

IPRO 317 Midterm Report

Testing Group

Objectives

The primary objectives of the testing group are to:

1. Verify the flight tests performed during the previous semester.
2. Confirm the sustainability of the engine and the reliability of control.
3. Verify the ability of the VTOL to successfully complete vertical take off and landing.
4. Verify the ability of the VTOL to transition from vertical to horizontal flight.
5. Demonstrate free flight of the VTOL.

It is very likely that in the process of completing these objectives, other problems may arise that need to be solved. We will focus our immediate attention on solving these problems, however our long term focus will be on completing the primary objectives.

Results to Date

As of March 9, 2006, the testing team has addressed many of the smaller concerns brought forward from the previous semester's work, and in doing so completed some of our primary objectives. We have fixed the problems associated with engine stability by identifying an ideal fuel ratio and by replacing a gasket in the muffler. We also verified the reliability of control of the VTOL for a short range and confirmed it is possible to kill the engine remotely. These components are vital to ensuring the success and safety of operation during flight.

Additionally, we have verified most of the tests performed through the work of the previous semester. We demonstrated tethered operation of the VTOL with and without the rotor blades. These tests restricted the VTOL to completely tethered flight, such that it could not move vertically or horizontally. In order to begin the next phase of testing, we have finalized a design for an apparatus that would allow the VTOL to demonstrate its ability to vertically take off and land as well as to transition from vertical to horizontal flight.

Task Schedule

The following goals have been set to complete the tasks necessary to meet our objectives:

- Purchase the supplies necessary to construct testing apparatus (3/10/06)
- Construct testing apparatus (3/21/06)
- Demonstrate and verify vertical, tethered flight (3/30/06)
- Demonstrate and verify vertical to horizontal, tethered flight (4/10/06)
- Demonstrate free flight (4/20/06)

Barriers and Obstacles

As expected there have been barriers along the way that have diverted our attention from our primary objectives or forced us to solve a specific problem.

There were two large obstacles we faced thus far: starting up the engine and sustaining the engine. It took a longer time than anticipated to start the engine on the VTOL because the precise fuel ratio had to be determined and the engine was not primed with enough fuel to turnover the engine.

The other problem we faced was ensuring the self-sustainability of the engine. After we were able to repeatedly start the engine it immediately turned over and died. We trouble-shooted the issue and concluded the problem was due to the degraded gasket in the muffler. The gasket was not providing a proper seal, and therefore was not allowing the pressure required to keep pumping fuel into the engine. We designed a new gasket and replaced it in the muffler. Although it took a fairly long time to identify the problem, this solution has allowed the engine to remain sustainable during operation of the VTOL.

Fundraising Team Midterm Report

1. Objectives:

Continue seeking sources of funding through grants and information through market surveys. By the end of the semester we should have a reasonable number of survey submissions and several proposals submitted for funding. Additionally, we will create a brochure that will provide answers to the most common questions encountered about the project. 📄📄

2. Results to Date

We have had very limited success with the market survey; getting results for something like 20, and, of these, many may not have been taken seriously. As for funding, we have compiled a list of possible sources and have begun to compile the necessary information to complete their application processes.

3. Task Schedule

Beginning week of Mar. 6 – Build contacts (NASA and others); Continue adding to list of possible resources
Beginning week of Mar. 20 – Work on information brochure; Acquire parts list from the parts team
Beginning week of Apr. 3 – Finalizing market survey; Finalizing grant proposals and funding applications
Through end of semester – Work on final presentation

4. Barriers and Obstacles

Although there are many sources of funding for innovative projects, it is important to distinguish our work as a constructive, guided process with high probability of results as compared to a spontaneous attempt at a harebrained idea. Last semester's grant proposal was rejected most likely for failing to show a reasonable business plan. We hope that our information brochure will display that issues such as marketing, societal issues, etc. have been thoroughly investigated.

As of now, attempts at making corporate contacts have also been unsuccessful. We will continue to get word of our project out to individuals and companies who are in a position to possibly help.

Our experience with the market survey has shown that people are not very willing to participate even if it only takes a couple minutes. Also, it is difficult to create a survey that will be unbiased and also one that will be taken seriously. More work needs to be done to accomplish these goals and to gain valuable feedback from it for our project.

**IPRO 317—VTOL Aircraft
Midterm Progress Report
Design/Parts Team**

TASK AND PURPOSE

The design and parts team is charged with the task of refining the design of the microscale model and the full scale prototype of the VTOL aircraft, and finding parts that can be purchased moving forward for the building of the full scale and microscale prototypes. The primary tool of this team is the X-Plane simulator, a computer program that can model the behavior of the planes and accept various input parameters.

CURRENT PROGRESS

The group has taken the time this semester to master the use of the X-Plane simulator. With that established, we have modified the models slightly to maximize stability. The group had now moved into the establishment of the parts list, and is just reaching the point of being able to test the parts on the simulator.

FUTURE ACTIONS OF THE GROUP

As we move toward the end of the semester the group has a couple of tasks at hand. First of all, the group will be producing a nearly complete list of the necessary parts to construct the microscale model, and also begin to look into the parts necessary to construct the full size prototype. The group's plan is to use the simulator to determine approximate specifications necessary for parts, then to find actual parts which are available and input their properties into the simulator and record their performance. The acceptable parts will be placed into a list. This list will be available to the build team and the funding team in order to determine finally which parts will be purchased this semester for moving forward.