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Mechanical properties of heat treated 3D printed semi-crystalline PEEK material

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Relatively new manufacturing processes such as 3D printing or additive manufacturing impose a set of thermos-mechanical influences on materials. These influences have neither been extensively studied nor reported in the literature. For high temperature semi-crystalline thermoplastic materials like PEEK (poly-ether-ether-ketone) these influences can be quite pronounced. The 3D printing of PEEK requires a strict definition of the processing conditions and parameters. One of the challenging aspects of the processing is the control of the temperature profile dominant in and around the printed part. This is especially important because the development of the crystalline phase in 3D printed PEEK part depends on the cooling rate of the melt during the printing process. A typical attribute of 3D printed parts is the structural discontinuities observable on the surface and in the vicinity of the deposited layers. To improve on the structural integrity of the printed part, some heat treatment is conducted on the part. In the current presentation, results for tempered 3D printed PEEK parts are presented. The mechanical properties as well as the microstructural state of the PEEK parts are reported and explained within the context of the tempering process.

Biography

Uwe Popp has completed his Diploma in Material Science and Engineering from the University of Stuttgart in 2012 and worked for two years at the Karlsruhe Institute of Technology as a Research Assistant. He is currently the Head of Research and Development at Apium Additive Technologies GmbH as well as one of the Founders of the company. He has participated in publishing more than 5 papers in reputed journals.

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