MODS

A modular footwear solution that reduces the amount of waste in the environment.

1.1 Contact Information

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1.2 Submitting Category

Student
Used Autodesk Fusion 360

2.1: Product title and Description

"According to the U.S Department of the Interior, Americans throw away at least 300 million pairs of shoes each year. These shoes end up in landfills, where they can take 30 to 40 years to decompose." And of those shoes thrown out, only a fraction of the shoe are actually deteriorated.

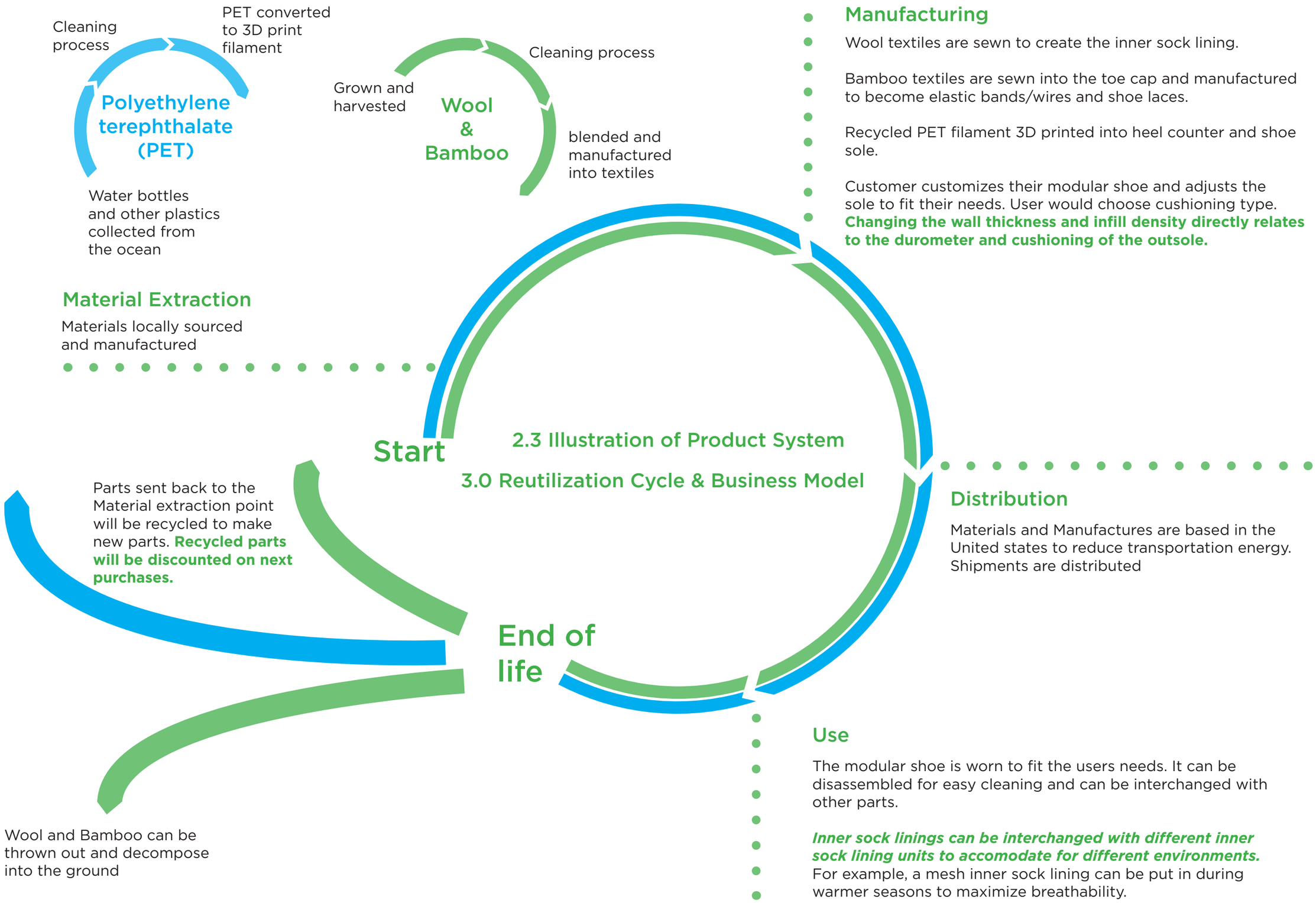
How can we prolong the lifecycle of a shoe? Current methods of prolonging the life of shoes are downcycling and repairing shoes. For example, Nike's Nikegrind program downcycles shoes and develops them into materials used in athletic facilities. And shoe cobblers refurbish shoes, but this is only accessible to dress shoes and boots where its material is much higher quality. However, these processes are done after the Shoe's usage.

