

PROTOTYPE DESIGN COLLECTION

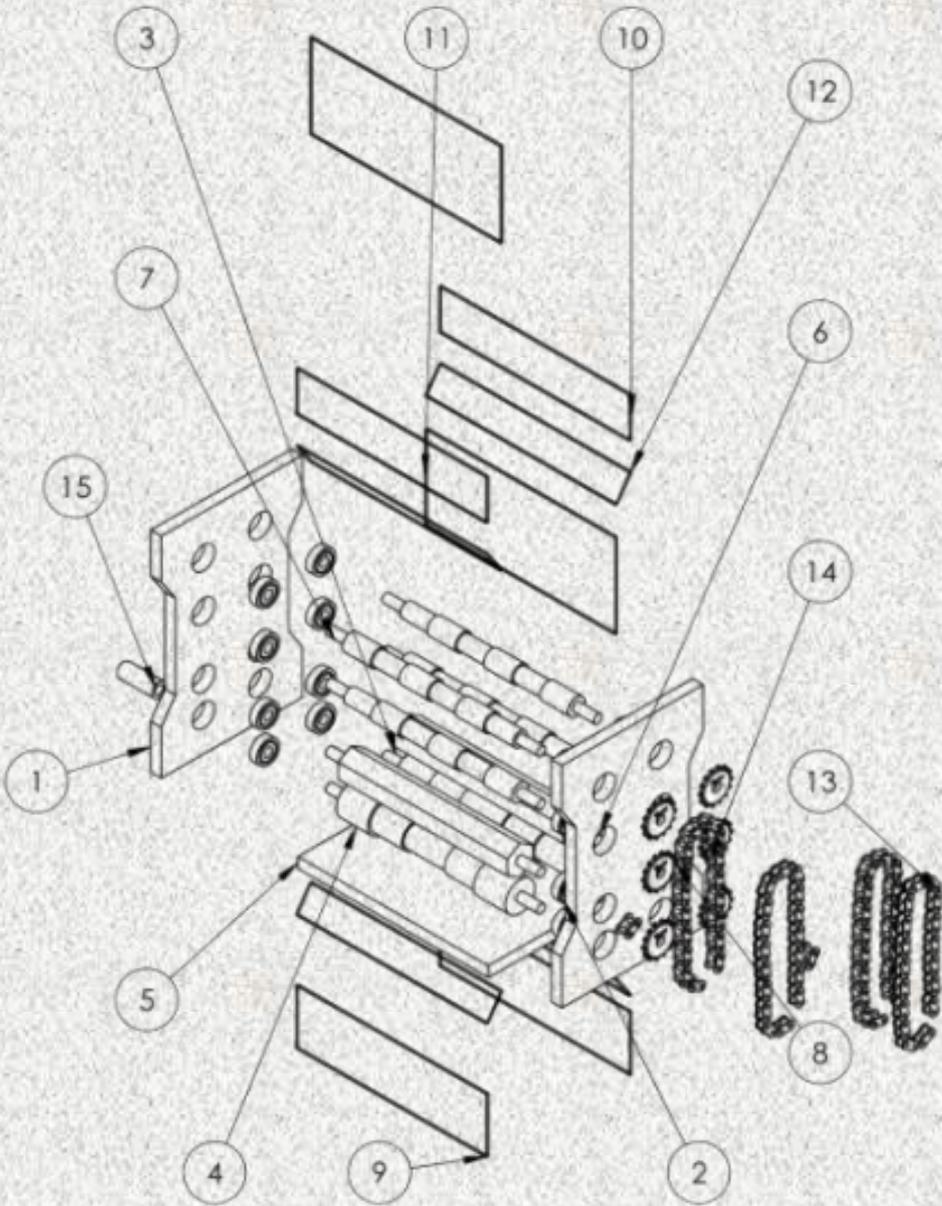
SERIES 4



Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



Ahmad Najmie Rusli

**Copyright © 2025 Universiti Teknologi MARA Cawangan Johor, Kampus Pasir Gudang,
Jalan Purnama, Bandar Seri Alam, 81750 Masai Johor.**

All rights reserved. No part of this digital book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the written permission of the Head of the Centre for Studies, Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus.

CHIEF EDITOR:

Ahmad Najmie Rusli

EDITOR:

Nurul Nadiyah Rasdi

PUBLISHER:

Universiti Teknologi MARA
Cawangan Johor Kampus Pasir Gudang,
Jalan Purnama, Bandar Seri Alam, 81750 Masai, Johor
September 2025

eISBN: 978-967-0033-62-4

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.

