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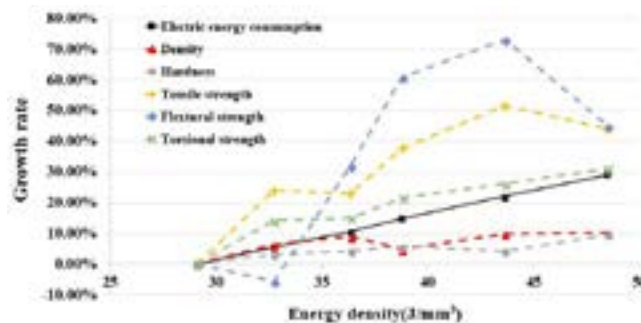
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Influence of processing parameters on the energy consumption and mechanical properties of selective laser melted parts

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In selective laser melting (SLM), processing parameters are of a great importance which affects the amount of laser energy absorbed by metal powders. On one hand, the mechanical properties of the processed part depend on them. On the other hand, processing parameters also affect power profile and scanning time, which directly relates to electrical energy consumption. In this research, we investigate the correlation between electrical energy consumption and mechanical properties and study whether electrical energy can be effectively reduced without significantly compromising mechanical properties by optimizing processing parameters. 316L stainless steel was used as powder materials. Two key parameters, laser power and exposure time, were selected and several mechanical properties, including density, hardness, wear resistance, tensile strength, flexural strength and torsional strength, were tested. The results of electrical energy consumption and mechanical properties were jointly analyzed using growth rate comparison. It was found that the improvement of various mechanical properties with increased electrical energy consumption differs greatly. Density can be effectively increased without significantly increasing the electrical energy, but the electrical energy needs to be greatly increased in order to achieve a high flexural strength. Growth rate three-dimensional maps of mechanical properties and electrical energy consumption are presented as a reference for processing parameter optimization.



Biography

Yi Zhu has completed his PhD in the year 2013 at the age of 29 years from Royal Institute of Technology. He is an associate professor in the department of mechanical engineering at Zhejiang University. He has published more than 25 papers in reputed journals and has been serving as an associate editor of Journal of Tribology.

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