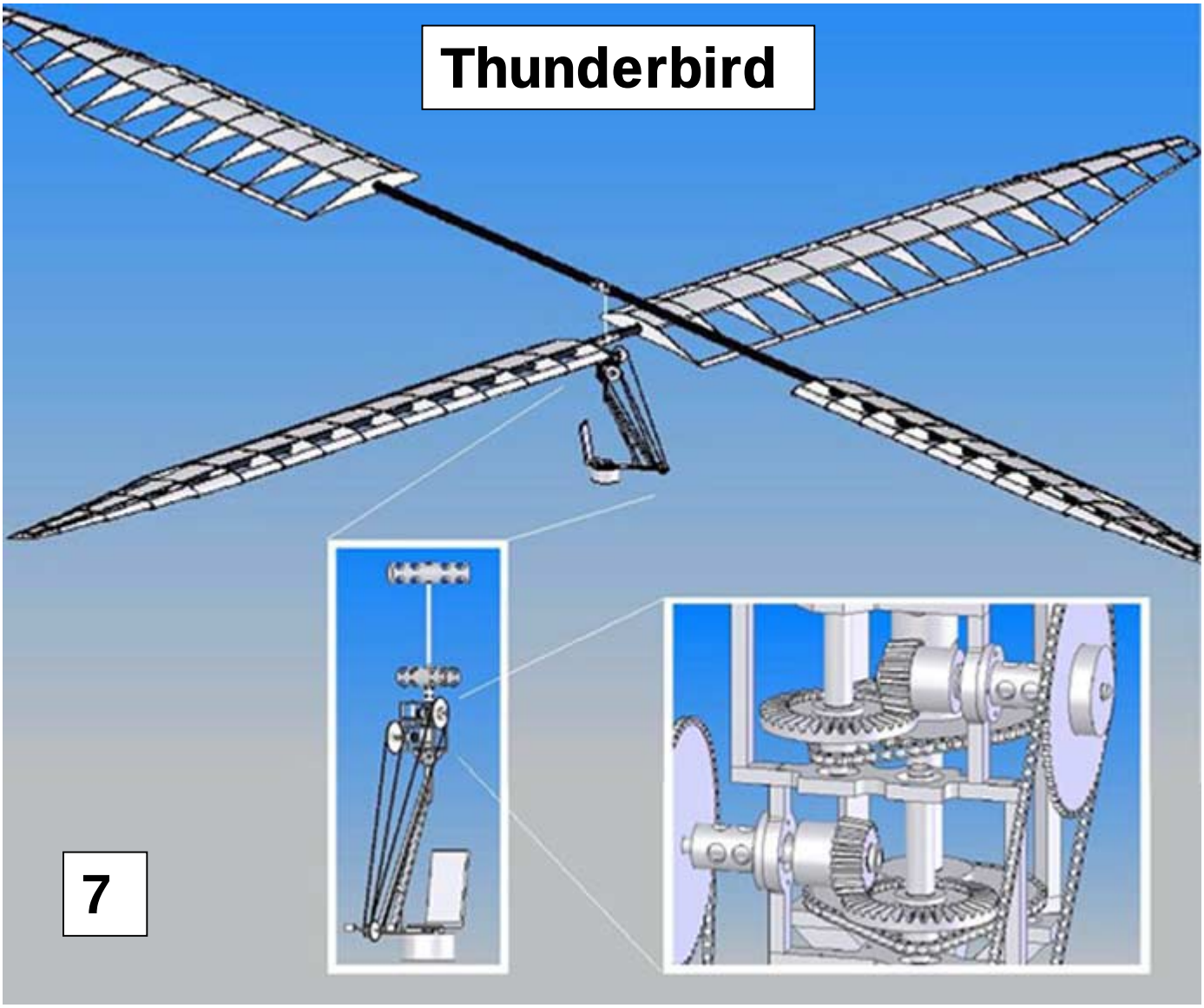
Education and Campus News by Jim Bell



This **WAS** going to be a short one. The B/W Chapter has just completed its 25th annual Vendor Nite. It was a fantastic success. 120 people signed up to participate with 21 table top exhibits. I spent a tad more time on helping with its preparation than I had intended. Does your chapter provide a Vendor Nite? If not, why not? If not, why don't you take action to do so? Putting on a show like this is relaxation, fun, educational. Bet you would have people coming out of the woodwork to attend!

