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Mechanical Properties of 17-4PH Stainless Steel Parts Produced by DMLS

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Additive manufacturing (AM) is a type of manufacturing technologies where material is added layer upon layer in order to produce an object. This quality lets additive manufacturing stand out from traditional subtractive manufacturing technologies and opens up possibilities to create geometrically complex objects.

The most widely applied additive manufacturing technology for metal part production is a powder-based AM technology called Direct Metal Laser Sintering (DMLS) where metal powder particles are fused together by a laser beam. Microstructure and mechanical property characterization with consequent DMLS process optimization helps to overcome the weaknesses and extend its area of use [1].

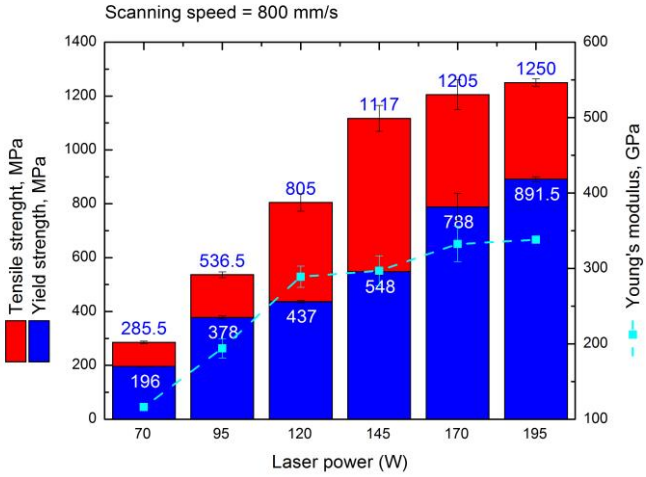

Fig. 1 Mechanical properties of specimens produced with a constant scanning speed.

Our study concentrated on the investigation of the mechanical properties of produced 17-4PH (stainless steel) parts using DMLS. The effect of the DMLS process parameters (laser power, scanning speed and energy density) on the ultimate strength, yield strength and Young's modulus was determined (Fig. 1). We showed an evolution of the microstructure. The detected defects were classified. This study allowed to determine the optimal regimes of DMLS for SS 17-4H and describe mechanical properties of the produced parts as well as helped to show future possibilities of DMLS development.

REFERNCES

[1] M.D.Viramgama, M.C.Karia. Study and investigation of influence of process parameters for selective laser melting. IJEDR4(1),pp. 578-585 (2016).