

PROTOTYPE DESIGN COLLECTION

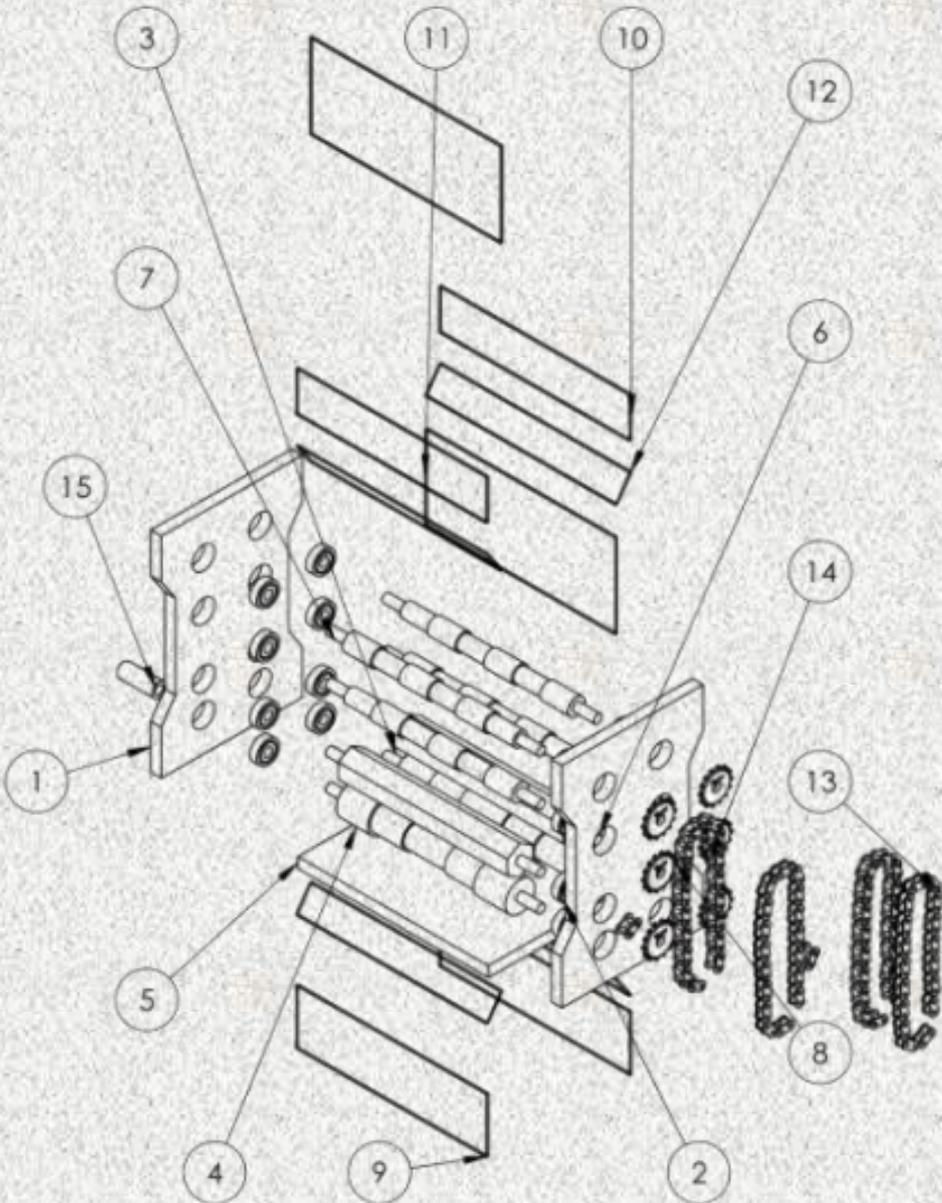
SERIES 4



Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



Ahmad Najmie Rusli

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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 12

Luggage Scooter

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PROJECT DESCRIPTION

The use of luggage is essential for travelers navigating airports, train stations, and urban environments. Conventional luggage, however, frequently presents logistical and ergonomic difficulties. Travelers frequently experience fatigue and inefficiency when transporting heavy bags across large transit hubs. Furthermore, the motorized luggage options currently available on the market are often prohibitively expensive and inaccessible to budget-conscious users. This study tackles these problems by designing and developing a motorized luggage scooter as an affordable and practical substitute. The aim of this project is to design and fabricate a prototype that combines a 38-liter luggage compartment with a small electric scooter. The methodology involves 3D modelling and structural simulation using SolidWorks, followed by rigorous engineering calculations to determine torque requirements and optimize gear ratios. Fabrication was carried out using MIG welding, precision drilling, threading and assembly, employing materials selected for their strength-to-weight ratio and affordability. The resulting prototype, powered by a 36V, 350W brushed DC motor, successfully demonstrated reliable propulsion, maneuverability and structural stability under a load of up to 100 kg. The prototype achieved all functional and economic objectives with a total production cost of RM383.73. In conclusion, the project confirms the feasibility of a low-cost, sustainable and ergonomically efficient rideable luggage solution, offering a practical and scalable alternative for last-mile mobility and short-distance travel.

Keywords: *Luggage Scooter, Low-cost*

PROTOTYPE



DESIGN PARAMETER