I designed a modular shoe that can be customized and updated as the shoe deteriorates without using glue. It consists of 5 modular units that are the minimal amount of material needed for maximum comfort and security. Each of these units are made from recyclable and sustainable materials. Essentially, the user has full control of the shoe's aesthetic and functionality.

After use, if one of the parts is deteriorated the user would send that unit back to the manufacturer to be recycled into a new part. The modular design can be easily assembled and disassembled allowing for an easy clean. By prolonging and continuing the life cycle of the shoe, this modular product reduces material waste and slowly reduces the carbon footprint step by step.

2.2 Image

Source: "Recycling with Sole. Waste360.com. Elizabeth Kirk. 1 April 2012. Web. 22 March 2016.


Cleaning process
PET converted to 3D print filament
Polyethylene terephthalate (PET)
Water bottles and other plastics collected from the ocean
Grown and harvested
Wool & Bamboo
Cleaning process
blended and manufactured into textiles
Manufacturing
Wool textiles are sewn to create the inner sock lining.
Bamboo textiles are sewn into the toe cap and manufactured to become elastic bands/wires and shoe laces.
Recycled PET filament 3D printed into heel counter and shoe sole.
Customer customizes their modular shoe and adjusts the sole to fit their needs. User would choose cushioning type. Changing the wall thickness and infill density directly relates to the durometer and cushioning of the outsole.
Material Extraction
Materials locally sourced and manufactured
Start
2.3 Illustration of Product System
3.0 Reutilization Cycle & Business Model
Distribution
Materials and Manufactures are based in the United states to reduce transportation energy. Shipments are distributed
Parts sent back to the Material extraction point will be recycled to make new parts. Recycled parts will be discounted on next purchases.
End of life
Use
The modular shoe is worn to fit the users needs. It can be disassembled for easy cleaning and can be interchanged with other parts.
Inner sock linings can be interchanged with different inner sock lining units to accomodate for different environments.
For example, a mesh inner sock lining can be put in during warmer seasons to maximize breathability.
Wool and Bamboo can be thrown out and decompose into the ground

4.1 Overview

MODS is made from three homogeneous materials:

Wool used for the inner sock lining is a great insulator and naturally wicks away moisture.

Bamboo is used for the toe box and the elastic wires and bands. Bamboo is extemely fast growing and its fibers can be pulverized and spun into yarn. Its fibers have flexible and strong properties.

Polyethylene Terephthalate (PET) used in the shoe sole and heel counter is 3D printed through converting water bottles and ocean plastics into a 3D filament. The 3D prints will be customizable in it's wall thickness and inlay densities, so its strength and flexibility varies on the user.

4.2 Material Reutilization

MODS is essentially 100% reusable. The wool and Bamboo is compostable and can be recycled into new parts. And the PET 3D prints can be recycled to become reusable 3D filament. Although a percentage of the materials will be lost during the recycle and conversion process, all the materials are not wasted.

