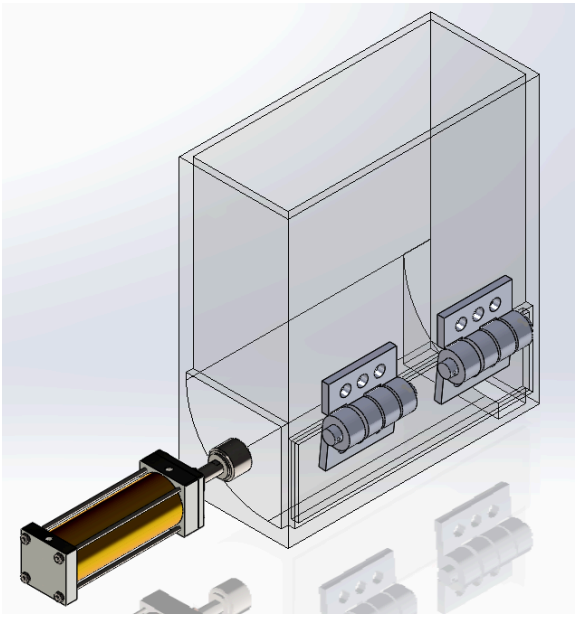
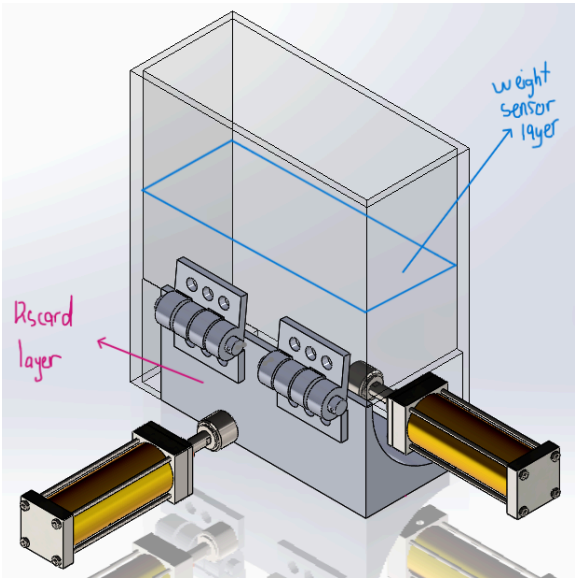
Appendix B: Alternative Designs

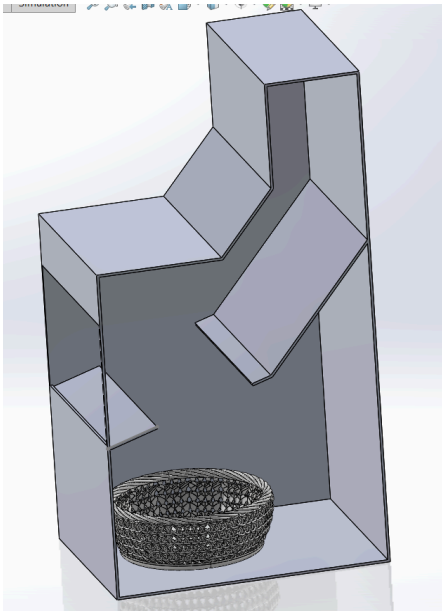
Design 1:

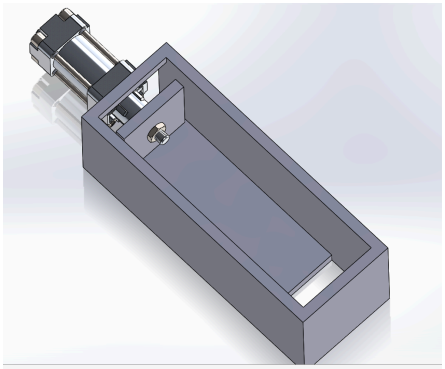
	In this system, a can is dropped into the mechanism through a conveyor belt. If the can is filled, compressing it could be dangerous. The design ensures that a filled can, due to its weight, will naturally open the door, preventing it from being compressed. Conversely, if the can is empty, it will not have enough weight to open the door and will therefore be safely compressed. The system also incorporates an ultrasonic sensor to control the speed at which cans are dispensed into the system. Additionally, a metal sensor is included to detect whether the object is metal or not.

Design 2:

	The cans or other objects will enter the design through a conveyor belt. Design consists of 2 layers, a weight sensing layer and a compression/discarding layer. Both layers are held closed by a retractable working cylinder where the platforms are attached to the walls of the design by a hinge. Layer 1 consists of a weight sensor, once the object has had its weight measured, the first cylinder retracts, platform opens and the object drops to the second layer. In the second layer is a metal induction sensor where it detects whether the object is metal or not, if it is not metal or the object is too heavy, then cylinder 2 retracts, platform opens and the object is discarded. If it is metal a compressing cylinder from the front will extend and compress the can.

Design 3:





In this design, the crushing subsystem and weight sorting subsystem is separated. Can will be dropped into the weight sorting subsystem by hand. If it is too heavy or in another word filled, it will fall into the basket. While if it is light or empty, it will not fall into the gap and fall into the conveyor belt.On the conveyor, there is an inductive sensor to detect metal. If it is metal, a cylinder will push the can into the crusher box. If not a metal, it will just fall off at a box located at the end of the conveyor. With this design, only 1 sensor is required.

Evaluation of Alternative Designs:

Design Criteria	Weight	Solution 1		Solution 2		Solution 3	
		Rating /5	Weighted Score	Rating /5	Weighted Score	Rating /5	Weighted Score
1) Effectiveness (How many unknown it can handle)	1 14.2857%	3	8.5714	2	5.7142	4	11.4285
2) Complexity	2 14.2857%	3	8.5714	1	2.8571	5	14.2857
3) Speed	5 14.2857%	3	8.5714	2	5.7142	5	14.2857
4) Sustainability	6 14.2857%	4	11.4285	4	11.4285	5	14.2857
5) Cost	3 14.2857%	5	14.2857	2	5.7142	4	11.4285

6) Ease of use	4 14.2857%	3	8.5714	1	2.8571	4	11.4285
7) Appearance	7 14.2857%	3	8.5714	2	5.7142	5	14.2857
Total	100%	68.5712%		39.9995%		91.4283%	
Rank		2/3		3/3		1/3	
Selected Design		Design 3					

We decided to go with Design 3 because it has a higher weighted score compared to our design according to our set criteria. Instead of combining crushing and sorting in the same box, we decided to separate it. Not only is it less complex, but also easier to manufacture. It is also cheapest since we are only using 1 sensor. Its speed is also greatly faster compared to the other 2 designs.

Guidelines:

- You may add criteria by inserting rows or remove criteria by deleting rows.
- The weight of all criteria must sum up to 100%. You can also assign equal weights to all criteria.
- Rate each criteria for each design by giving a rating of 1, 2, 3, 4 or 5 (where 5 is the highest rating).
- Rank the designs based on the **Total** row. The highest total is ranked as 1, and it will be selected as the final design.
- Add a short paragraph below the evaluation table to explain the reason for selecting the final design
- You may refer to this YouTube video for more explanation: https://www.youtube.com/watch?v=ePMV-NrmUXo
- This guideline section can be deleted before submission.