

Taguchi Method for Parametric Appraisal of Wear on Micro-end-milling Tools with Different Coating

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Abstract

Experimental milling of Al alloy was performed to compare single edge rhombus micro-end mills. The purpose was to examine how various control factors affect tool wear. Examined control factors included coating layer, side clearance angle, feed rate and spindle speed. Taguchi method was applied to rapidly derive an experimental optimum combination of cutting parameters. During the milling test, depth of cut was fixed at 0.2 mm and width of cut at 0.50 mm to explore correlations among side clearance angle, feed rate, spindle speed and coating layer. Upon completing each milling test, the cutting-edge wear and flank wear were measured offline by the aforementioned tool microscope. The experimental results showed that, among the four control factors, side clearance was the most important factor in tool wear. Using TiCN-coated drill bits and setting side clearance angle at 12 degrees, spindle speed at 6000 rpm and feed rate at 0.0125 mm/rev minimized the wear on micro-end mills and maximized tool life.

Keyword : Dry milling, Taguchi method, micro-end-milling, tool wear, different coating