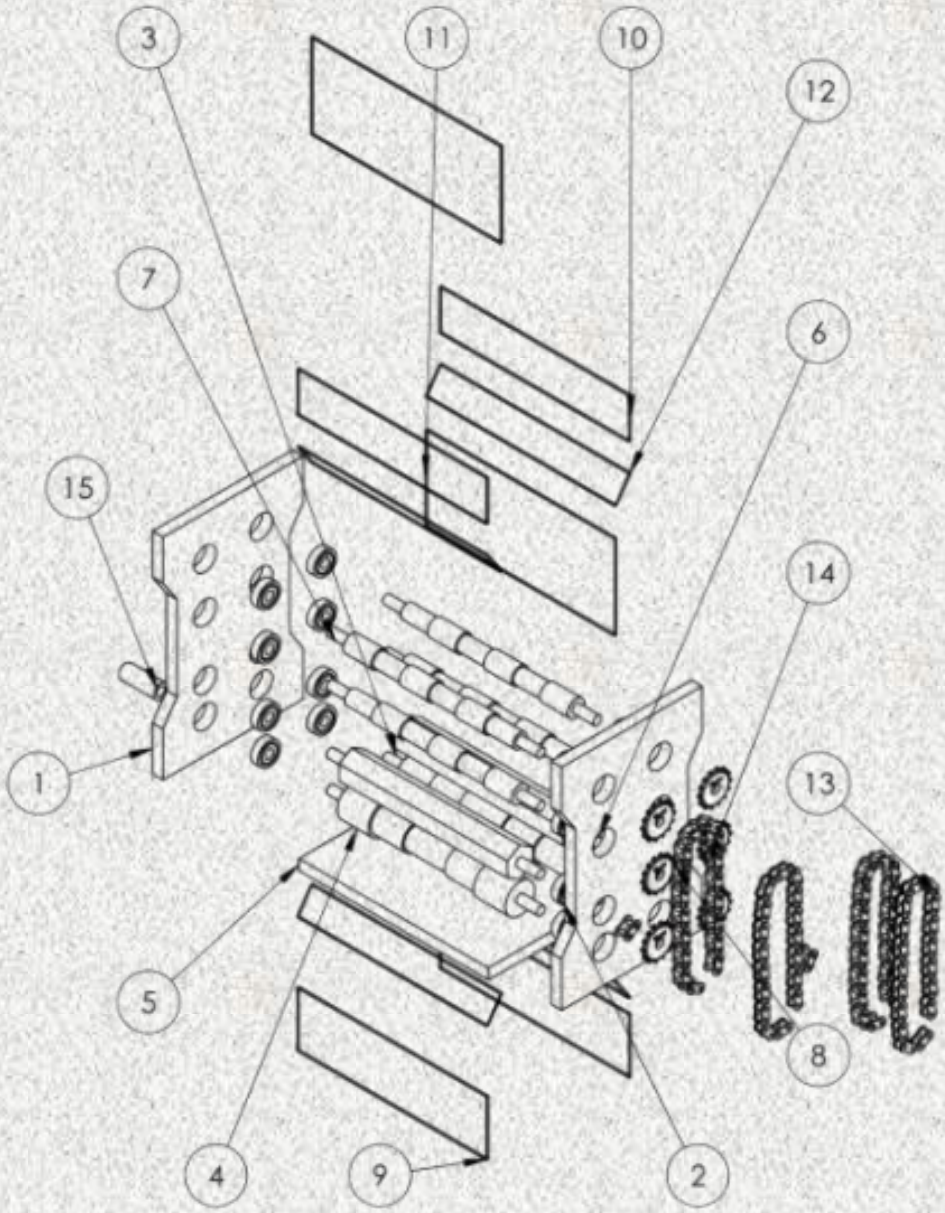
PROTOTYPE DESIGN COLLECTION

SERIES 4

Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



Ahmad Najmie Rusli

CHIEF EDITOR:

Ahmad Najmie Rusli

EDITOR:

Nurul Nadiah 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

e-ISBN: 978-967-0033-62-4

CHAPTER 5

Prototype of a PLA Filament Extruder

Abdul Harith Hazim Bin Abd Rashid [1] and Ahmad Najmie Rusli [2*]

