

# PROTOTYPE DESIGN COLLECTION

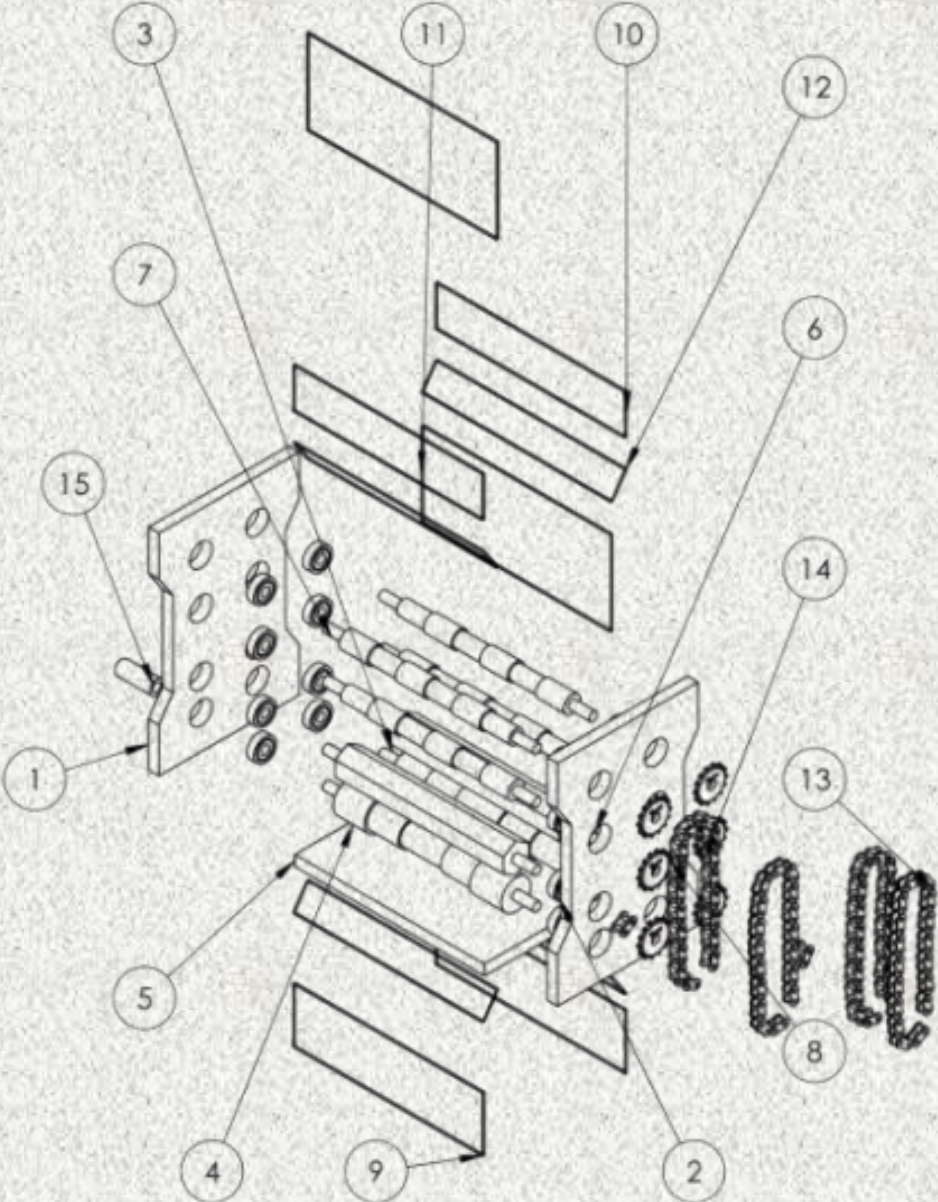
SERIES 4



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.

