

PROTOTYPE DESIGN COLLECTION

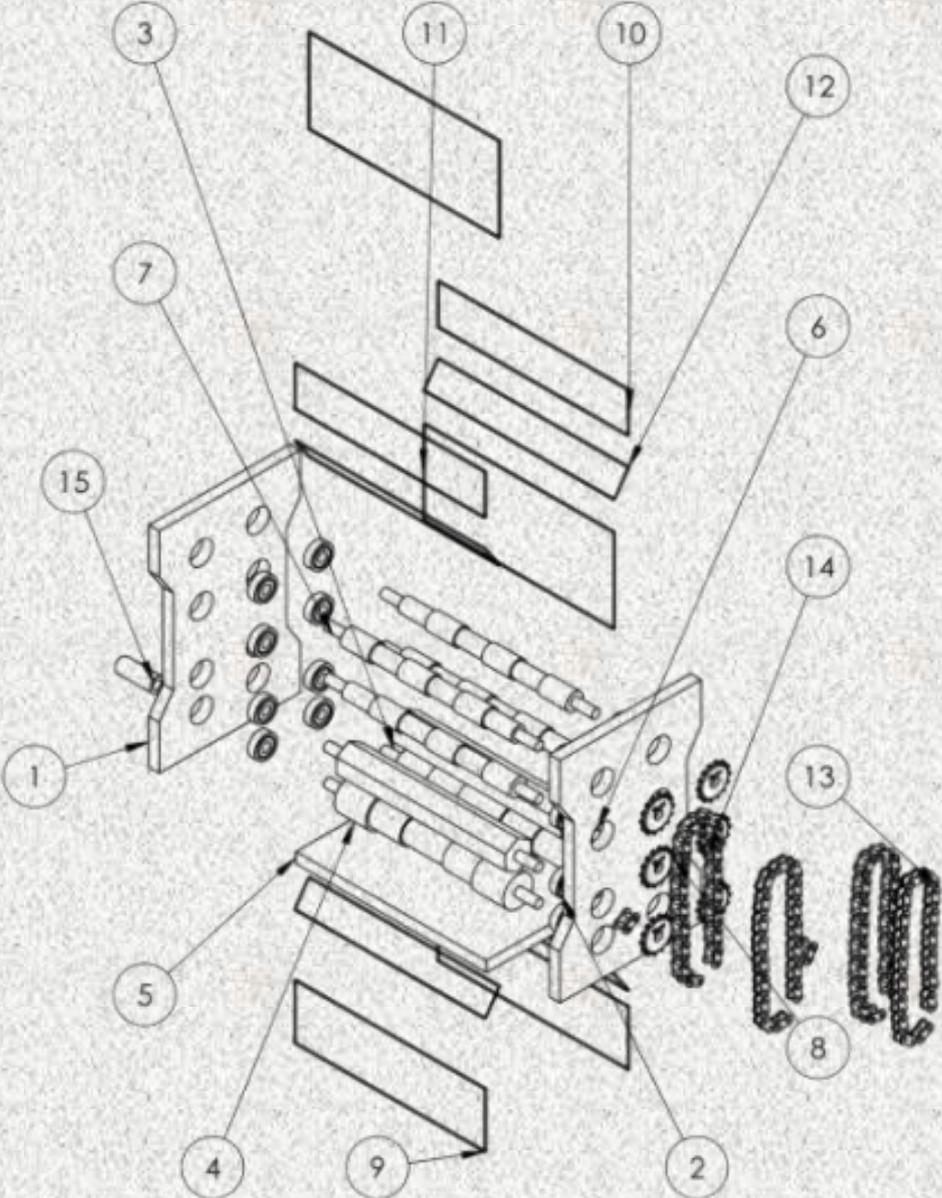
SERIES 4



Universiti Teknologi MARA
Pasir Gudang Campus

Prototype Design Collection

Series 4



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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 8

Manual Compaction Machine for Casting

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PROJECT DESCRIPTION

The production of sand molds for casting is a critical process in modern manufacturing, particularly in industries such as automotive, construction, and machinery. However, existing ramming tools and machines face several inefficiencies, including uneven compaction, high costs, and ergonomic concerns. This study focused on the design and fabrication of a manual ramming machine tailored for small-scale workshops and educational purposes, offering a low-cost and user-friendly solution for efficient mold-making. The proposed manual ramming machine is designed using SolidWorks and incorporates a 2-ton hydraulic jack to ensure uniform sand compaction. Fabrication methods included cutting, welding, and mechanical assembly using durable and recyclable materials. The final prototype is compact, portable, and manually operated, reducing energy consumption and promoting sustainability. Testing confirmed the machine's capability to achieve uniform compression with minimal operator effort, producing high-quality molds in under one minute. The design prioritizes safety and simplicity, making it ideal for students and small-scale manufacturers. Furthermore, the incorporation of recyclable materials and manual operation underscores its environmental benefits. This research highlights the potential of the manual ramming machine to address inefficiencies in current tools, improve accessibility, and enhance the learning experience in casting workshops.

Keywords: *Manual, Casting*

PROTOTYPE



DESIGN PARAMETER

