UNIVERSITI TEKNOLOGI MARA

DESIGN AND FABRICATION OF CRASH BOX AND ANTI PENETRATION PLATE FOR SAFETY PURPOSES FORMULA STUDENT RACING CAR

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Abstract

The abstract for a project on the design and fabrication of a crash box and anti-penetration plate for safety purposes in a Formula Student racing car highlights the objectives, which is to improve the overall safety of Formula Student Racing cars by enhancing the performance and reliability of crash boxes and anti-penetration plates. The problem that people faces is that current crash boxes and protective plates may not be sufficiently absorbing impact energy to avoid debris or objects entering a cockpit during an accident. This is a serious safety issue for the driver and, in consequence, does not lead to any major development of safety standards across F1 student racing. I have been planning and designing these crash box and anti-penetration plate since Final Year Project . The process of designing, material selection and other things are not done easily. In the end, the crash box and anti – penetration plate are done in Final Year Project 2. Eventhough I cannot test my product, I am sure it is good enough to be used in the car. This initiative not only enhances car safety but also takes into account environmentally friendly materials and disposal processes, coinciding with the global trend towards more sustainable automotive solutions.

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CHAPTER 1
INTRODUCTION

1.0 Background of Study

In the last few years, major attention has been paid to developing and installing crash shields and anti-collision plates on Formula Student racer cars for safety purposes. Formula Student Racing is an international competition in which engineering students are challenged to design, build, and race their own Formula style racing cars.

In motor racing, safety is always a major concern and Formula Student Racing has been no exception. A vital component of ensuring driver safety in case of an accident shall be crash cushions and barrier plates, which are essential for the protection of drivers. These elements are intended for absorbing the force of collision and preventing debris or objects penetrating the cockpit, in order to protect the driver from injury.

Factors such as impact absorption characteristics, weight and structure integrity must be considered when designing crash boxes. Various design approaches, including the use of hexagon honeycombs and composites, have been examined by researchers. The ability to absorb the energy during an impact has been demonstrated by hexagonal honeycomb structures, while composites have a favorable combination of strength and lightness.

In the same way, selecting materials and structures that can absorb impact forces while preventing penetrations is also part of the design of anti-penetration plates. Composite materials have been favored for their high strength-to-weight ratio and ability to resist penetration. Researchers have also studied the use of novel design techniques like additive manufacturing to create crash boxes and anti-penetration plates with complicated geometries and decreased weight.