

PLAN, DESIGN & MANUFACTURE A DOMESTIC COMPACTOR

AUTHORS

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AIMS

The Main Aim of this Project was to research, plan, design, manufacture and test a domestic recycling bin compactor. As engineer students, we are required to take a systematic approach in dealing with the project. Establishing the follow goals kept the team aware of the progress made each week.

- Establishing a need for the product by using MS surveys.
- Compiling Data to analysis the problem.
- Research the relevant data needed to facilitate the requirements.
- Brainstorming the Conceptual designs for the compactor.
- Finalizing Design using a Process of elimination.
- Designing the Final Design using 3D Modelling Software such as SolidWorks.
- Manufacturing the Design using TUS workshops.
- Optimizing the Design to recorrect any errors during the process.
- Debugging and Testing the compactor.

CONCLUSION

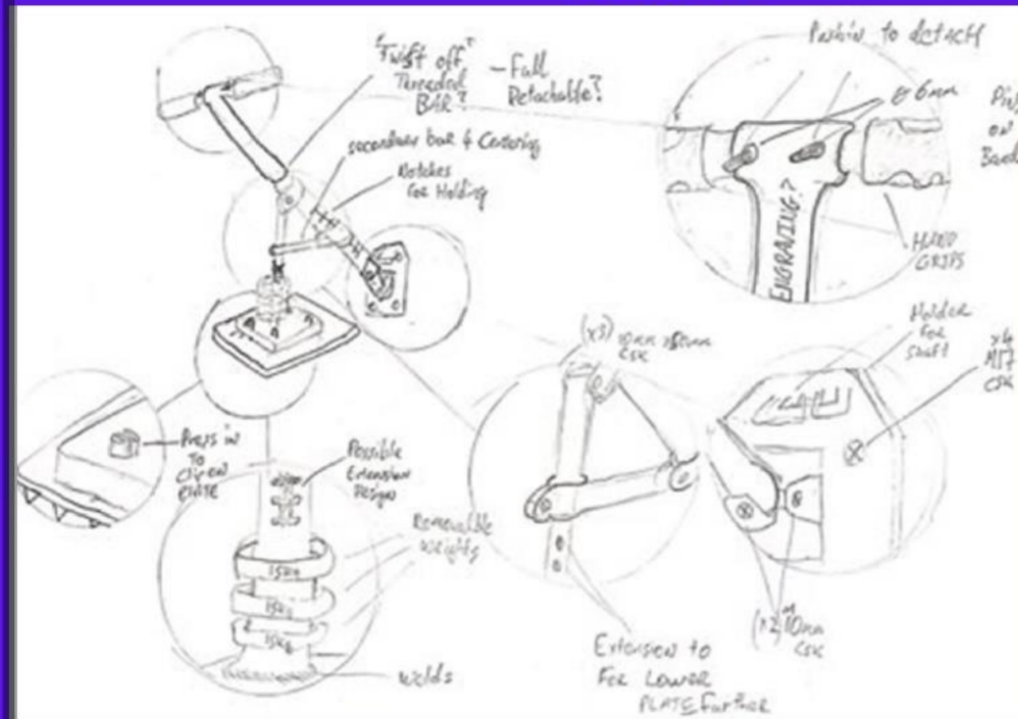
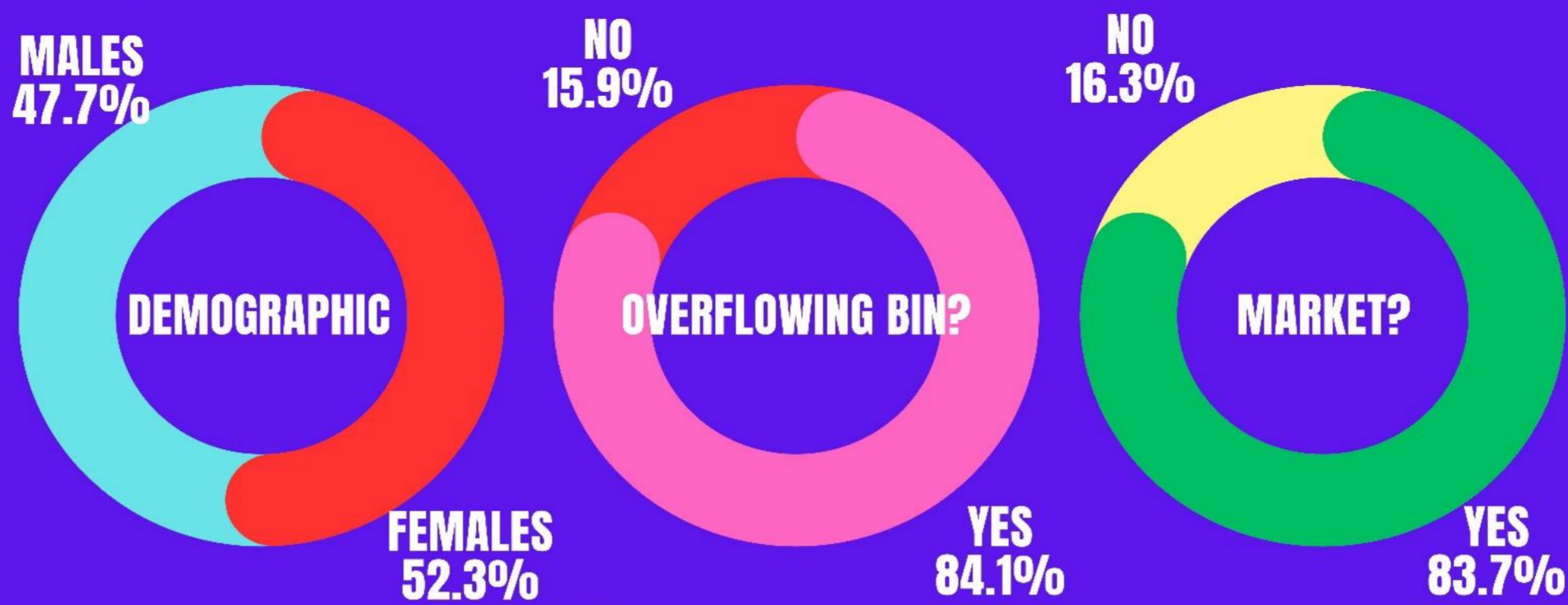
The Recycling Bin Compactor, was planned, Design & Manufacturing within the time frame of 12 weeks. Individual projects covered, Optimization and Reduction, Physical & Simulation Testing, FEA Design Studies, Safety Manual, Installation Manual, Remanufacturing and Theoretical Electrical Controls and Cost Analysis. Looking ahead, a valuable avenue for future exploration would be to delve deeper into commercial cost analysis to gain insights into how to streamline costs for mass production of the compactor. This could involve rethinking the design and manufacturing processes to develop smaller models tailored for commercial use and making further strides in enhancing the physical electrical model for improved efficiency and performance.

