

PROTOTYPE DESIGN COLLECTION

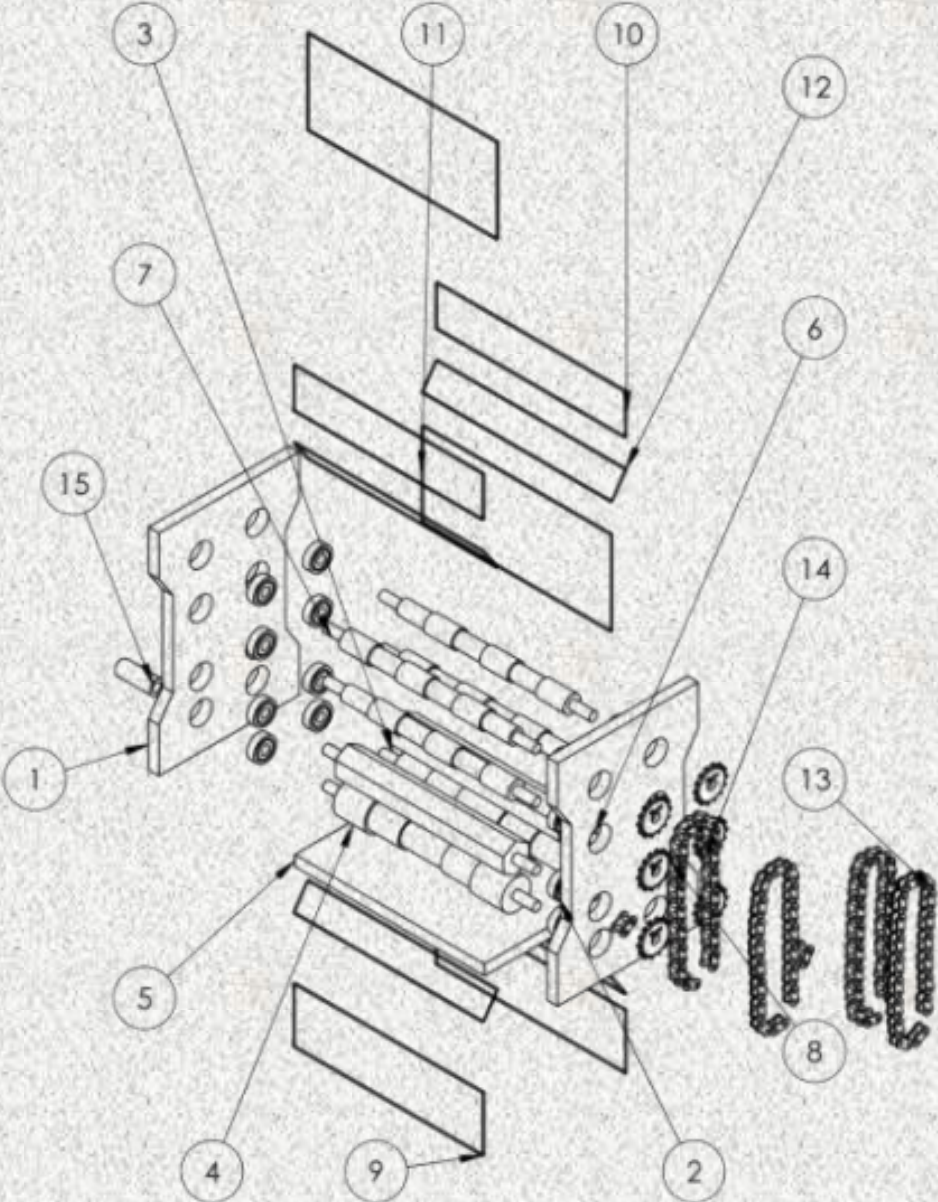
SERIES 4



Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



Ahmad Najmie Rusli

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Jalan Purnama, Bandar Seri Alam, 81750 Masai Johor.**

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CHIEF EDITOR:

Ahmad Najmie Rusli

EDITOR:

Nurul Nadiyah Rasdi

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FOREWORD

This digital book on Prototype Design Collection Series 4 (PDC Series 4) is published as a reference design for mechanical engineering students. The designs presented experience a few phases of analysis before fabrication of prototype. Each project summarises the project description, prototype, figures, and design parameter. The design products vary in tools or equipment for household, workshop, entrepreneur, etc. Suggested material and detail of prototype dimension are also mentioned in this book.

It is hoped that this book will assist the students to have more ideas on innovation design products in the future.