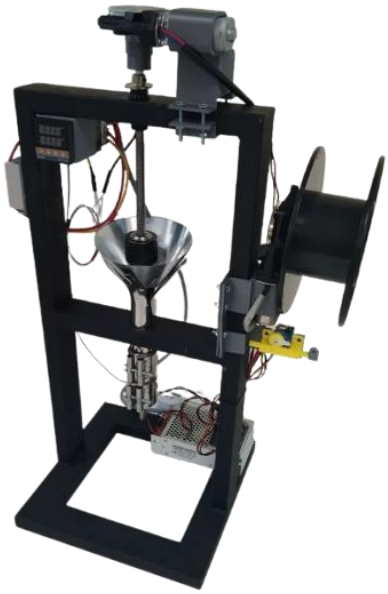
[1,2]*Faculty of Mechanical Engineering, Universiti Teknologi MARA Johor Branch, Pasir Gudang Campus, 81750 Masai, Bandar Seri Alam, Johor Darul Ta'zim.*
**Corresponding author (e-mail): ahmad7586@uitm.edu.my*

PROJECT DESCRIPTION

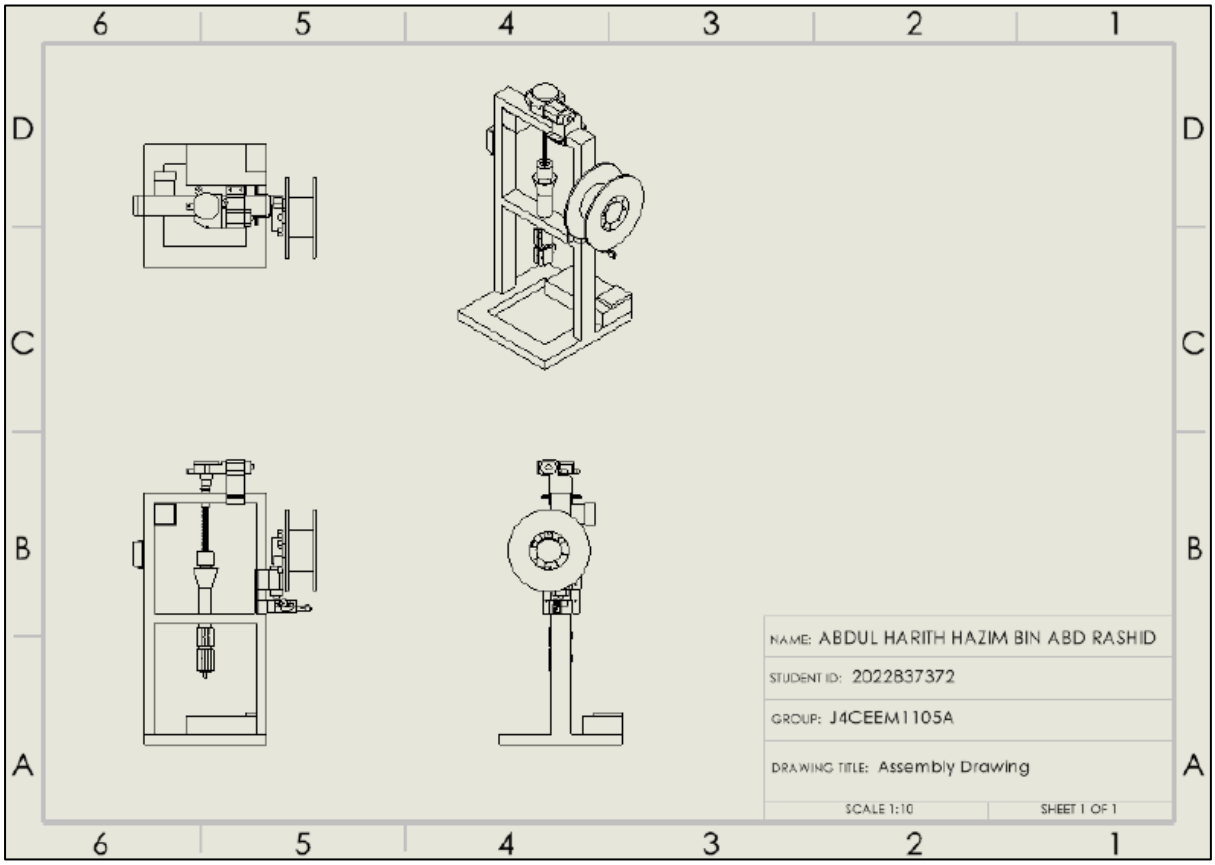
This project aims to design, develop and fabricate a low cost prototype of a PLA filament extruder as a proof of concept. The extruder features a horizontal extrusion process and is equipped with a heating element controlled by a temperature controller to ensure consistent melting. A 12V DC motor is used to regulate the extrusion speed providing better control over filament quality. The system is designed to produce filament with a uniform diameter of 1.7mm. The design process involves studying existing models, redesigning using computer-aided design (CAD) software and performing mechanical and electrical fabrication. This project promotes sustainability, reduces filament cost and makes filament recycling accessible for home users. The goal is to produce a compact, affordable and functional filament extruder that supports sustainable practices, reduces filament costs and increases accessibility for personal or small scale use. This prototype could significantly contribute to eco friendly 3D printing and promote responsible material usage within the growing community of 3D printing enthusiasts and professionals.