ACKNOWLEDGEMENTS

The Team would like to thank our Supervisor, Neil Conway and Ciaran O'Loughlin for their Guidance and encouragement on our projects. A special thanks to Edward Fitzgerald and Niall Hogan for putting up with incessant questions and going the extra mile.

SURVEYS

Survey Sample Size of a 100 Households



• BIN - MOUNTED DESIGN

The initial design was rejected due to concerns about handle breakage from excessive pressure during waste compression. The engineering team developed a new design with reinforced materials to prevent breakage, enhancing durability and functionality. The revised design aimed to meet safety standards and user expectations.

Advantages	Disadvantages
No assembly or installation required.	Weight of full assembly due to all components being made from steel.
Can be removed from the bin a stored away.	It could cause damage to the bin if too much force is added.
Can be used by many households due to mobility.	Compression plate could miss small materials such as food packaging or sweet paper.

MANUFACTURING

CAD model drawings with ± 0.2 dimensional tolerance are created for manufacturing the Domestic Compactor. Various machines like milling machines, lathes, MIG welding, grinding, polishing, and knurling are used to shape, join, and finish the compactor. Each step is essential to meet quality standards for effective domestic use.

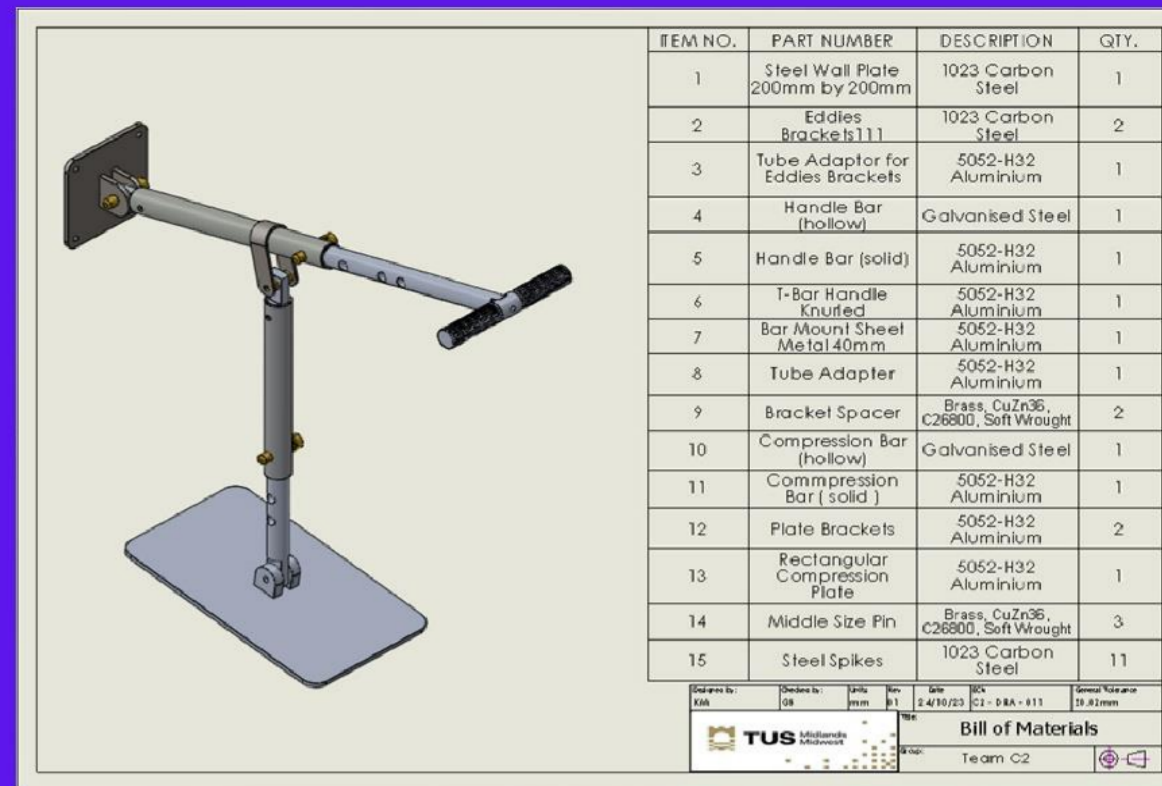
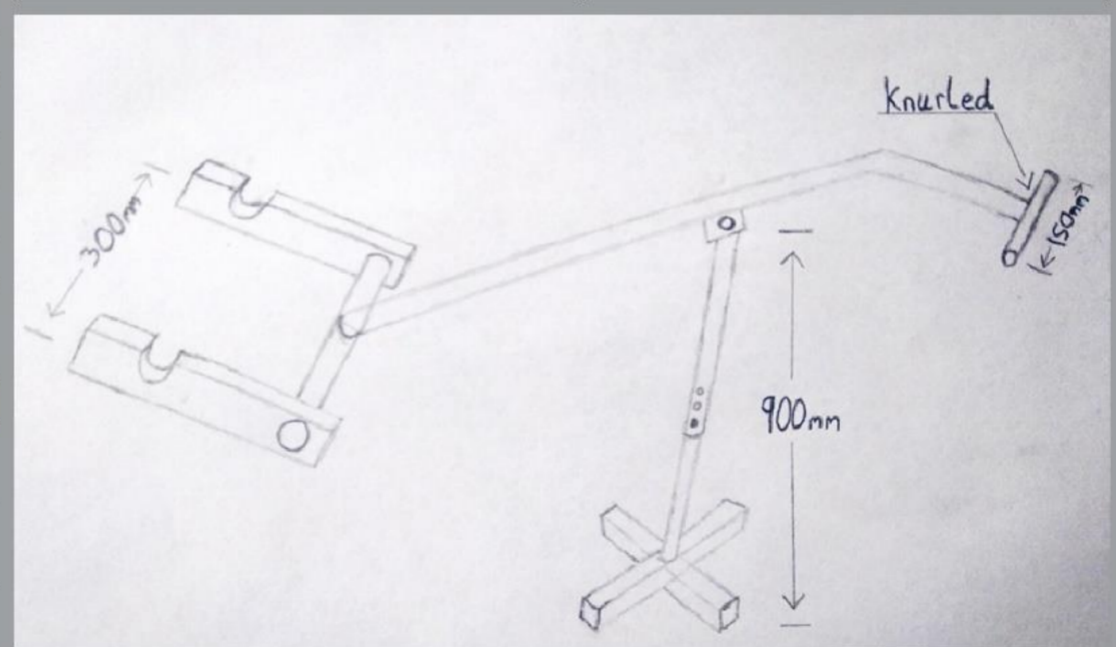


