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MEC299

VIBRATION REDUCTION OF MECHANICAL STRUCTURE USING TUNED MASS DAMPER

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ABSTRACT

The final year project is about a study of the project student work on the tuned mass damper used in the mechanical structure to reduce the vibration. The project will create several design processes and create objectively based structures to obtain the results of this concept in the mechanical field. This project will also show some examples of how it works when high vibration is applied that will be tested in terms of vibration and durability. The goal of this research is to reduce vibration in specific cases where the vibration is quite high in the structure. The problem is to choose the type of tuned mass damper mechanism and sketch the best design for each structure that is subjected to heavy vibration. It is important to decide on a suitable design and build a solid design in order to solve the problem in vibrations. This project objective is to design a damping mechanism and to fabricate and test the performance. For the scope of work, this project limited to design, fabrication, and testing only. The project will be conducted for semesters 4 and 5 to finish the project. The time is taken for the vibration slow until its stop is around 20 seconds. The durability will be tested after making the project and the size will be constructed for 1meter length x 1-meter width x 1meter height for the tuned mass damper and building structure for this project product.

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CHAPTER 1
INTRODUCTION

1.0 Introduction

This project is about reducing vibrations in mechanical structures based on application studies of physics and control. The project will create several design processes and create objectively based structures to obtain the results of this concept in the mechanical field. The project is to observe the working concept of a tuned mass damper as a reduction of vibration in some mechanical structures. This project will also show some examples of how it works when high vibration is applied that will be tested in terms of vibration and durability in several studies on this project.

All of the resources for this project will be prepared by those who design and fabricate the project during the time given to make a proposal and produce the project with some material provided for the student. Students will select and use materials to produce projects based on needs and the machine can be accessed from the UiTM. The process will be conducted by students under the supervision in the making of fabricating and as a reference until finish the project.

1.1 Background of Study

The project is focused on the reduction in vibration using the concept of physics and dynamics. The goal of this research is to reduce vibration in specific cases where the vibration is quite high in the structure. The study gives more understanding by showing applications of how a tuned mass damper works. Damping is one of the mechanisms needed in the structure to avoid damage to the building from vibration and for other reasons. This project is very important because it can help structure to be more stable when there are forces applied in one building so that it can avoid or slow down the vibration from anywhere.

1.2 Problem Statement

The concept of a damping system is to understand how to reduce the vibration in various structures based on the project applications using tuned mass dampers that provide an explanation of how the damping mechanism works with all the structures, designed and tested the performance. The problem is to choose the type of tuned mass damper mechanism and sketch the best design for each structure that is subjected to heavy vibration. It is important to decide on a suitable design and build a solid design in order to solve the main problem, which is the harmful impacts of vibration such as building collapse, building damage, and extreme vibration. We need to choose the appropriate design for the structure so that it can be used effectively to reduce vibration and know the type of vibration that occurs in order to make a more suitable design.

1.3 Objectives

The main objectives of this project are:

1. To design a damping mechanism to reduce the vibration of the structure
2. To fabricate and test the performance of the damping system