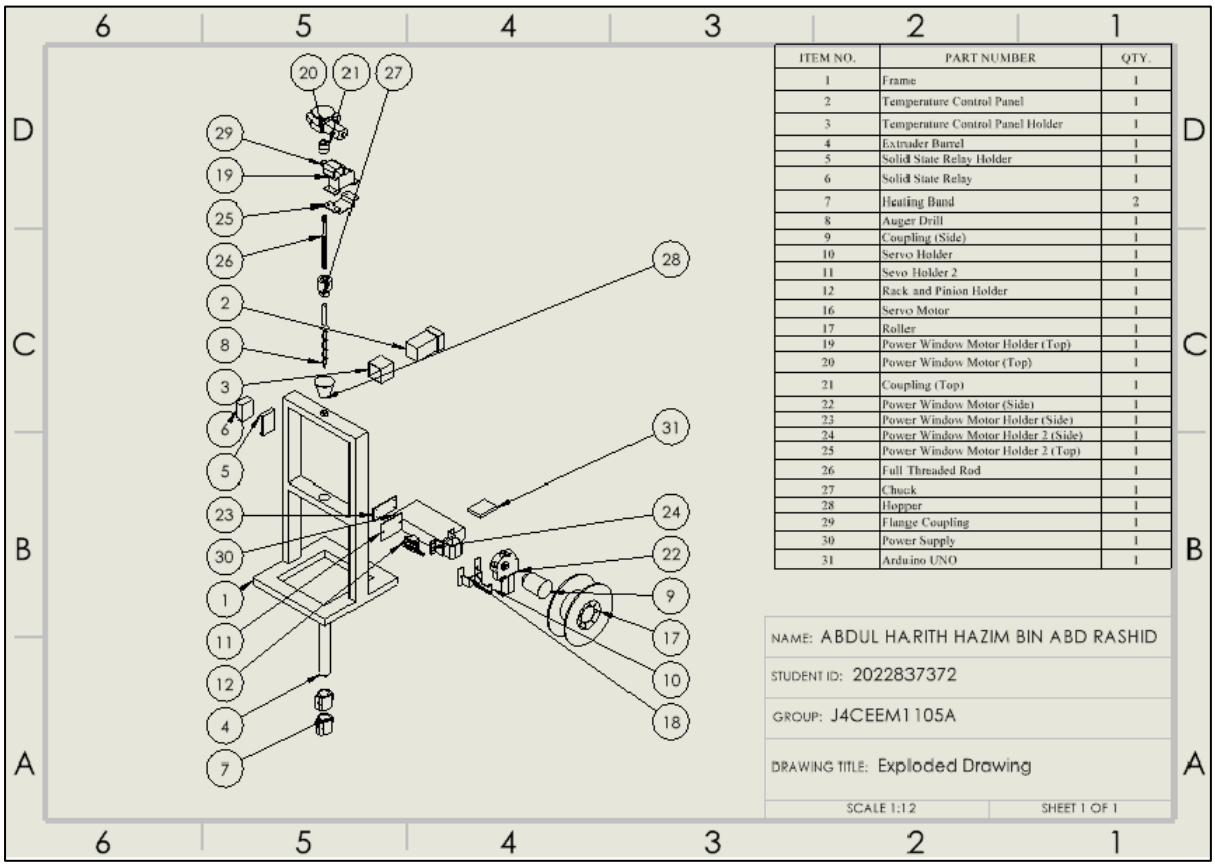
Keywords: *Filament, Filament extruder*

PROTOTYPE



DESIGN PARAMETER





ITEM NO.	PART NUMBER	QTY.
1	Frame	1
2	Temperature Control Panel	1
3	Temperature Control Panel Holder	1
4	Extruder Barrel	1
5	Solid State Relay Holder	1
6	Solid State Relay	1
7	Heating Band	2
8	Auger Drill	1
9	Coupling (Side)	1
10	Servo Holder	1
11	Sevo Holder 2	1
12	Rack and Pinion Holder	1
16	Servo Motor	1
17	Roller	1
19	Power Window Motor Holder (Top)	1
20	Power Window Motor (Top)	1
21	Coupling (Top)	1
22	Power Window Motor (Side)	1
23	Power Window Motor Holder (Side)	1
24	Power Window Motor Holder 2 (Side)	1
25	Power Window Motor Holder 2 (Top)	1
26	Full Threaded Rod	1
27	Chuck	1
28	Hopper	1
29	Flange Coupling	1
30	Power Supply	1
31	Arduino UNO	1