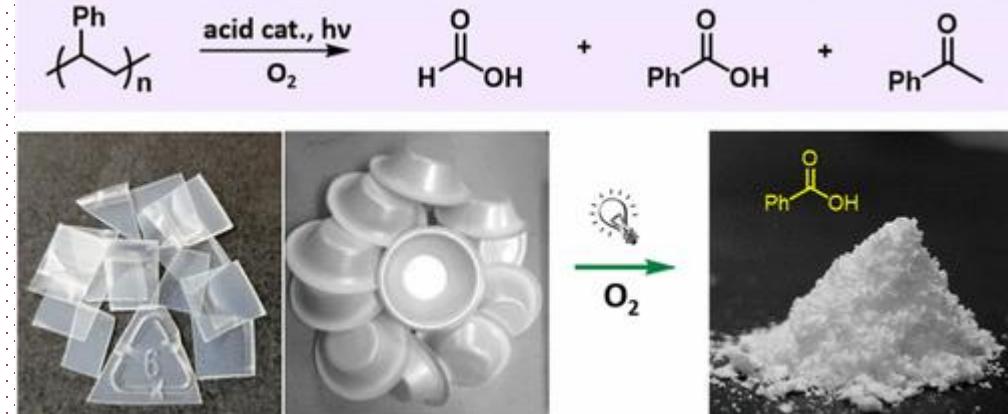




Flux Cup

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Problems with SOLO Design



Example Recycling Process

"...Remarkably inert and difficult to degrade without special treatment." – Journal of American Chemical Society, Zhiliang Huang et al.

Problems with SOLO Design (cont.)

Open top = spills!



Desired Properties/Design Goals

1. Constraining Properties

- Tensile strength
- Good barrier properties (so it holds liquid)
- Nontoxic material
- Chemically inert

2. Desired Properties

- Easily processed/manufactured (reduces cost)
- Recyclable
- Keeps drinks cold
- Aesthetically appealing



Material Selection

Material Considerations:

PET

- Recyclable
- Easy/cheap processing (thermoforming or injection molding)
- Non-toxic
- Eliminates need for polyethylene coating



Considered composite materials, but each had their drawbacks

Our Design

Spout

- Easy drinking

Tapered Cup

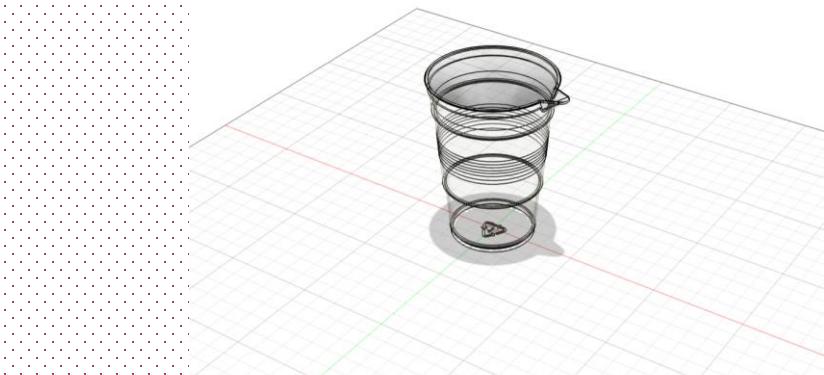
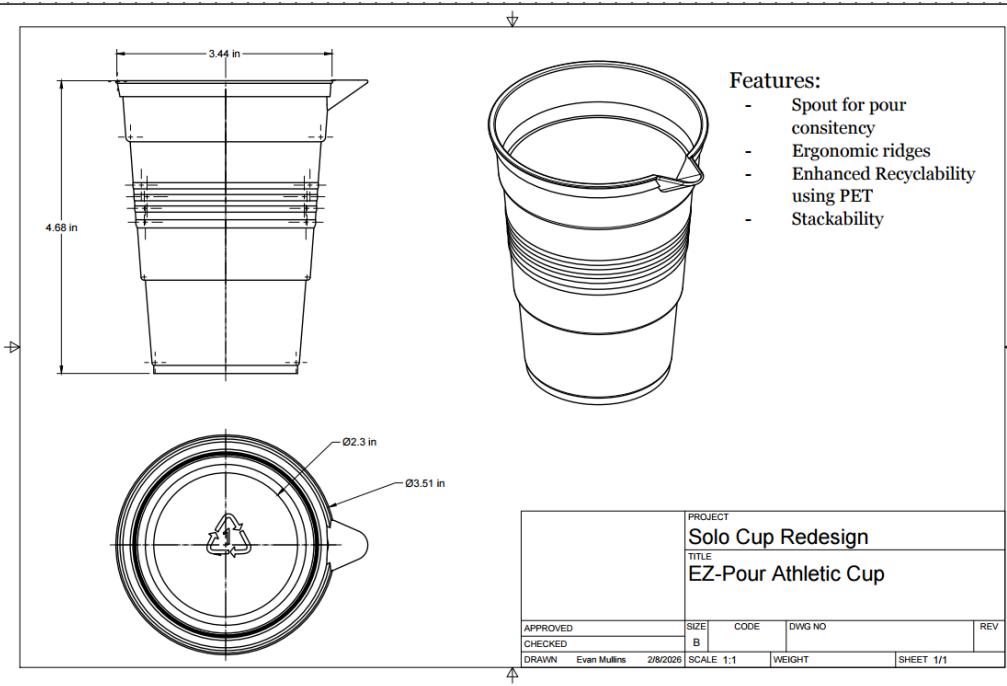
- Allows stackable/easily stored design

