FAMU & FSU COLLEGE OF ENGINEERING
Department of Mechanical Engineering

EML4552C – Senior Design II – Spring 2013

Restated Project Scope & Project Plan

Mobility Lift for European Insider Applications

Group # 19

Lauren Hulett
Phong Tran
Richard Valle

Project Sponsor: Harmar Mobility Inc.

Project Advisor: Dr. Carl A. Moore, Ph.D.

EXECUTIVE SUMMARY

PREVIOUS WORKS

The fall semester was a prosperous learning experience. The semester began with building rapport with the project sponsor, Michael Savinsky. The design characteristics required and desired by the sponsor were then established. From there, three design concepts were created. Unfortunately, this process was done individually, which was later determined to be better had the team worked together in this development. From these concepts, a single design was chosen—the more traditional design. This chosen concept was altered and improved upon by the team to meet the requirements of the sponsor throughout the later portion of the semester. The components were created and assembled in Pro/Engineer. Initial finite element analysis was conducted on components, and proved to be a challenge. This required the team to learn a new software program, COMSOL Multiphysics®, in addition to Pro/Engineer's Mechanica to perform the FEM analysis. While continuing with the structural analysis of the selected model, the researching into the availability and cost of parts was simultaneously being conducted. Since the sponsor has many of these parts readily available on-site, the ordering process is expected to be expedited. The team also took a trip down to Sarasota, where the Harmar manufacturing facility is located, and had a tour of the day-to-day operations of the facility.

FUTURE WORKS

In looking towards the spring semester, completion of a more in-depth stress analysis of the proposed design is to be completed. Additionally, finalization of a drawing packet by the second week of February is to be submitted to Harmar so that they can provide the required parts. Also, another visit to the Harmar manufacturing facility in Sarasota, FL is scheduled towards the end of January. The goal of Team 19 is to begin assembly and testing of a prototype before spring break (mid-March)—anticipating and allowing time for any obstacles that may occur. From there an owner's manual, economic analysis and final documentations will be created.

PROJECT SCOPE

PROBLEM STATEMENT

Currently, there is a need to provide a solution to individuals in Europe who transport themselves in smaller vehicles. The task is to design a lightweight inside lift to compete in the European Market.

BACKGROUND AND JUSTIFICATION

The interior mobility lift devices currently available in the European market are constrained to complex and expensive systems. The interior mobility lift devices currently manufactured in the United States by Harmar Mobility are limited to larger vehicles, such as SUVs and/or vans. For the individuals that have difficulty walking and require a mobility device, such as a scooter or power-wheelchair, and wish to still transport themselves in their compact vehicles encounter the issue of limited availability of mobility lift devices.

The initiative of this project is to design and build a lift device that will fit into the cargo area of compact European vehicles, have the ability to fold down when the lift is not in use, be able to lift a capacity of 60 kg (130lbs), and be adjustable in height and length. The prototype will meet the requirements outlined later in this report.

PROJECT PLAN

Team 19 will follow a four stage process in order to meet the demands of the sponsor and produce a successful prototype. These stages include: (1) design, (2) material procurement, (3) prototype development, and (4) prototype testing.

DESIGN PROCESS

The design stage involves communicating and visiting with Harmar Mobility to determine the design requirement parameters. The team also met with faculty and technical advisors to aid in the development of the project. Additionally, extensive research on the existing technologies available was conducted. The future task of completing a market analysis on the selected model in a European market setting is also to be completed. In the fall semester, with three initial concepts were presented. This concluded with the selection of one design based on team, advisor and sponsor inputs. At the beginning of the spring semester, certain components that require a more in-depth understanding will be analyzed. These include the design of the strap spool and interface between electrical components, such as the motor, with the mechanical components. Lastly, high quality CAD drawings are to be prepared for the large scale manufacturing process.

MATERIAL PROCUREMENT

Currently, the team is planning a spring semester visit to the Harmar Mobility facility located in Sarasota, FL. The proposed travel date is expected sometime towards the end of January 2013. Unlike the fall semester visit, the team will not be going for a tour of the facility, but rather for the submission and request for raw materials, a motor, a control system, and other supplies while readily available on-site.

