

# **STATIC AND DYNAMIC ANALYSIS OF SPINDLE OF A CNC MACHINING CENTRE**

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## **ABSTRACT**

In any machining centre the spindle forms a vital component as it supports, holds and rotates the cutting tool. As such, the modeling and analysis of this part of the machining center is crucial for successfully designing and subsequently manufacturing them. The dimensional accuracy and surface finish of the work piece in machining operation are of particular interest and the manner in which the machine tool spindle influences these parameters is of great concern to the user. In the present work, an attempt has been made to study the static and dynamic behavior of spindle of a CNC horizontal machining centre using finite element analysis. The geometric model of spindle is created in UNIGRAPHICS software as per the drawing. This model is imported to HYPERMESH through IGES format and FEA model with converged mesh is developed. To this FEA model various loading conditions like static and dynamic analysis and operating conditions are applied using ANSYS to obtain the deflections and stresses. The deflection curves and mode shapes for various types of gear and cutting forces in its different speed ranges are presented. The outcome of this work can be used for CNC machining centers.

**KEYWORDS:** Finite Element Analysis, Spindle, Static Analysis, Dynamic Analysis