MTB T-Bar Tow – The Ben Shima Group

Overview
In recent years, chair lifts and gondolas have become more popular for winter sports, leaving T-Bar lifts abandoned. This project aims to repurpose outdated T-Bar lifts for downhill mountain biking by designing an attachment capable of towing a mountain bike and rider up a mountain.

Objective
The objective for this project is to design, build, test, and validate an attachment for a T-Bar lift capable of towing a mountain bike and its rider safely to the top of a mountain.

Approach
- Established a list of customer needs and target specifications through multiple discussions with the sponsor
- Researched T-Bar lifts and downhill mountain bikes
- Reviewed materials and previous designs provided by the sponsor
- Generated concepts and used a concept scoring matrix to select the best design option
- Performed an external search to review patents and existing products
- Designed and fabricated cardboard pre-pre-alpha prototypes
- Designed and fabricated wooden pre-alpha prototypes
- Tested pre-alpha prototypes for fit and comfort
- Generated CAD models for six iterations of alpha prototypes and 3D printed each iteration with PLA material
- Performed an engineering analysis to determine loads on the alpha prototypes
- Tested the alpha prototypes and evaluated them with regards to the customer needs
- 3D printed the final prototype with PETG, a superior material compared to PLA
- Performed full test procedure on the final prototype to validate the design

Outcomes
- Unique final design is unlike any products currently on the market
- Final prototype provides a means for towing mountain bikes and riders up a mountain
- Final prototype is a universal design that can be used for all mountain bikes
- T-Bar lifts can be used during warmer months to tow mountain bikes and riders, thus generating revenue for ski resorts
- Final prototype can be mass produced by injection molding for minimal cost