

Research on Relationship Between Cutting Conditions and Chip Formation during End Milling of Aluminium Alloy 6061

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Abstract. This paper studied chip morphology in end milling of aluminium alloy 6061 by various cutting parameter such as feed rate, cutting speed and depth of cut. Slot milling operation were conducted. The analysis consists of chip morphology, chip weight, chip thickness and chip length. Scanning Electron Microscope (SEM) were used to obtain and examine the chips. Result shows that, end milling with higher cutting speed, feed rate and depth of cut generated short, small and light weigh of chips.

Introduction

Aluminium alloy 6061 have been known of their machinability. They are widely applied in manufacturing aircraft, automobiles and marine due to its good strength, light weight and better corrosion properties. But, it exhibits inferior tribological properties in extensive usage [1].

During cutting process, almost all the energy is consumed for chip formation [2] and the flow stress. Chip morphology play a significant role in determining machinability for some material. Thus, this research focuses the prediction in optimizing end milling operation in studying the chip formation and also focuses the weight of chip formed. Fig 1 shows the correlation between the chip formation by considering chips length and chip thickness.

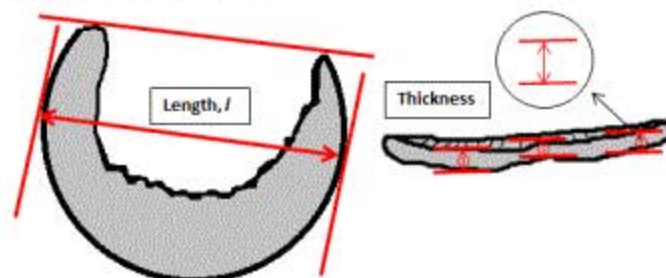


Fig. 1: Chip measurement

Experimental Set-Up

The operation will be conducted is slot milling operation towards a block of Al6061, with l of 120 mm, w of 40 mm and t of 10 mm and will be machined approximately 40 mm w with the selected DOC of 0.5 mm and 1.0 mm. The chemical compositions of work piece were listed in Table 1. The milling machine used is a Mazak Vertical Center Nexus 410A-II CNC milling machine. The type of milling operation was a slot milling. The cutting conditions and the tool are described in previous section. All measurements have been made three (3) times with the same method and the average value was considered.