



The Development of a Standard Tool to Predict the Environmental Impacts of Footwear for Deckers Outdoor Corporations

Ariana Arcenas, Julie Holst, Takuma Ono, Matt Valdin
Faculty Advisor: Sarah Anderson

deckers
OUTDOOR CORPORATION

DO YOU KNOW THE ENVIRONMENTAL IMPACTS OF YOUR SHOES?

Do you know how much carbon is generated from a pair of shoes? 15 kg. How many pairs of shoes do you own? If you're like the average Bren student, you own 15 pairs.

This equates to 67 million metric tons of CO₂ from American's shoes -- more than the total annual CO₂ emissions of Finland.

By changing materials, designers can significantly reduce the CO₂ emissions of shoes. Here, a the emissions of a suede saddle sneaker is equivalent to that of almost four cotton Sattie



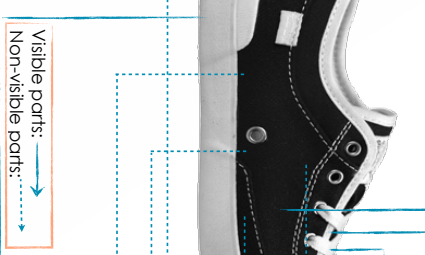
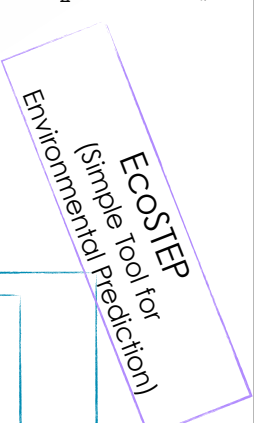
What impacts did we focus on?
Acidification Potential (AP), Eutrophication Potential (EP), Freshwater Aquatic Toxicity Potential (FAETP), Global Warming Potential for 100 years (GWP100), Human Toxicity Potential for (HTP)

ECOSTEP

A life cycle assessment model that predicts the cradle-to-grave environmental impact of a pair of shoes during the design phase.

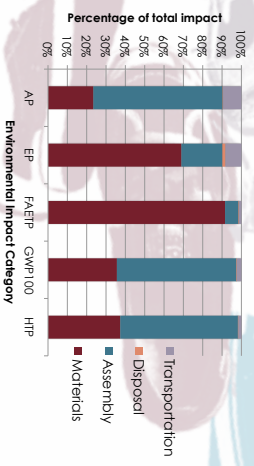
The pair of shoes' is defined as a women's size 7 or men's size 9 shoe that lasts at least two years.

Now, put yourself in a designers' shoes...how would you reduce the environmental impact of footwear?

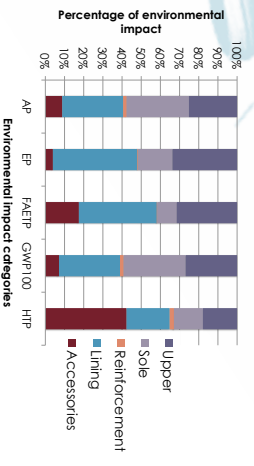


Question	Shoe 1
> Section 1: The basic information	
Is it a Men's Shoe or Women's?	Women's
Who's brand of shoe would you like to design?	Low-End Sneaker
If applicable, enter upper area in 1/2	If applicable, enter upper area in 1/3
Look at entire life cycle or only shoe components?	Look at entire life cycle
How is the shoe assembled?	Vulcanization
> Section 2: Shoe Upper (Vamp, Quarter, Tongue)	
>> Upper Material 1	Cotton
What is the primary material used for the upper?	Cotton
What % of the upper does this material cover?	100
What % of the upper does this material cover on an overlay?	10
>> Upper 2	Hemp
What 2nd material is used for the upper?	Hemp
What % of the upper does this material cover?	10
What % of the upper does this material cover on an overlay?	0
> Section 3: Accessories	Organic Cotton
What material is used for the laces?	Organic Cotton
>> Eyelets	Copper
What material are used for the eyelets and vents?	Copper
How many eyelets and vents are on the shoe?	12
> Section 4: Lining	
>> Lining Material 1	Cotton
What is the primary material used for the lining (boot)?	Cotton
What % of the shoe interior is covered by this lining (boot)?	100
What % of the shoe interior does this material cover on overlays?	0
>> Insole Material	Polyurethane
What material is used for the insole?	Polyurethane
What material is used for the padded wedge?	Polyurethane
> Section 5: Non-visible reinforcements	
What material is used for the toe box?	Small PET
What material is used for the heel counter?	Small PET
What material is used for the arch/collar?	Polyurethane
What material is used for the arch/collar?	Polyurethane
> Section 6: Sole	
>> Inlaid Sole 1 (Liners)	Laticx foam
What is the 1st material used in the inlaid sole?	Laticx foam
What is the 2nd material used in the inlaid sole?	Small PET
What is the 3rd material used in the inlaid sole?	Rebound
What is the 4th material used in the inlaid sole?	Laticx foam
>> Soles with Specific Thickness 1	Laticx foam
What is the 1st material used in the inlaid sole?	Laticx foam
How thick is this material (in mm)?	None
>> Outside	Rebound Car Tire
What material is used for the outsole?	Rebound Car Tire
What is the thickness of the outsole (in mm)?	5
What material is used for the tongue?	Synthetic Rubber

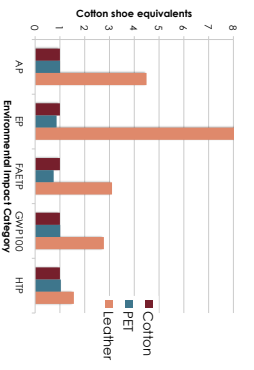
Focus on materials and assembly.



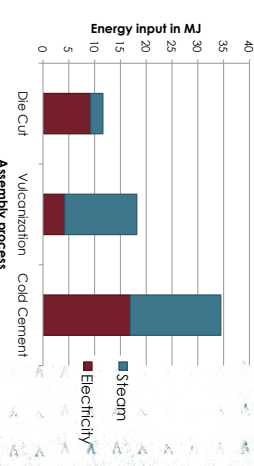
Consider all parts.



Avoid leather.



Use vulcanization or die-cut.



Acknowledgements:

From Deckers: Mark Fegley, Abigail Nugent, Ron Hillas, Darrien Peoples
From Bren: Sarah Anderson, Roland Geyer, Brandon Kuczenski, Irish Holden, Jeff Dozier, Lee Hennrich
From PE Americas: Peter Carnepa and Lilla Woods