Low Cost Cargo Bike for Developing Nations

Faculty Advisor: Dr. Kevin Kochersberger

Graduate Advisor: Yang Chen

Darren Barlow, Oliver Donkervoet, Charlotte Ebeling, Veronika Glitz, Wes Kurowski, Jason Luci, Stephen Patterson, Matt Schmidt, Ben Seiden, RD Stoepker, Alex Yi

Problem: Rural farmers in many developing nations lack an affordable mode of transportation to move produce to market

Objective: Design an affordable cargo bike for use in developing nations

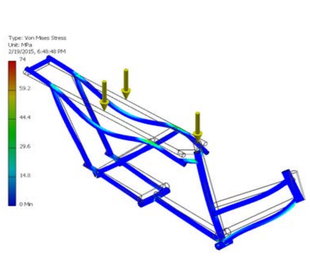
Frame

Long bike Design

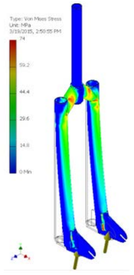
Long bike with a step through frame:
Easy and comfortable transportation of goods and persons even of women with long dresses

Durability

Infinite Loading analysis with a factor of safety of 2.
2 g force on rack and 1.5 g on saddle
Endurance limit = 74 MPa



Max Von Mises Stress= 31.1 MPa



Max Von Mises Stress= 68.7 MPa

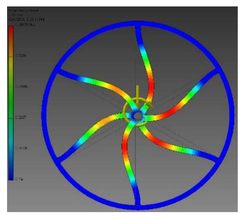
Manufacturing

Welding quality in Africa is not up to par. Manufacturing of the frame will be completed out of country

Wheels

Initial Concepts

Disc wheel
20kg - $48



6 spoke wheel
2.6kg - $33

Final Design

Conventional Wheel Kevlar Tire Air Tube
Decision based on cost and weight: $16, 0.7kg

Testing

Puncture Resistance/ Static Load: >400lb

Tire Wear: 21g mass loss after 43 miles

Components

Kickstand/Chain Tensioner

Kickstand made from simple PVC tube for comfortable and safe loading. DIY chain tensioner to tension that chain and keep it from falling off

Brakes

Coaster brake in the back for low maintenance V-brake in the front assembled with bolts instead of specialized parts

Pedals

Wrapped pedals for barefoot riding

Fenders

Plastic bottle fenders to keep rider clean from any kickback

Back Rack

Durability	Type 5 DOM Steel
Carrying Capacity	Back rack: 70 kg Saddle: 100 kg
Affordability	$114 cost
Repairability	Standard steel tube
Cultural adaptability	Step through frame and chain guard for longer clothing
Comfort	Ergonomic grips, saddle and design