

STATIC AND DYNAMIC ANALYSIS OF PORTAL MILLING MACHINE USING ANSYS WORKBENCH

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Rezumat. *Precizia de aschiere a unei masini-unelte este direct influentata de comportamentul static si dinamic al acesteia. Aceasta lucrare trateaza comportarea statica si dinamica a masinii de frezat portal. Structura masinii de frezat portal a fost modelata folosind software-ul CATIA, dupa care a fost importata ca fisier neutru in software-ul de analiza cu elemente finite ANSYS WORKBENCH 11.0. Initial s-a realizat analiza statica a masinii de frezat portal sub actiunea fortelor de aschiere, prin simularea modelului in diferite pozitii ale cursei traversei. In continuare, s-a trecut la analiza modala in scopul de a evidentia intervalul de frecvente in care precizia masinii-unelte este obtinuta.*

Abstract. *The cutting accuracy of a machine tool is directly influenced by its static and dynamic behavior. This paper treats the static and dynamic behavior of portal milling machine. The portal milling machine structure was modeled using CATIA software then imported as a neutral file in the FEA software, ANSYS WORKBENCH 11.0. First was made the static analysis of portal milling machine under the action of the three cutting force components, by simulating the model in various positions of the cross-beam stroke. In the second simulation, was performed a modal analysis in order to underline the frequency range in which the machine tool is obtained.*

Keywords: FEA, static analysis, modal analysis, cutting, frequency.

1. Introduction

Machine tools are characterized by high precision, even at heavy-duty regimes (high magnitudes of cutting forces). During the machining process, the portal milling machine has to bear static and dynamic loads [1].

Portal machine tool type have an important rate in establishing the relative displacement between parts and tool. Portal deformations are determined mainly by the columns bending. Portal machines, which enable up to five axes machining gain more and more significance in fields of mold and die production as well as in

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