

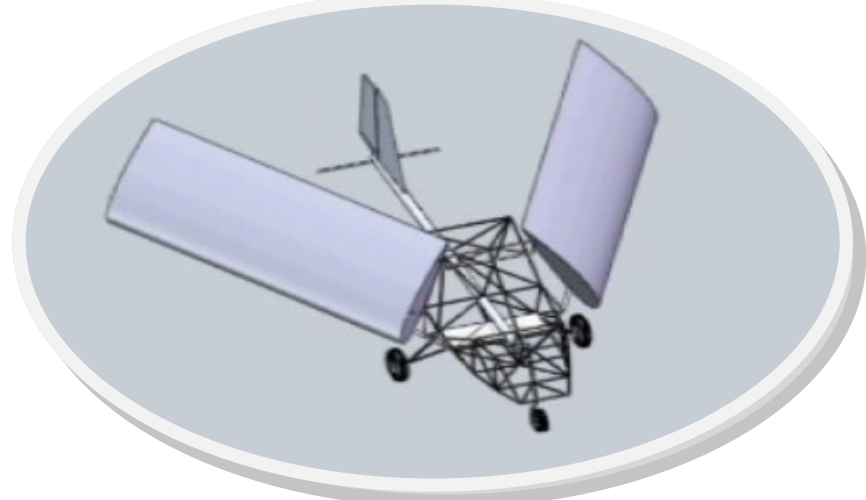
The Transportation Groups

LIGHT SPORT AIRCRAFT

Richard Dufrenne

Background and History

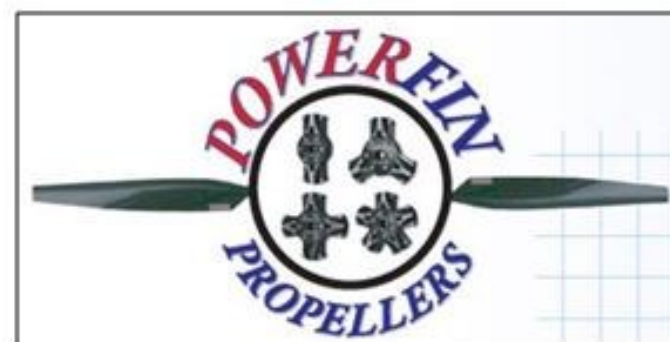
The LSA has been a long term project within both the Collaboratory and the IPC here at Messiah. For the past several years, there have been many persons working on multiple aspects of the entire plane. From folding wings and flight controls, to engine mounting and suspension, each aspect required the hard work and dedication of the members to come to fruition. The main three goals of this aircraft are: folding wings to promote easy ground transportation or shipping, Short Take-Off and Landing (STOL), and affordability.



The FAA classification of Light Sport Aircraft also does not require the same stringent processes for acquiring a private pilots license as some other planes. This allows an opportunity for more persons to become pilots. This also cuts down on training costs, and the LSA classification requires more safety features and materials than an Ultralight, but not so many as to price it too high. Thus making an LSA and affordable option for medical services in remote areas. The STOL capacity also allows the aircraft, equipped with the right wheels, to land in small rugged areas; fields, unpaved roads, and plains to name a few. This allows for the plane to reach those areas which are too isolated for land vehicles to reach quickly in order to provide the possibly life saving medical assistance. With this development, small towns and villages can send seriously injured patients to more advanced facilities easier and much more safely than in the back of a slow moving and rough riding land vehicle.

Clients

The LSA had its beginnings in the flying club here on campus, and after it disbanded, was picked up solely by IPC. In the intervening years, the LSA acquired its two current clients. These clients are HKS, the manufacturer of our engine, and PowerFin, the manufacturer of our propeller. Both clients are interested in hearing our performance data, and any issues we run into in the manufacturing and integration processes. Currently, the LSA has no client, but the Collaboratory is searching for a client who is interested in the many uses of the LSA.



