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Ingo F. F. Silva[✉], Pedro A. R. Rosa[✉], Ana R. Reis[✉]
and André M. P. de Jesus[✉]

INTECH, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal
arosa@fe.up.pt
IDMFC, Instituto Superior Técnico, Av. Rovisco Pais 1, 1049-001 Lisbon, Portugal

Abstract. Metal additive manufacturing is a trending type of manufacturing being increasingly investigated due to its numerous advantages, such as design freedom. Some challenges remain, namely the need to extend post-processing operations of the parts towards improved surface finishing, which in some cases only involve machining operations. In addition, it is not evident the compatibility of additive manufactured parts is adapted for machining operations. Therefore, understanding the machinability of additively manufactured materials leads to timely research. This paper presents research on metal cutting supported by orthogonal cutting operations, aiming to investigate the machinability of the additively manufactured Ti6Al4V titanium steel. Material build direction and tool rake angle were investigated. In order to investigate the material was tested for tensile purposes. Cutting force, specific cutting pressure, shear angle, thrust and chip geometry are evaluated according to Merchant theory. Despite the higher stresses and anisotropic behaviour of the additively manufactured metal used, their specific cutting pressure is more influenced by the mechanical condition than the geometric effect of the cutting tool rake angle.

Keywords: Additive manufacturing - Ti6Al4V - Machining test - Machinability - Specific cutting pressure

1 Introduction

It is well known as rapid prototyping, additive manufacturing (AM) has shifted its focus towards industrial applications rather than the development of prototype functional prototypes over the last decade. Originally limited to a group of polymers, it quickly evolved to metal processing. The current range of metallic material options expanded with the possibility of obtaining different geometrical features (ones of them impossible otherwise) has attracted the industry.

The compelling advantages of AM and its development as manufacturing process have contributed to the fact that most of the fabricated parts will serve as a functional