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CHAPTER 55

Design and Fabrication of Spoilers on A Formula Student Race Car

Muhammad Haziq Azizi Bin Noor Ikhsan ¹ and Hazim Sharudin ^{2*}

^{1,2}*Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*

**Corresponding author (e-mail): hazim@uitm.edu.my*

PROJECT DESCRIPTION

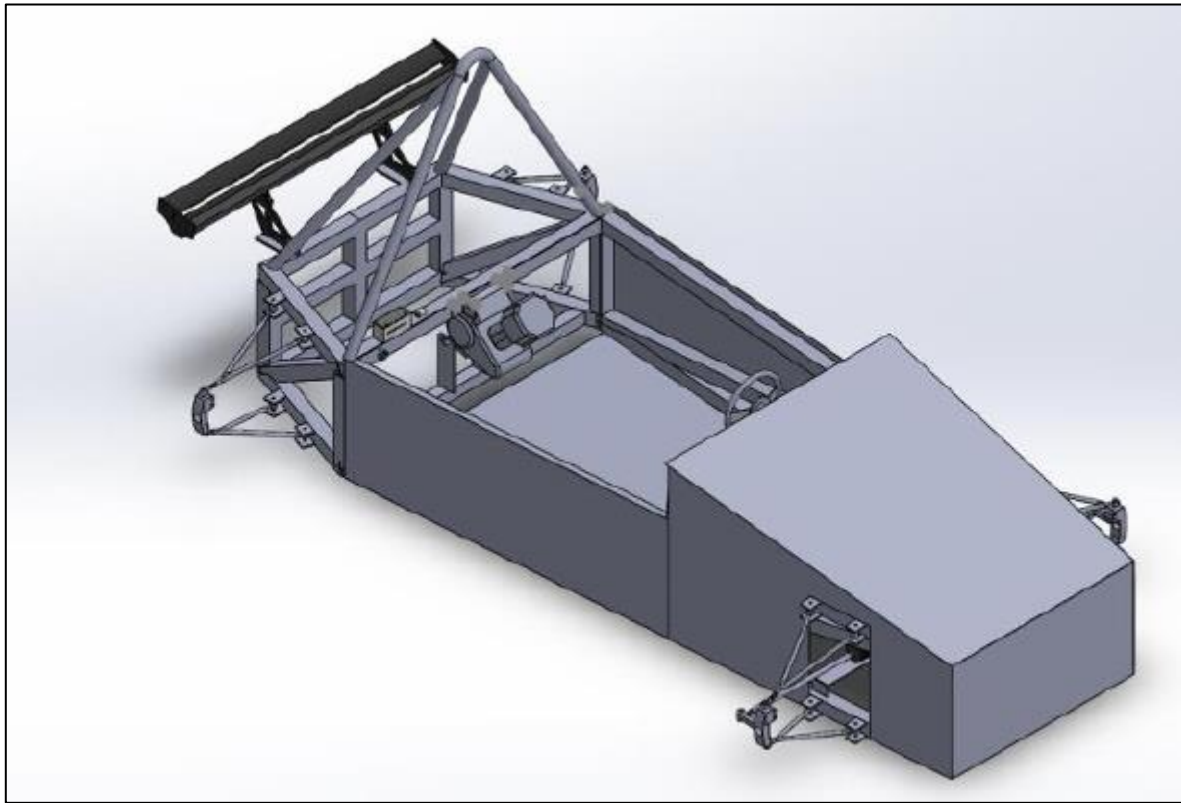
This study focuses on the aerodynamic analysis and design optimization of a spoiler and mounting bracket for a Formula Student race car. The challenge at hand is to develop an effective spoiler and mounting brackets for a Formula Student race car, with a limited budget and advanced knowledge and access to sophisticated machinery. This project aims to create a spoiler that, while budget friendly, incorporates a simplified yet efficient design. The task involves leveraging limited resources, combining advanced aerodynamic knowledge with innovative engineering techniques to craft a spoiler that enhances the car's performance while being cost-effective. Computational Fluid Dynamics (CFD) simulations testing is employed as methodologies to analyze the airflow, visualize flow patterns, calculate drag and lift forces, and validate the proposed design modifications. From the obtained results, it can be conclude that the aim of this project has been achieved, which is to create an efficient spoiler system for a formula student racing car that also adheres to the safety regulations and requirements. The spoiler system setup was managed to get done, but not perfect enough due to limited time and budget. This product also was successfully fabricated within the specification time given. This spoiler system will be improved in the future to achieve the better quality and performance if given the time for development.

Keywords: *Formula race car, Spoilers and Mounting Bracket*

PROTOTYPE



DESIGN PARAMETER



ITEM NO.	PART NUMBER	MATERIALS	QTY.
1	Lower Blade	Aluminium	1
2	Endplates	Aluminium	2
3	ISO 7380 - M6 x 20 - 20S	Stainless Steel	2
4	B18.3.4M - 6 x 1.0 x 20 SBHCS --S	Stainless Steel	6
5	B18.3.4M - 4 x 0.7 x 20 SBHCS --S	Stainless Steel	8
6	Pin Washer	Aluminium	8
7	Bracket Pin	Aluminium	8
8	B18.2.4.2M - Hex nut, Style 2, M4 x 0.7 --D-S	Stainless Steel	4
9	B18.2.4.2M - Hex nut, Style 2, M6 x 1 --D-S	Stainless Steel	4
10	Bracket Lower Blade	Aluminium	2
11	Upper Blade	Aluminium	1

NAME: MUHAMMAD HAZIQ AZIZI
STUDENT ID: 2021833694
CLASS: FYP 2
DRAWING TITLE: EXPLODED VIEW OF SPOILER ASSEMBLY
SCALE 1 : 2 SHEET 1 OF 1