Ridges

- Grip

Insulated

- Keeps drinks cold for comfort of user





Final Design



User Needs (Pouring)

User Needs (Stackability)



Thank You



Sources

- Consumer Sentiment: <https://redcupliving.com/blogs/news/why-are-red-solo-cups-so-popular>
- Design Methodology - Solo Cup Patent: <https://patentimages.storage.googleapis.com/33/58/aa/35d9e8689bb99b/US8152018.pdf>
- Informative Design Article - Nasa Zero-G Cup Uses Spout: <https://www.zmescience.com/future/nasa-cup-zero-gravity/>
- PET Yield Strength Calculations: <https://www.matweb.com/search/DataSheet.aspx?MatGUID=a69bbdcdf6f41dd9818eec3599eaa20>
- Sugarcane Bagasse Fiber Table: https://www.researchgate.net/publication/341763962/Comparative_study_of_fly_ash_sugarcane_fiber_reinforced_polymer_composites_properties/figures?lo=1
- Splining for Cad Sketch: <https://www.istockphoto.com/vector/red-plastic-party-cup-material-design-red-beer-cup-vector-gm1442763678-481981519>
- Thermoforming: <https://www.productiveplastics.com/thermoforming/>
- Recycling Polystyrene: Huang, Zhiliang, Muralidharan Shanmugam, Zhao Liu, Adam Brookfield, Elliot L. Bennett, Renpeng Guan, David E. Vega Herrera, et al. "Chemical Recycling of Polystyrene to Valuable Chemicals via Selective Acid-Catalyzed Aerobic Oxidation under Visible Light." *Journal of the American Chemical Society* 144, no. 14 (March 30, 2022): 6532-42. <https://doi.org/10.1021/jacs.2c01410>.
- Guy Spilling Drink <https://www.dreamstime.com/funny-man-white-coffee-cup-spills-over-himself-man-spills-coffee-over-himself-video183746058>
- Cups https://toppng.com/free-image/red-plastic-cup-png-red-solo-cup-stack-PNG-free-PNG-Images_171518
- Pour <https://unsplash.com/photos/a-person-pouring-a-drink-into-a-glass-U1DXErAquY8>
- <https://www.westend61.de/en/photo/CAVF40224/female-athlete-drinking-water-on-race-tracks>

Sources

Pet Sustainable image <https://www.yiypak.com.au/the-rise-of-pet-understanding-its-dominance-in-packaging/?srsltid=AfmBQoqQAhBrGvLA8eRVYXpAuRF1kMAAiM9nUM9t8SJWouvxK7uYXS6A>

Kraft Paper <https://papyruspapers.com/en/product/kraft-liner-board/>

Bagasse <https://www.bioleaderpack.com/benefits-of-bagasse-include-microwave-safety-recyclability-and-water-resistance/>

PET Recyclability <https://www.recycletheone.com/recycling-pet-plastic/how-does-pet-plastic-recycling-work/#:~:text=First%2C%20the%20PET%20pellets%20are,even%20other%20types%20of%20plastic.>

More Pet: <https://at-machining.com/pet-plastic-machining/>