Ahmad Amsyar Zuhdi Bin Ahmad Rizal ¹ and Muhamad Faris Syafiq Bin Khalid ^{2*}	21
CHAPTER 12	23
Luggage Scooter	23
Muhammad Yazdane Zalhizra ¹ and Mohd Fadzli Ismail ^{2*}	23
CHAPTER 13	25
Coconut Grating Machine	25
Nur Aina Shamimi Shaiful ¹ and Mohd Fadzli Ismail ^{2*}	25
CHAPTER 14	27
Portable Hydraulic Bending Machine with Various Types of Shape	27
Mustafa Mohamad Salleh ¹ and Hazriel Faizal Pahroraji ^{2*}	27
CHAPTER 15	29
Design Concept of Semi-Automatic Barbeque Grill	29
Muhammad Afiq Najmi Sharudin ¹ and Hazriel Faizal Pahroraji ^{2*}	29
CHAPTER 16	31
Design Concept of Paper Shredder Machine	31
Muhammad Hakim Shamsulzairi ¹ and Hazriel Faizal Pahroraji ^{2*}	31
CHAPTER 17	33
Design and Development of Coconut De-Husking Machine	33
Muhammad Azreen Mohammad Shaharom ¹ and Abdul Hadi Abdol Rahim ^{2*}	33
CHAPTER 18	35
Design and Fabrication of 2-in-1 Sand Sieving Machine	35
Adam Mikhail Zulkharnain ¹ and Norjasween Abdul Malik ^{2*}	35
CHAPTER 19	37
Design and Fabrication of Automatic Cat Litter Box	37
Adam Mikhal Masrol ¹ and Norjasween Abdul Malik ^{2*}	37
CHAPTER 20	39
Design and Fabrication of 2-In-1 Convertible Chair-Ladder	39
Arif Haiqal Bin Roslan ¹ and Mohd Ghazali Mohd Hamami ^{2*}	39
CHAPTER 21	41
Mini Robotic Arm for Educational Purpose	41
Muhammad Raziq Hudzaifah Mohd Razali ¹ and Wan Muhammad Syahmi bin Wan Fauzi ^{2*} ...	41
CHAPTER 22	43
Design and Fabrication of an Automated LED Bulb Replacement Device	43
Aiman Haikal Bin Mohd Nizam ¹ and Miqdad Bin Khairulmaini ^{2*}	43
CHAPTER 23	45

CHAPTER 18

Design and Fabrication of 2-in-1 Sand Sieving Machine

Adam Mikhail Zulkharnain ¹ and Norjasween Abdul Malik ^{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): norjasween@uitm.edu.my*

PROJECT DESCRIPTION

Sand sieving is a crucial process in construction, manufacturing, and other industrial applications where fine and coarse particles must be separated to ensure optimum material used. Conventional sieving methods, which often rely on manual labor, are time-consuming, inefficient, and physically demanding. Thus, this project aims to design and fabricate a 2-in-1 sand sieving machine, which integrates both manual and motorized operations to enhance efficiency and flexibility. The combination of manual and automated sieving mechanisms makes the system cost-effective, reducing labor thus improving productivity. This machine operates using a roller sieving mechanism, where a rotating cylindrical sieve filters sand particles based on size. As the roller rotates, finer sand particles pass through the mesh while larger impurities are separated, ensuring high-quality sieved sand. In manual mode, the user rotates the roller by hand, while in motorized mode, an electric motor drives the roller, automating the sieving process for improved efficiency and reduced labor effort. For the fabrication part, the process involves designing the product, selecting raw materials, and shaping them through machining and forming.

Keywords: *Sand Sieving, Sieving*

PROTOTYPE



DESIGN PARAMETER

Technical drawing showing front, side, and detail views of a 2-in-1 and sieving machine. Dimensions are 1000.00 and 600.00. A detail view shows a diameter of $\phi 404.80$.

NAME : ADAM MIKHAIL BIN ZULKHARNAIN
STUDENT ID : 2022832418
TITLE : DESIGN AND ANALYSIS OF 2 IN 1 AND SIEVING MACHINE
PART NAME : ASSEMBLY OF ALL PART
PART NO : 10
SCALE : 1:20
SHEET : 10

Exploded view assembly drawing of the 2-in-1 and sieving machine. The drawing shows 10 numbered parts. A parts list table is provided:

ITEM NO.	PART NUMBER	QTY.
1	PART 1 (Stable)	1
2	Support Rod	2
3	Part6 (Collector)	1
4	ROD PANJANG	1
5	4 branch yang baru	2
6	Part 1 news	1
7	puller	1
8	penahan kain	2
9	tulang bulat mid	1
10	motor	1

NAME : ADAM MIKHAIL BIN ZULKHARNAIN
STUDENT ID : 2022832418
TITLE : DESIGN AND ANALYSIS OF 2 IN 1 AND SIEVING MACHINE
PART NAME : EXPLODE VIEW ASSEMBLY
PART NO : 11
SCALE : 1:20
SHEET : 11