

OPTIMIZATION OF MACHINING FIXTURE LAYOUT CONSIDERING WORKPIECE DYNAMICS.

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ABSTRACT

Dimensional accuracy and surface quality of work parts depend on how firmly they are placed during machining. A fixturing system should ensure that during entire machining the workpiece is held in the desired position without any unwarranted motion, though infinitesimal. Additional dynamic effects of imposed cutting forces also affect the workpiece accuracy. Positioning of locators and clamps in a fixturing scheme affect the deformation of the workpiece during machining. In this paper an attempt is made to establish the position of these elements so as to minimize the workpiece motion. The finite element method (FEM) is used to model the equation of motion and a genetic algorithm (GA) is adopted to optimize the fixture layout with an objective of minimizing the elastic deformation of the workpiece.

KEYWORDS: Optimization, Workpiece Dynamics, Fixture layout, FEM, Genetic algorithm