

FAMU/FSU College of Engineering

Department of Mechanical Engineering

Need Statement

Team #22: Development of Functional Pedibus

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Abstract

The scope of the Pedibus bus project is to deliver a fully functional Pedibus to the sponsor by March 14 of next year. So far, the team has contacted and met with the project sponsor, Ron Goldstein, to discuss design constraints and ideas. Though very few design constraints have been placed by the sponsor, the team is challenged with the task of delivering a top tier product that will be sure to enhance Mr. Goldstein's current business model. The Pedibus design has been broken down into separate design categories and each has been delegated to a current team member. Brainstorming meetings have occurred, and the team has discussed each separate aspect of the design. Final design concepts have been completed and are ready to be discussed with the sponsor for approval. Computer models of the Pedibus will be completed up to shop standards within the next two to three weeks; this will ensure a timely start of the fabrication process. The team plans to have a functioning Pedibus by the end of the fall semester.

1 Introduction

In response to the finalized product that was delivered last year, the Pedibus senior design project has been assigned again for the 2014-2015 school year. The sponsor has instructed the current team assigned to this project to design and fabricate another fully functional, multi-user, pedal powered vehicle called the Pedibus 2.0. The scope of the project is to have a fully functional product by Springtime Tallahassee, thus the team received the date of March 14, 2015 as a completion date constraint. The sponsor and owner of Capital City Pedicabs, Ron Goldstein, has given the team minimal design constraints and has allowed the group with almost unrestricted creativity for the design. Mr. Goldstein plans to add the Pedibus to his fleet of pedal powered vehicles, with hopes to increase his exposure.

Several design considerations have been determined from pre-existing models of this vehicle. However, the team plans to integrate numerous new design ideas not seen in the market before. The final product must be simple and rugged in nature to ensure minimal maintenance and optimal functionality. The design and build will be oriented around maximizing potential revenue sources. The Pedibus is planned to serve as an entertainment venue around the city. A modular design will be adopted in order to allow the sponsor freedom to expand the use of the vehicle across many demographics. This modularity will help provide additional revenue and exposure for Capital City Pedicabs.

2 Project Definition

2.1 Background research

The concept of a multi-user bike utilized for leisure and group entertainment is an existing concept. Typically, this type of vehicle is used as a mobile attraction, often including on board entertainment and refreshments. In other cities this type of vehicle has existed through a variety of different names (i). This business model is a fairly recent development for major cities in the United States. A handful of private investors have had one of these vehicles fabricated to fit a specific business model. These vehicles vary in design and performance since there is no single manufacturer that has monopolized production. Although different in detail, all party bikes share several characteristics, such as the seating arrangements and similar frame construction.

The current project sponsor, Ron Goldstein, owner of Capital City Pedicabs, has requested an original design based on the aforementioned vehicles as a new venture for Capital City Pedicabs. This is a unique design challenge due to the environmental constraints present in Tallahassee. Because of the custom nature of these machines, literature regarding the design specifications is difficult to source, therefore the team will be working closely with the sponsor to ensure an acceptable product. The fabrication of this project was attempted last year by another senior design team and some of their design concepts will be implemented into this build, but most of the final product will remain original and one of a kind.

2.2 Need Statement

The current sponsor for the Pedibus project is Ron Goldstein, owner of the Capital City Pedicab Company here in Tallahassee. The sponsor wants to have a fully functional multi-user bike that can be rented out for events around the city. In addition to having a multi-person bike, some form of digital advertisement, mounted to the bus, is needed. The build that he received last year was near unsatisfactory. Mr. Goldstein had to reach out to a third party fabricator upon receiving the product for the build to be optimized and finalized. The team plans to deliver a fully functional, optimized product to the sponsor no later than March 14, 2015, in time for Springtime Tallahassee. In order to introduce this new business model to the city of Tallahassee, a well-functioning, and attractive pedal powered bus must be made.

2.3 Goal Statement & Objectives

The Pedibus senior design team plans to deliver a fully-functional and optimized Pedibus to Ron Goldstein by March 14, 2015, along with shop drawings and build specifications for possible future reproduction.

- Accommodate a minimum of 10 pedaling riders
- Accommodate at least 2 extra non-pedaling riders
- Optimized design for servicing multiuse (bar, bbq, etc)
- Hitch towing ability
- Packet containing all shop drawings and fabrication specs along with components sourcing
- Detailed cost analysis for entire build
- Fully functional electric driver assist
- A clearly visible digital advertising banner
- Affordable and light-weight power source

2.4 Constraints

The design constraints that have been placed for this build were set both by the sponsor and by law. The sponsor state early on in the design process that we wishes to utilize new, off the shelf parts as much as possible throughout the Pedibus. The sponsor also stated that the vehicle must be able to accommodate 10 pedaling passengers, at least 2 more non-pedaling passengers, as well as the driver and server. Another major design constraint that has been encountered is the ability for the Pedibus to move and perform without it having all 10 passengers pedaling. Therefore a transmission system is going to have to be implemented to ensure that the vehicle will stay fully functional with minimal passengers on board. The bus must be able to effectively climb the hills around the Tallahassee area without putting too much strain on the customers on board. Through preliminary research it has been found that digital advertising banners can be expensive depending on the size, resolution and other parameters. Mr. Goldstein wants a professional advertising banner at a reasonable cost while maximizing advertising revenue. The Pedibus can only support so much weight therefore the advertising banner should not weigh more than the frame can support. This project will operate under a dynamic budget that will be re-evaluated during acquisition in order to allow the sponsor and the team the ability to select proper componentry. The last two major constraints encountered, which are currently being investigated, are to optimize the design of the Pedibus to comply with all current towing and street laws of the state of Florida to ensure the vehicle is fully street legal and legal to tow. (iii)