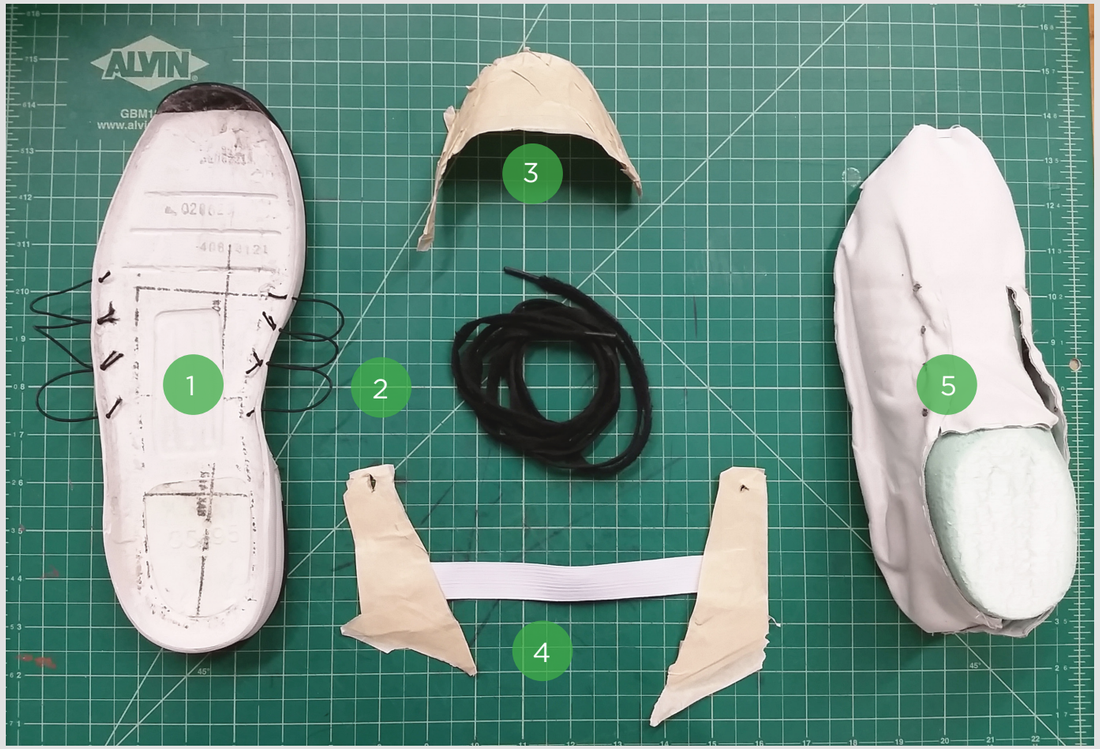
4.3 Material Health

Wool is a natural hypoallergenic material that wicks away moisture, so youre feet will always stay dry.. The wool fibers do not allow for mold and mildew to produce due to the lack of dampness. And because the inner sock lining is detachable, it can be cleaned and sanitized when needed.

Bamboo grows naturally without pesticides or fertilizers. It is also moisture wicking material that will keep your shoe dry. It's fibers are flexible and strong, so the toe box will bending and shaping to your foot for maximum comfort.

Polyethylene Terephthalate (PET), previously used in water bottles and food containers, is hydrophobic. So once again, it will keep your shoe and feet dry.

1 Wool (seasonal) 2 Bamboo Blend 3 Bamboo Elastic 4 3D printed PET



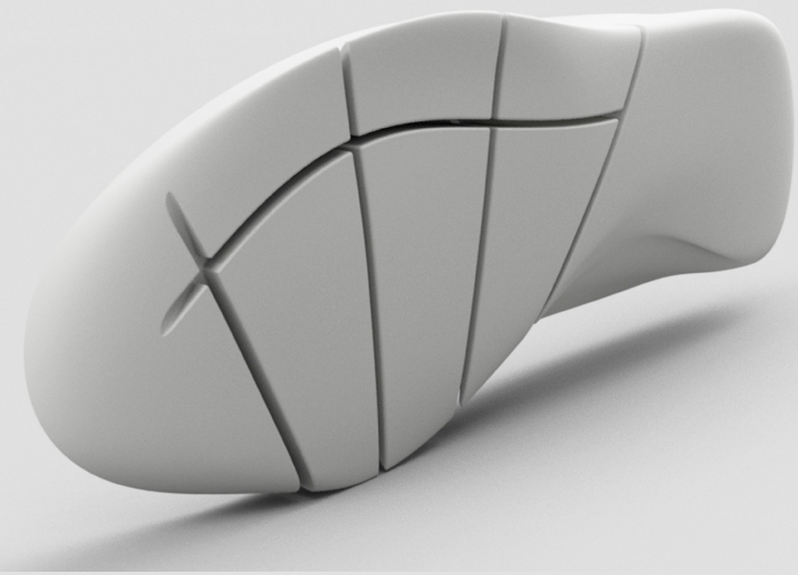
1 outsole

2 lock in wire

3 toe box/ vamp

4 heel counter

5 inner sock lining



5. Designed with Autodesk Fusion 360

After seperating soles from old shoes, I used Fusion 360 to model a running shoe sole that was thin and flexible while still allowing cushion.

Using the Sculpt mode was especially helpful. Fushion 360 gave me the freedom to sculpt a shape that I really wanted. I was able to edit minor details without changing the whole form too much.

After finishing the CAD model, I 3D printed a section of the sole and saw that I could change the wall thickness and inlay densities. This allows for customization of the soles density.

Footwear culture has progressed and 3D printing technology has exponentially advanced. Having an adaptable program helped me tie these two things together to make this project possible.

SECTION VIEW OF
3D PRINTED SOLE