Hans Cycles Cargo Trike

Gordon Hansen

Funding Provided by: NCIDEA™ CORPORATION FOR Entrepreneurship & Innovation

Western Carolina University

PROBLEM STATEMENT

Team 20 was tasked with creating a tricycle design using the tadpole transmission designed by Hans Cycles. The tricycle must be designed with two front wheels and one rear wheel, with the ability to carry a second passenger on the front.

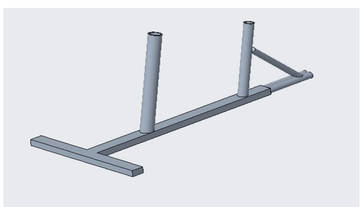
REQUIREMENTS

The trike needed to be able to handle obstacles such as curbs, roots, and other common obstacles on a typical commute. The trike had to be able to comfortably support a rider on the front carriage of the trike.

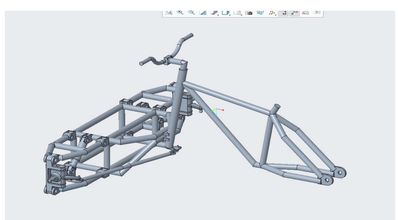
#	Description
1	<$1,500 Manufacturing cost. The sponsor would eventually like to sell the trike for around $2,000.
2	Modular Design. The bike must be easy to assemble.
3	Carrying capacity of 200lbs cargo or rider.
4	Trike incorporates the patented custom transmission.

CONCEPTS

- The team initially produced two main designs for the trike
- The first design was much simpler and did not include a front suspension.
- The team came up with an alternative design that featured suspension for the front carriage of the trike.



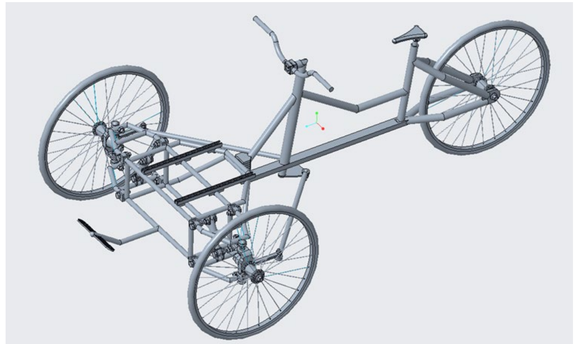
CAD model of initial frame design



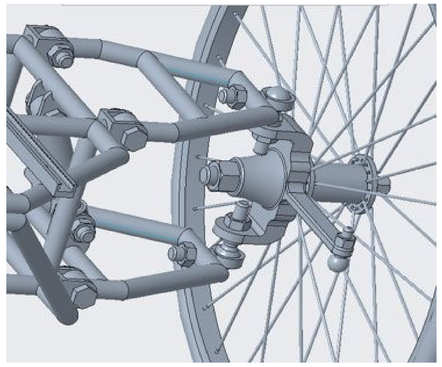
CAD model of the alternative tricycle design

FINAL DESIGN, APPROACH, PLAN

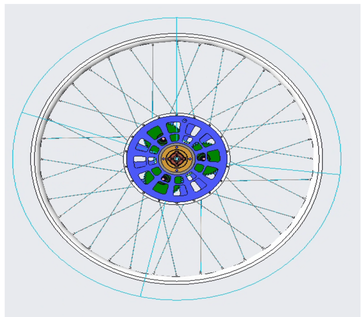
The team began the year with brainstorming designs and concepts to best suit the requirements the project. After several concepts were created, the team decided on the final design and began to rework it to enhance and strengthen the design. The design the team chose for the cargo trike is shown in the figure below. The frame of the trike was to be fabricated from steel, due to its rigidity and ease of machining.



CAD model of the final Tricycle design



CAD model of steering assembly and front suspension



CAD design of rear tadpole transmission created by the WCU Rapid Center

RESULTS

The construction of the Han's cargo cycle began with the front section of the frame, including the control arms and custom hub assemblies. The rear of the frame was then assembled, as well the crank arms for the tadpole transmission. The picture below show the custom suspension system and wheel hub designed and fabricated by the team.

Control arms with suspension and unfinished hub

Tricycle Prototype in progress

Rear Transmission built by the WCU Rapid Center

SUMMARY AND CONCLUSIONS

The team was able to finish an alpha prototype for the Han's cargo tricycle, implementing the tadpole transmission. Due to time constraints, several sacrifices had to be made on the final prototype design. The photo in the results section to the left shows some of what the team had completed at the time of making the poster. The team had several setback throughout the course of this project, delaying the construction of the trike. Additional progress was made by the end of the year.

FUTURE WORK

Gordon Hansen would like to see a continuation of this project in future capstones. The possibility of another version of the tadpole transmission also may be created for future projects. One possible future project is a Bicycle design utilizing the tadpole transmission.

TEAM & ACKNOWLEDGEMENTS

- Grayson Fowler – BS Mechanical Engineering
- Cade SmithMartin– BS Engineering Technology
- Matthew Daggerhart- BS Engineering Technology
- D'Najah Slappy- BS Engineering Technology
- Sponsor- Gordon Hansen
- Mentor- Timm Muth
- Assistance from WCU Rapid Center