

Article Abstract

Title:	Optimization of CNC end milling process parameters using PCA-based Taguchi method
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Abstract:	In order to build up a bridge between quality and productivity, the present study highlights optimization of CNC end milling process parameters to provide good surface finish as well as high material removal rate (MRR). The surface finish and material removal rate have been identified as quality attributes and are assumed to be directly related to productivity. An attempt has been made to optimize aforesaid quality attributes in a manner that these multi-criteria could be fulfilled simultaneously up to the expected level. This invites a multi-objective optimization problem which has been solved by PCA based Taguchi method. To meet the basic assumption of Taguchi method; in the present work, individual response correlations have been eliminated first by means of Principal Component Analysis (PCA). Correlated responses have been transformed into uncorrelated or independent quality indices called principal components. The principal component, imposing highest accountability proportion, has been treated as single objective function for optimization (multi-response performance index). Finally Taguchi method has been adapted to solve this optimization problem. The aforesaid methodology has been found fruitful in the cases where simultaneous optimization of huge number of responses is required.
Keywords:	CNC end milling, surface finish, material removal rate (MRR), principal component analysis (PCA), Taguchi Method