Laser Additive Manufacturing Processes for Near Net Shape Components

A. Riveiro, J. del Val, R. Comesaña, F. Lusquiños, F. Quintero, M. Boutinguiza and J. Pou

Abstract Laser-based additive manufacturing is a group of manufacturing processes widely used to produce three-dimensional near net shape components. Lasers can provide localized and controllable amounts of energy with the aim to cure a liquid photopolymer, to sinter or melt powders of different nature or even to cut laminates in order to obtain a physical model in the macro- or microscale. This work provides an overview on some major near net-shape manufacturing processes based on laser. Influence of the processing parameters, materials suitable for each one, and main advantages and current limitations of these techniques are reviewed for readers to understand and undertake research to establish the field further.

Keywords Additive manufacturing · Laser · Stereolithography · Selective laser sintering · Selective laser melting · Laser cladding · Laminated object manufacturing · Two-photon polymerization

1 Introduction

Several different manufacturing methodologies have been introduced in the industry during last decades with the aim of reducing productions costs. In this sense, the development of near net shape technologies address this paradigm through the minimization of processing steps. Different near net shape processes have

A. Riveiro (✉) · J. del Val (✉) · F. Lusquiños · F. Quintero
M. Boutinguiza · J. Pou
Applied Physics Department, University of Vigo, EEI,
Lagoas-Marcosende, Vigo 36310, Spain
e-mail: ariveiro@uvigo.es

J. del Val
e-mail: jesusdv@uvigo.es

R. Comesaña
Materials Engineering, Applied Mechanics and Construction Department,
University of Vigo, EEI, Lagoas-Marcosende, Vigo 36310, Spain