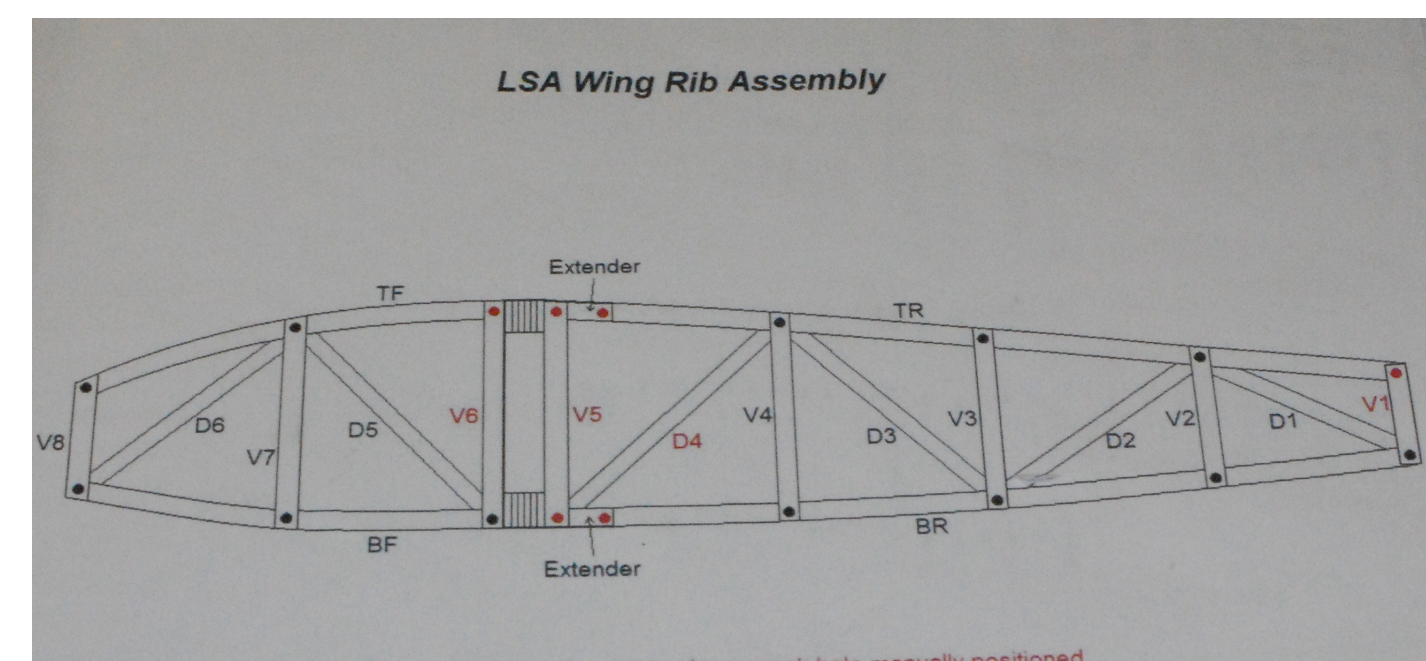
Semester Progress

This semester, work began with the intention to finish what previous students had started, but when the realization that almost all previous members had either graduated or left to other projects, we began to reconsider.



That is, when work began, we had to take another direction. Instead of focusing on the engine, as the previous work had ended with, the new recruits and myself began to broaden the scope of the project. The remaining work was divided into the main three remaining areas to be completed and a consensus was reached to focus instead on the wing construction and folding, our beginning materials are depicted to the left and below. This development required myself and the Group Orientation students to delve into the plethora of knowledge left behind by our predecessors. The majority of the

work carried out by the incoming students has been to look at past log books and discover what information can be gotten from them. We have learned much and are preparing to launch into the fall semesters work with gusto



As the sole remaining senior member of the LSA Team, my area of focus throughout the semester was to finish one aspect of Engine Integration tasks which was crucial now that another project within our group required the test stand that the HKS engine had been mounted to: finishing the base mount. The base mount is an important component of the fuselage because it accepts and withstands the force of the spinning engine and rigidly connects it to the fuselage along with the trust mount. These two pieces are crucial and must be manufactured to fit in three dimensional space to hold the engine in the correct

