

Bicycle BattBooster: Bicycle-powered Phone Charger

Hydrogen: X Sun, Miles Luhn, Lizzette Corrales, Monica Tang, Claudia Renero, LuLu Zhang

Market Need

There are 47.5 million Americans who bike regularly. Our environmental friendly product allows users to charge their phones during their commute, while accessing their phone for various purposes, such as GPS and flashlight

Scale Up Production

Both injection molding and stamping & forming will allow us to produce a large quantity of part rapidly. Producing a high quantity of parts at high efficiency rate will lower production costs per part.

Housing: Injection molding with resin

Dynamo Clamps: Metal stamping and forming

Phone Mount: Injection molding with ABS

Reflection

We learned a lot about tolerance in manufacturing processes and how our design would require us to choose manufacturing methods carefully. More importantly, we learned how to use our knowledge from E27 on developing products that could benefit society.

In the future, we hope to better protect the electrical components in harsh weather by developing an elastic and watertight housing unit to prevent water and dirt from getting in. We would also make the clamp and mounts more adaptable to various bike frame sizes.

Differentiation

Clean energy

- does not require a battery pack
- powers devices via the energy generated from the rotation of the rear wheel

Compact

- includes pre-assembled components (unlike current solutions that are marketed as DIY projects)
- just install and go!

Accessibility of phone

- allows users to access the phone's functionalities (e.g. GPS, flashlight) while it is charging

Existing products often have a limited set of features, but our solution combines these into one compact and easy-to-assemble product.

Materials & Processes

| Component Name | Process | Material | Reasoning |
|---------------------------------------|-------------------|---------------|--|
| Housing | 3D Printing | PLA Filament | -Can print simpler geometry of housing -light weight -cheap to produce |
| Bottle Dynamo Mount (Mount to Dynamo) | 3D Printing (FDM) | Ultimaker PLA | -Can print complex geometry -light weight, but stiff -cheap to produce |
| Bottle Dynamo Mount (Mount to Bike) | 3D Printing (FDM) | Ultimaker PLA | -Can print complex geometry -light weight, but stiff -cheap to produce |
| Phone Mount (clamp for phone) | 3D Printing (FDM) | Ultimaker PLA | -Can print complex geometry -light weight, but stiff -cheap to produce |
| Phone Mount (mount for bike) | 3D Printing (FDM) | Ultimaker PLA | -Can print complex geometry -light weight, but stiff -cheap to produce |

Design



| Fit # | Connects Component (A) | ... to Component # (B) or external object | Function of Fit | ANSI grade of fit or "snap fit" | Component A Critical Dimension Tolerance | Component B Critical Dimension Tolerance |
|-------|--------------------------------|---|---|---------------------------------|--|--|
| 1 | Dynamo clamp (mount to dynamo) | Dynamo via M10 bolt | Attach dynamo to mount | LC10 | Hole Diameter 11mm ± 0.4 mm | 9.9mm ± 0.1mm |
| 2 | Dynamo mount (mount to bike) | Bike frame via M10 bolt | Attach dynamo mount to bike frame | LC10 | Hole Diameter 11mm ± 0.4 mm | 9.9mm ± 0.1mm |
| 3 | Housing | Bicycle frame | Hold electric components in place on the bike | LN2 | Diameter 19.8mm ± 0.4 mm | Diameter of bike frame |
| 4 | Phone mount (mount to bike) | Bicycle handlebars | Hold the mount onto the bike | FN2 | Diameter of clamp that attaches to handlebar 22.1 mm ± 0.1 mm | Radius of handlebar 11.1 mm |
| 5 | Phone mount (mount to phone) | Phone | Hold the phone in place | N/A (mechanism) | Minimum width of clamp (ie. when clamp is closed) that attaches to phone 70 mm | Width of phone 75.8 mm |