Investigation into Micro Machining Cutting Parameters of PMMA Polymer Material Using Taguchi’s Method

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Abstract

This paper applied Grey-Taguchi method to optimize the micro-drilling of PMMA polymer with multiple performance characteristics. The four parameters being optimized are coating layer, feed rate, spindle speed, and depth of cut. The performance of the drilling process was evaluated by two performance characteristics, namely drill wear and surface roughness. The orthogonal array, grey relational analysis, and analysis of variance were used to study the two performance indices. The optimal combination of parameters was determined by using the grey relational grade, a performance index formed by combining the two performance characteristics. The experimental results show that TiAlN-coating drills generate least wear and thus possess the longest tool life and the best holes quality. Finally, confirmation experiments were conducted to confirm the validity of the results.

Keyword：Micro-drilling, PMMA Polymer, Machine Vision, Taguchi Method, Grey Theory