MECH/2023/03

COMPARITIVE STUDY OF VIBRATION IN SCREW AND SPRING SUPPORTED PRINTED CIRCUIT BOARD

A PROJECT REPORT

Submitted by

BILK EDISON.X	710419114013
NISHANDHAN.V. S	710419114044
PRAVEEN KUMAR.M	710419114050
VIGNESH C	710419114308

In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

CHRSIT THE KING ENGINEERING COLLEGE

COIMBATORE

ANNA UNIVERSITY: CHENNAI 600025

MAY 2023

Dr.M.JEYAKUMAR, M.E.,Ph.D
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

BONAFIDE CERTIFICATE

Certified that this project report **"COMPARITIVE STUDY OF VIBRATION IN SCREW AND SPRING SUPPORTED PRINTED CIRCUIT BOARD"** is the bonafide work of **"BILK EDISON.X (710419114013), NISHANDHAN.V.S (710419114044), PRAVEEN KUMAR.M (710419114050), VIGNESH.C (710419114308)"**who carried out the project work under my supervision.

SIGNATURE
Prof. R. HARI PRASATH
HEAD OF THE DEPARTMENT

Department of Mechanical Engg.,
Christ the King Engineering College,
Coimbatore–641104.

SIGNATURE
Prof. Mr.S.GIRIDHARAN
SUPERVISOR
Assistant Professor
Department of Mechanical Engg.,
Christ the King Engineering College,
Coimbatore–641104.

Submitted for the project viva voice held on 23/05/2023.

INTERNALEXAMINER

EXTERNALEXAMINER

Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

ABSTRACT

Vibration causes cracks in PCBs which leads to short circuits and other problems. To avoid those problemsthe vibration analysis of electronic assemblies that consists of an electronic box, printed circuit board and electronic components is presented. A detailed vibration analysis of a real electronic assembly is performed by Analysis Software.

In this project, the distinctness of vibration analysis of electronic control unit box assembly with spring and screw supported printed circuit board with electronic components are considered. A comprehensive longitudinal vibration analysis of a real electronic control unit box assembly is performed in simply supported condition with respect to structural type and modal analysis. Effects of component addition, board mounting, component modeling are investigated in detail.

In order to identify the most efficient, reliable and suitable method three different types of electronic box assemblies aremodeledto observe different dynamic characteristics. The validity of those model is computationally checked by comparing results with finite element solutiondepending on the type of problem, the natural frequency with which the system is vibrating. The maximum deflection of this model is solved by finite element solution using solver target as mechanical APDL in ANSYS software.

Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

CHAPTER 4

CONCLUSION

4.1 RESULTS AND DISCUSSION

In this project, the vibration analyses of electronic devices are performed in considering environmental working conditions. First of all finite element modeling is performed in order to understand the vibratory behaviour of a selected electronic system consist of rectangular printed circuit board with simply supported and fixed edges is developed.

An electronic assembly composed of electronic box, printed circuit board and components are modeled using reliable commercial finite element software, ANSYS. Natural frequencies and mode shapes are obtained from these analyses.

Effect of design and mounting of the electronic box is investigated. Importance of box rigidity in terms of vibration transmission to the PCB is observed. The effects of cover in electronic box design are examined and the effect of cover mounting on the dynamics of the system is presented.

One of the most important issues in finite element modeling of printed circuit boards is defining boundary conditions. The identification of PCB edge condition is very critical to have a reliable solution. Another important issue about PCB vibrations is component addition. Depending on vibration modes of a PCB, the location of component may affect the dynamics of the PCB. Especially, addition of large and heavy components may alter the dynamics, and therefore such cases should be analyzed in detail. Finite element solutions showed that attaching a component on a PCB decreases natural frequency and increases stiffness of the board in that region.