UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

MATHEMATICAL ANALYSIS OF CRASH SENSOR USING SPRING MASS MODEL

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TABLE OF CONTENTS

ABSTRACT

In this project, mathematical analysis of crash sensor using spring mass model is presented. Laplace Transform method is used to derive the equation for displacement of beams from vibration equation. This project includes three types of material (steel, copper, and aluminum) with two different dimension of cantilever beam. From that, we will know the maximum response of beams so that we can conclude the best dimension of sensor to trigger airbag which is length=0.45m, breadth = 0.02m, and depth = 0.003m.

1 INTRODUCTION

In recent year, many cars are produced in our country and the demand also increased day by day. Automobile is very important because it will make us easy to move from another place to another. However, accident may happen if we don't have safety features like sensors, belt and so on. On a average, there are more than 6 million auto collisions on the streets of the US, every year. More than 3 million individuals get harmed because of car collisions, with more than 2 million of these wounds being permanent. There are in excess of 40,000 death because of auto crashes in every year. Therefore, the demand for auto safety features and better crash-rating systems has increased with the increasing number of crashes and the fatalities and injuries related to these crashes. Automobile manufactures have also begun incorporating more sophisticated technology into their designs. The introduction of pre-collision or collision avoidance system like sensor is one of the major developments that manufactures hope will reduce the number of injuries and fatalities on the road.

1.1 Research Backgroud

According to Fleming (2008), sensor are defined as devices that transducer physical quantities such as pressure or acceleration into electrical signals that serve as inputs for control. In the automobile field, these devices are all the more usually alluded as sensors. Sensor are essential components of automobile electronic control systems. Automotive sensors must fulfill a harmony between accuracy, robustness, manufacture ability, interchange ability, and low cost.

According to Pawlus, Karimi, & Robbersmyr (2010), vehicle users' safety is one of the important concerns of everyone who is involved in the automobile of industry. Industry are obligated to perform assortment of crash test for each new type of automobile which will show up on roads.