## Table of Contents

<b>CHAPTER 1</b> .....	1
<b>Design and Fabrication of a Multipurpose Baby Cot</b> .....	1
Nabil Qayyum Bin Roslan <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	1
<b>CHAPTER 2</b> .....	3
<b>Design and Fabrication of a Weather Sensing Cloth Drying Rack</b> .....	3
Mustaqim Syah Bin Kamarul Zaman <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	3
<b>CHAPTER 3</b> .....	5
<b>Design and Fabrication of a Patient Transfer Aid for Seamless Bed to Wheelchair Mobility</b> ..	5
Fateen Aqela Binti Azzaidi <sup>1</sup> and Miqdad Bin Khairulmaini <sup>2*</sup> .....	5
<b>CHAPTER 4</b> .....	7
<b>Prototype of a Donut Topping Machine</b> .....	7
Nurul Athirah Binti Ramizan Nassir <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	7
<b>CHAPTER 5</b> .....	9
<b>Prototype of a PLA Filament Extruder</b> .....	9
Abdul Harith Hazim Bin Abd Rashid <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	9
<b>CHAPTER 6</b> .....	11
<b>Prototype of a Candy Sorting Machine</b> .....	11
Hairul Ikhwan Bin Hazizan <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	11
<b>CHAPTER 7</b> .....	13
<b>Prototype of a 3D Printing Scrap Recycling Machine</b> .....	13
Raziq Amir Bin Rosdi <sup>1</sup> and Ahmad Najmie Rusli <sup>2*</sup> .....	13
<b>CHAPTER 8</b> .....	15
<b>Manual Compaction Machine for Casting</b> .....	15
Muhammad Hazim Md Azli <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> .....	15
<b>CHAPTER 9</b> .....	17
<b>Convertible Cart-Ladder</b> .....	17
Mohamad Aimi Zuhairi Fikri Mohd Aimi Zamani <sup>1</sup> , Najibah Ab Latif <sup>2*</sup> and Ainaa Maya Munira Ismail <sup>3</sup> .....	17
<b>CHAPTER 10</b> .....	19
<b>Design and Fabrication of Mini Firefighting Device</b> .....	19
Adam Faris Bin Ahmad Zaidy <sup>1</sup> and Muhamad Faris Syafiq Bin Khalid <sup>2*</sup> .....	19
<b>CHAPTER 11</b> .....	21
<b>Design and Fabrication of Shuttlecock Launcher Machine</b> .....	21

## CHAPTER 40

### Design and Fabricate Mini Lathe Machine

Nik Daniel Haziq Bin Nik Azman Abadi <sup>1</sup> and Ab Aziz Bin Mohd Yusof <sup>2\*</sup>

<sup>1,2</sup>*Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*

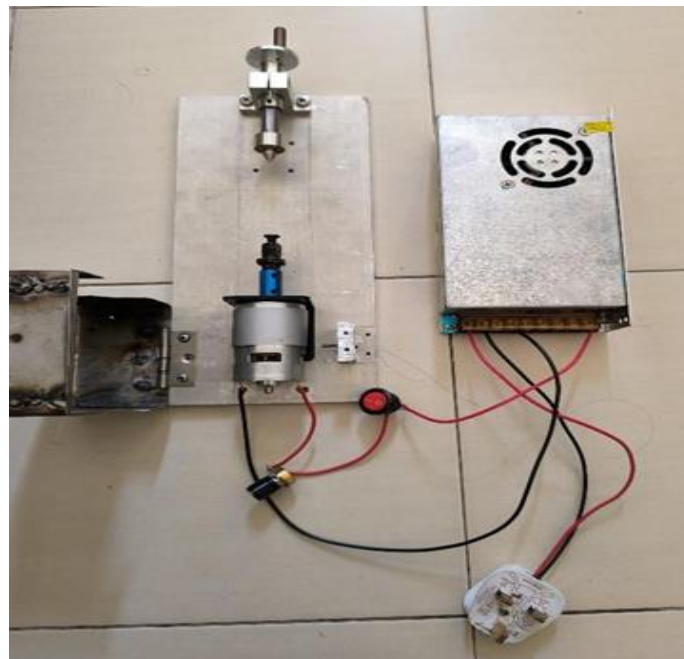
*\*Corresponding author (e-mail): abaziz86@uitm.edu.my*

#### PROJECT DESCRIPTION

Lathe machines are commonly used in workshops for various machining operations such as cutting and turning, with different types including CNC, engine, and bench lathes. These machines consist of three main components: the headstock, tailstock, and bed. A key challenge in this project is designing the bed of a mini lathe machine, as it must be sufficiently heavy to stabilize the structure and prevent excessive shifting. The machine will be designed specifically for machining wood, which is softer and easier to shape than metal but produces significant waste in the form of shavings and dust. The project has two main objectives: first, to design a prototype of a mini lathe machine using SolidWorks, and second, to fabricate the machine based on the developed design. Engineering analysis will identify high-stress areas and determine the factor of safety, while detailed design drawings will provide a clear visualization of the machine's components and assembly.

**Keywords:** *Design and fabrication, Mini lathe*

#### PROTOTYPE



**DESIGN PARAMETER**