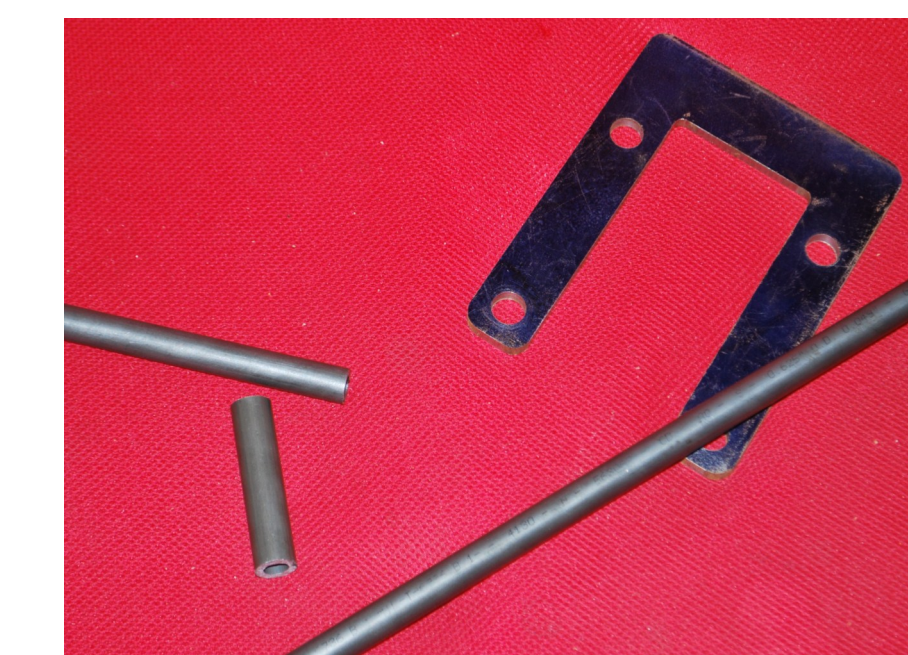
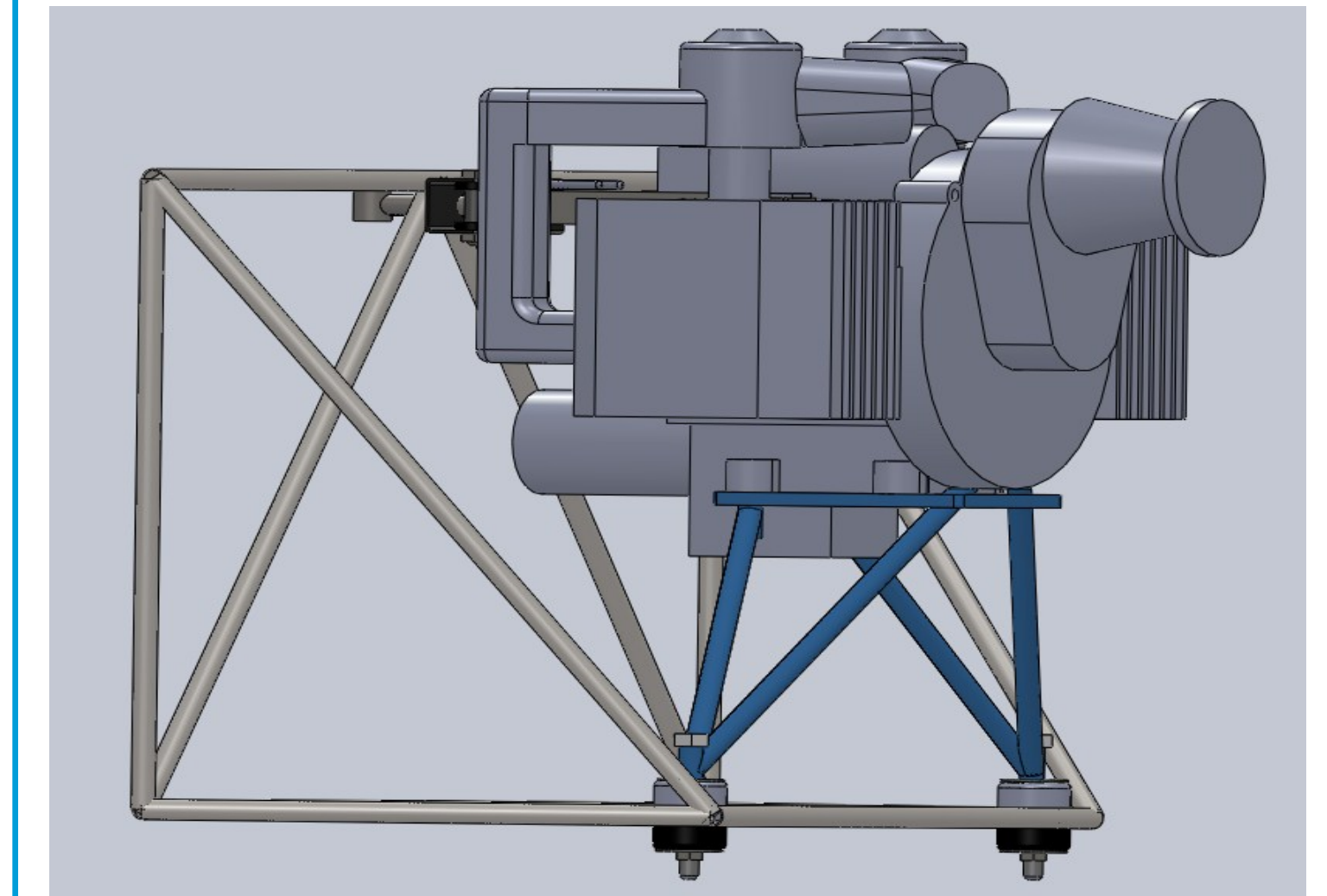
Want More Information?

