Injection Molding Plastic Repurposing Device

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DESIGN CENTER COLORADO

BIO•CUBE

Background

In 2018, scientists found a plastic bag in the Mariana Trench, the last untouched place on Earth. By 2030, the weight of plastic in the ocean will outweigh the weight of fish. Plastic waste is quickly suffocating the planet, so Bio-Cube aimed to create a low input, user friendly solution for developing communities primarily focused in Southeast Asia, where the amount of plastic waste is most prominent.

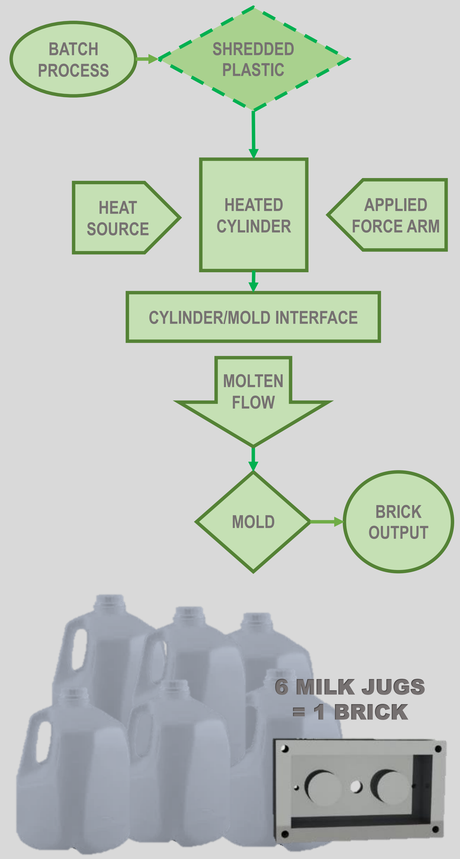
Objective

Bio-Cube created a naturally heated injection molding device to repurpose plastic into stackable Lego like bricks. This device enables those in places with low energy sources to repurpose localized plastic waste into different and creative solutions such as retaining walls, small structures, and artisan works.

DESIGN PRIORITIES	ADDRESSED
Cost	✓
Safety	✓
Maintenance/Repeatability	✓
Energy Efficiency	✓
Simplicity/Usability	✓

Amidst this development Bio-Cube strived to create a platform to further bring attention to the plastic problem and just how prominent it is on a global scale.

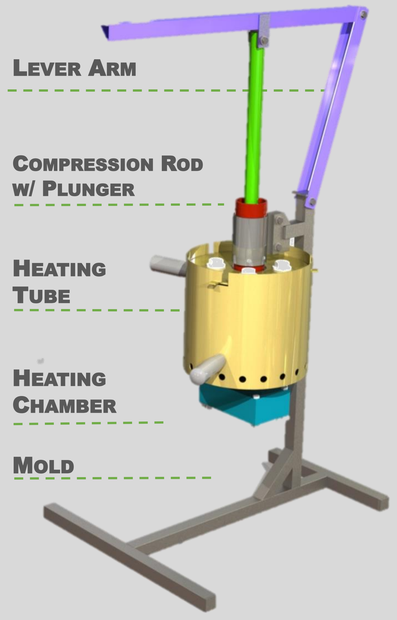
Process Flow



COMPRESSION

NATURAL HEAT SOURCE

MODULAR DESIGN

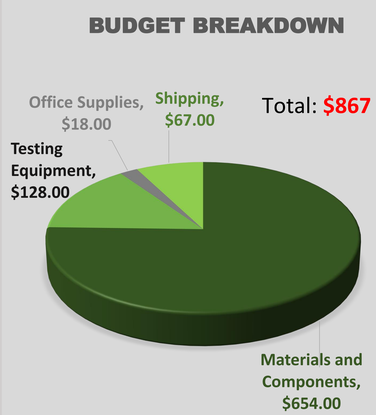


New Venture Challenge

Runner up for the Social Impact Prize

Bio-Cube competed in the annual New Venture Challenge, through the tracks of Hardware, Women in Entrepreneurship, and Social Innovation. The team won runner up for the Social Innovation prize, taking home $1250 to put towards the venture.

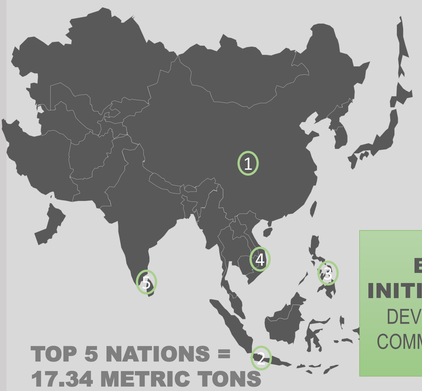
Finance



Estimated price per unit at Manufacturing production runs of 1—15 units estimated to be **$600**

SUBSYSTEM	ESTIMATED SPEND	ACTUAL SPEND
HEATING	$358	$471
INJECTOR	$166	$68
FRAME	$70	$73

Market Segmentation



TECHNICAL TEAM USA

MANUFACTURE OPERATIONS ASIA

ECO INITIATIVES DEVEOPING COMMUNITIES

INNOVATION DESIGN CENTERS GLOBAL

E-COMMERCE GLOBAL

GLOBAL COMMUNITY

TARGET MARKET $5 MN | ADDRESSABLE MARKET $10 BN | TOTAL MARKET $35 BN

Experimental Data

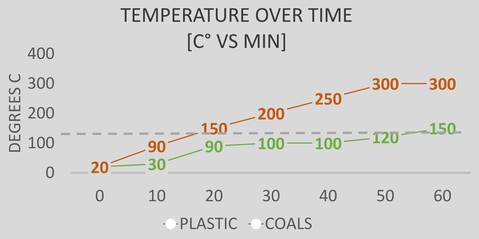
CRITERIA NUMBER	PASS/FAIL
MC.0.1 The plastic waste needs to reach a molten state.	PASS
MC.0.2 The plastic waste needs to be able to be forced through the heating chamber and needs to fill the mold.	PASS
MC.0.3 The time at which the chamber cools to room temperature is critical for knowing when the machine has stopped running.	PASS
HCM.0.1 Successfully remove the lower heating chamber from the upper heating chamber using the handles.	PASS
HCM.0.2 Successfully thread the mold onto and off the heating cylinder three times.	PASS

TESTING SUMMARY

- Successfully produced two bricks from process
- Force applied to lever arm assembly greatly overreached initial calculations during testing
- All components interface correctly with each another and provide seamless functionality

SAMPLE BRICK

MALE/FEMALE INTERFACE



Summary

We were confident with the progress we have made and look forward to taking what we've learned and move forward with new ideas.

Future Iterations:

- Increase height of heating tube and chamber, decrease width to maintain same volume for mold output.
- Increase heating tube to mold interface hole to reduce risk of plastic buildup.
- Research an oven method, so heat is better focused.

Acknowledgments

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IDEA FORGE GROW AND BUILD YOUR IDEA

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