CONCEPT DESIGNS

• WALL - MOUNTED DESIGN

The design features a Bent Bar for ergonomic purposes, enhancing functionality and unique approach to compressing. This alteration aims to improve user comfort and convenience while using the handlebar at full extension, emphasizing a user-centric approach to product design.

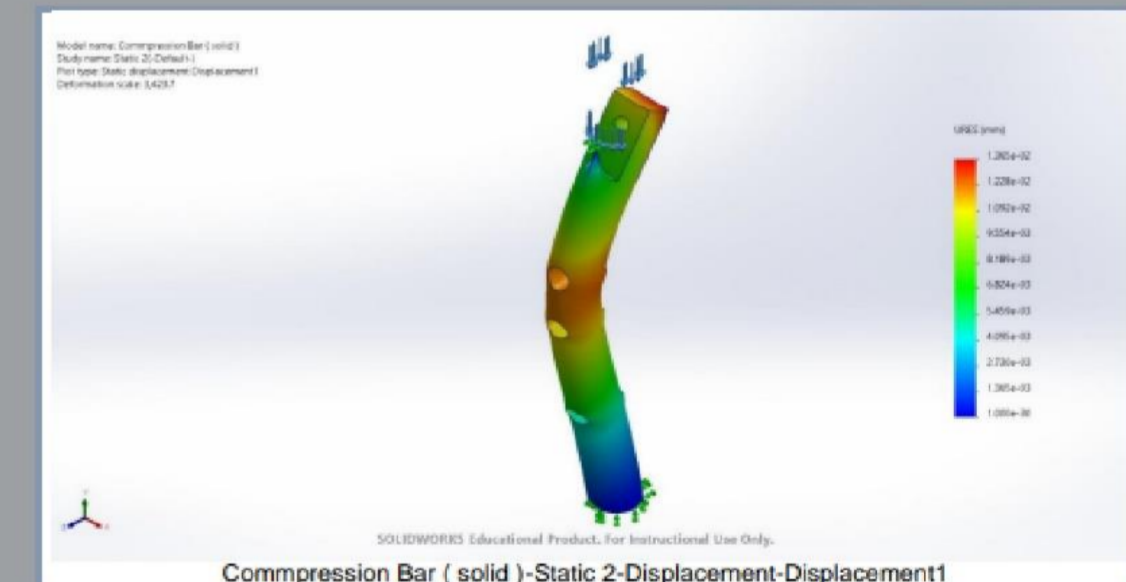
Advantages	Disadvantages
Parts require basic manufacturing techniques	Steel construction makes it very heavy.
Assembly uses commonly available materials.	Prone to corrosion.
Crusher plate is height adjustable.	Expensive steel plates.
Parts have high tensile strength.	Design does not allow for product to be stored out of the way easily.



CAD MODELLING

The design process involved merging three distinct conceptual designs into a single finalized design utilizing SolidWorks. By unifying these designs through SolidWorks, the design was enhanced, showcasing a meticulous focus on detail, comprehensive visualization, rigorous simulations, and structural integrity assessments. All components adhering to the Material Data Sheets provided by Manufacturers. Detailed FEA Analysis Data shows the limitation of Compactor when subjected to

FINITE ELEMENT ANALYSIS



FEA ANALYSIS OF HANDLEBAR UNDER 2000N OF FORCE