PROTOTYPE DEVELOPMENT

The development of a prototype is to begin in early of February. This will involve a two step process: machining and assembly. All machining will be done at the Sarasota Harmar Mobility Inc. facility. The assembly process is expected to begin in the first week of March. Assembly and storage of this prototype mobility lift is to be performed by Team 19 at the newly created mechanical engineering design room at the College of Engineering. This will give the team a chance to troubleshoot any and all problems that may occur.

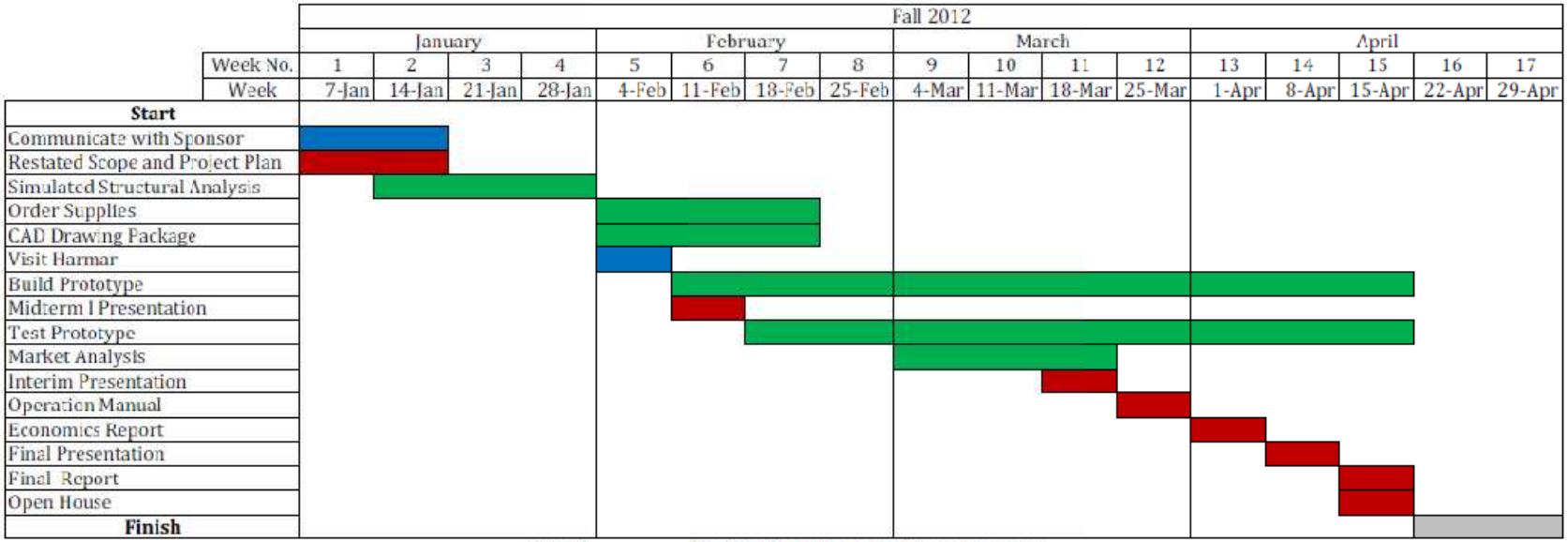
PROTOTYPE TESTING

Since this design is expected to be a consumer product, compliance with Harmar Mobility standards and market standards are to be upheld. The testing process will begin in late March. First, the team will perform the maximum static load test of 390 pounds. Afterwards, the prototype will be sent to Harmar's Sarasota facility for cyclic testing. This will consist of the utilization of an automated testing machine that will performed a 10,000 cycles test to insure our prototype will satisfy the consumer warranty that set by Harmar.

Additionally, the team is allowing three weeks to fix or modify the prototype to address any and all problems that may encounter. The team is anticipating that the integration of the control system to the mobility lift may create a possible bottleneck.

PROJECT TIMELINE

A timeline for the Spring 2013 semester is provided below.



*Website will be maintained throughout the Spring semester

Deliverable Work
Project Work
Other