooling schemes in hot gas turbine parts. In contrast to conventional manufacturing of removing material, with SLM parts are built additively to nearly net shape. This allows the fabrication of arbitrary complex geometries that cannot be made by conventional manufacturing techniques. However, despite the powerful capabilities of SLM, a number of issues (e.g. part orientation, support structures, internal stresses), have to be considered in order to manufacture cost-effective and high quality parts at an industrial scale. These issues are discussed in the present work from an engineering point of view with the aim to provide simple guidelines to produce high quality SLM parts.