2.5 Methodology

In order to ensure that a satisfactory product is delivered to the sponsor in a timely manner, the team has put in place a rigorous sequence of checkpoints throughout the Fall 2014 semester. These will facilitate the adherence to a proper schedule for the design and build sequences. The team already has most of the initial design ideas and will be discussing them with the Mr. Goldstein during the next sponsor meeting. If everything is approved, a computer model for the Pedibus will be finalized within several weeks and the fabrication will begin as soon as possible. The two main schedule goals for the Pedibus are to have all the major fabrication (frame, drivetrain, brake system) completed by the end of the Fall 2014 semester and deliver a finalized product with all the optional upgrades and accessories by March 14, 2015.

To maximize the possibility of accomplishing our goals, the team has divided the overall project into two main parts: The main fabrication, which includes aspects such as the frame and powertrain, and then the feature addition of the vehicle. The possible features include all of the non-necessary add-ons, such as LED screens, lights and electric assist. These two main breakdowns have been prioritized and scheduled separately and sequentially for the fall and spring semester. The more immediate priority aspect, the main fabrication and design, has been broken down even further to ensure adequate design prior to starting the build. These parts include: the structure and frame, the power and drive train, the crank and pedaling mechanism, and the seating arrangement. These different categories have been delegated to individual team members to ensure full focus in one particular aspect. These delegations were chosen based on the specialty of each team member in order to appropriately match each team member to where they could contribute the most. Since in the different aspects of the designs are being tackled individually, the team meets regularly to discuss their design and receive feedback from the rest of the group. As stated previously, the group plans to give the sponsor a finalized design concept within the upcoming weeks and get started on the fabrication as soon as possible.

2.6 Schedule

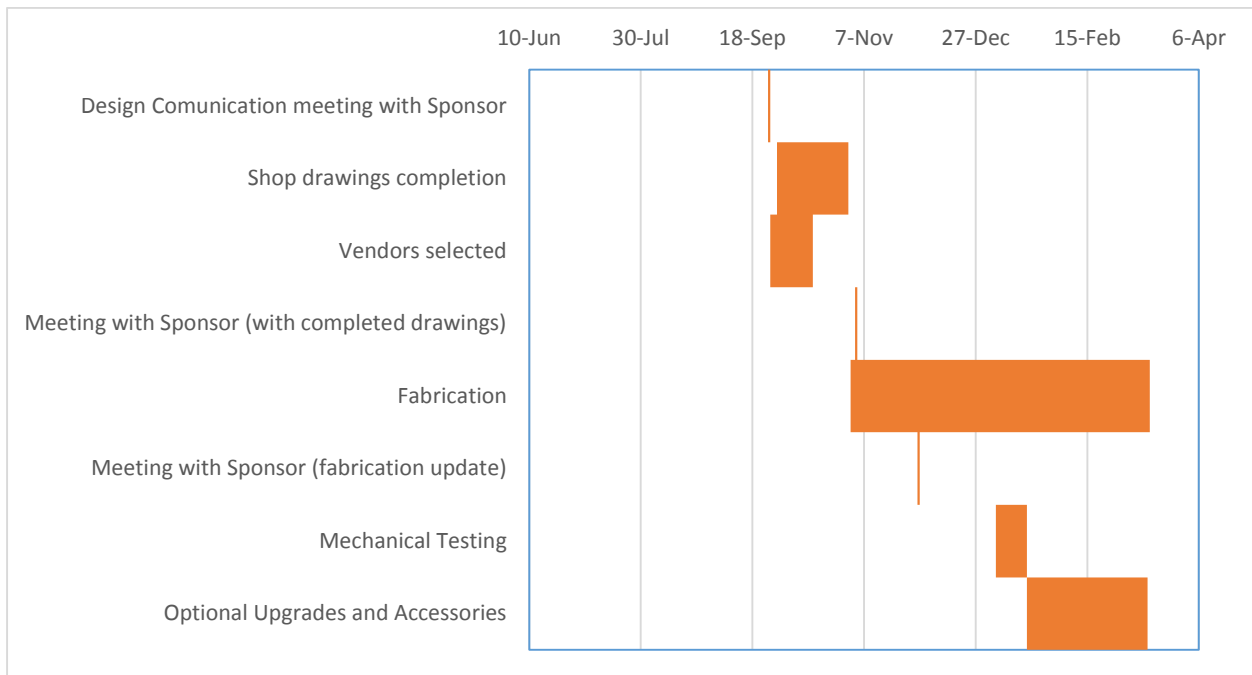


Figure 1. Tentative schedule for major events in the development of Pedibus project

3 Conclusion

At the current time, the team has initial design plans for the Pedibus. These design ideas will be shared and discussed with the sponsor as soon as possible in order to ensure that fabrication begins in a timely manner. The team plans to have a functional Pedibus by the end of the Fall 2014 semester. That way the rest of the time can be invested into providing the most ergonomic and business friendly design by adding upgrades and accessories. The final shop drawings will be generated as soon as the preliminary design is approved by the sponsor. The team plans to have all CAD modeling completed and begin fabrication within the next four weeks.

4 References

i

<http://blog.caranddriver.com/beer-run-we-test-the-pedalpub-a-16-person-alcohol-fueled-party-bike>

ii

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