More information can be found by visiting the Collaboratory Wiki page at: http://www.thecollaboratoryonline.org/wiki/Main_Page

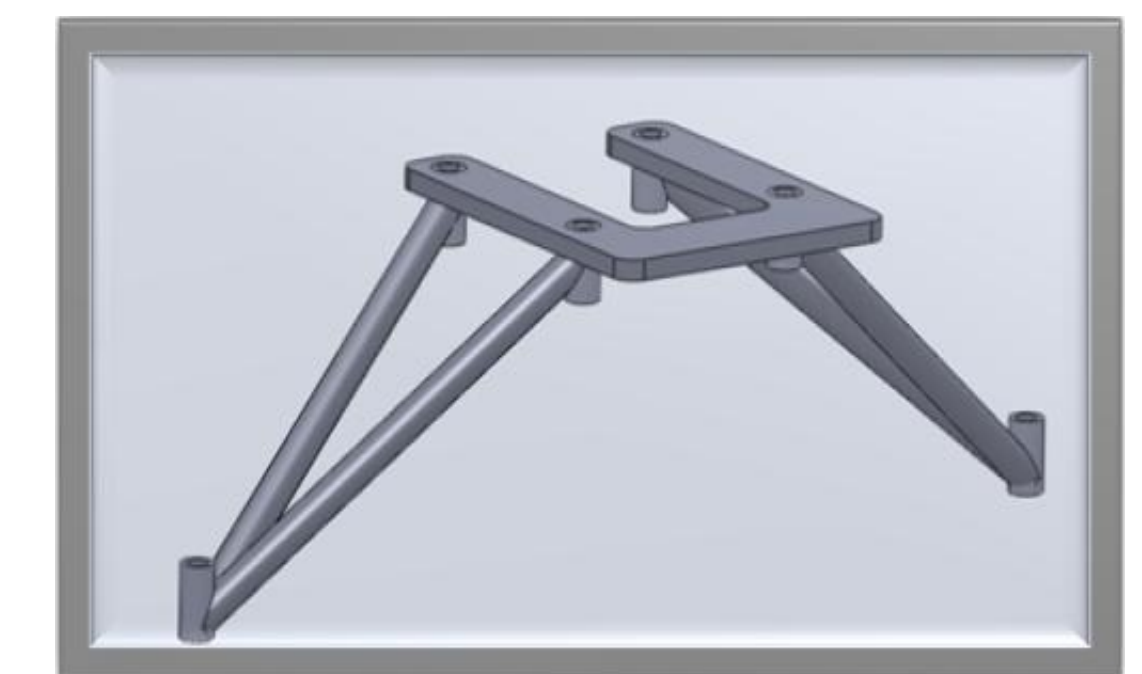
And going to the Application groups tab on the left, then to the Transportation sub-heading, and then finally to the Light sport Aircraft heading, or by e-mailing the Project/Group leader, Richard Dufrenne at Collabtransportation@messiah.edu.

Results

The product of the semester work is a finished Base mount ready for welding and attachment to the fuselage, and a firm understanding of the wing folding as well as how to construct them. The finishing of the base mount is a wonderful development in the project and provides a physical demonstration of the progress being made despite setbacks and loss of manpower. The gathered understanding of the wings allows us to begin training for assembly of the finished product.



Became



Future Directions



The LSA has taken a new direction beginning this semester, so the future of the project is to make progress with the wings and the joints thereof. The continued work that will begin in the Fall is firstly to train all members currently on the LSA team to manufacture the wings as well as to study the folding of the wings. Our plan is to take the current design of the joints, pictured left, and scale them to one-fifth of the actual size, and place them on a scale model of the fuselage. Using this scale model, we can study what must be accounted for when designing the second joint and the support strut. Afterwards, a second joint must be designed and tested before a final product is manufactured for the LSA. From there, the wings joints and struts can be manufactured and then the control systems can be made and mounted to the wings.

Special Thanks To:

Project Advisor: Dr. Donald Pratt
Shop Manager: John Meyer

Group Orientation Students: Jason Wright and Melanie Aroniss

All past Students whose research greatly helped in our research of the wings, wing folding, and wing construction for the semester.