I started writing the E&C News for the 2001 Jan/Feb issue of the Journal. In each year, four of the issues were on student chapter activities, one on the next year's SAMPE Education Programs and one on the winners of the present year's programs. That makes for 15 issues on student chapter activities. By the way there has not been a repeat in the student chapters in that time - until now. We have an appropriate time for it now. The University of British Columbia (UBC) was the E&C News first full length article in the 2001 Jan/Feb issue. At that time, they were working on a human powered helicopter called the "Thunderbird". They were going to fly it in the summer of 2001. That did not happen. They are still working on it. This will be an up date on its progress. To help to do so, here's an excerpt from the 0101 E&C News article.

"In 1980, the American Helicopter Society issued a reward of $20,000 for the first group to build a human powered helicopter. The conditions of flight are: strictly pure hover - no lateral motion required; maintain flight for one minute; keep in a zone of 10 meters square; and to momentarily reach height of 3 meters. In the passing 20 years there have been 18 attempts at this $20K award. Only 2 have attained flight time. The American entry was California Polytechnical Institute – San Luis Obispo. Their time in air was 8 second and reached a height of 8 inches. The Japanese University of Nihon flew for approximately 19 ½ seconds at a maximum height of 8 inches also. The University of British Columbia (UBC) has an active SAMPE student chapter on campus. The faculty advisor is Dr Anoush Poursartip (Photo 1). The sponsoring professional

chapter is Seattle. Three years ago UBC decided to take on the task of designing, fabricating and testing of a human powered helicopter. They put in an initial technical proposal to Joe Leonardo's Student Chapter Yearly Program Funding the second year. They followed up with an additional carry on proposal last year. The two proposals netted the UBC chapter $1325 to play with. Professor Poursartip assigned the project to Michael (Mike) Georgallis, a PhD candidate (Photo 2). They are scheduled to fly in the summer of 2001."

Mike is still on the project. He has been and is the driving force for this project and his enthusiasm infects students, faculty and sponsors alike. He just completed his successful defense of his thesis, which is on a completely different subject than the Thunderbird. By the time you read this he will have received his Doctorate Degree. He plans to stay around for the flight of the Thunderbird and is hoping to become an assistant professor with the idea of encouraging students to pursue projects such as the Thunderbird. The UBC SAMPE Student Chapter is still active in SAMPE's Education Programs. They won $600 in 2002 in Joe Leonardo's Tech Proposal Program (Guess where the money went?). In Tony Saliba's University Research Symposium, Elvis Cepus won a trip in 2001 to the 2002 JEC/SAMPE Paris show; in 2002 as a senior, Tim Sargent gave a talk on the Thunderbird spar; and in 2003, Marcus Robinson talked about hip replacements.

The design of the "Thunderbird" is a two-opposing-rotation rotor system (Photo 3). Note that the upper rotor has a larger span than the wing span on a 737. If they rotate the upper rotor at 3.5 rpm and the lower at 6, the designed lift would be 137 kilos. With a pilot of 74 kilos, that left 63 kilos for the craft weight. Mike says that they are a bit over the craft weight but are under on the pilot. So it ends in a wash. UBC missed the flight date by a bit. Let Mike state the present plan of attack. " Let me first give you the overall picture. We have completed all the wings, all the parts for the pilot support structure and some of the parts for the transmission. Two items still remain: welding of the support structure and machining of any remaining parts for the transmission. The schedule is as follows: By the end of May--- complete remaining parts (manufacturing, welding etc.) June -- will be used for final assembly (with some testing) and first flight is planned for July." A lot of effort has gone into this project. If they are successful, what a feather in UBC's cap this will be.

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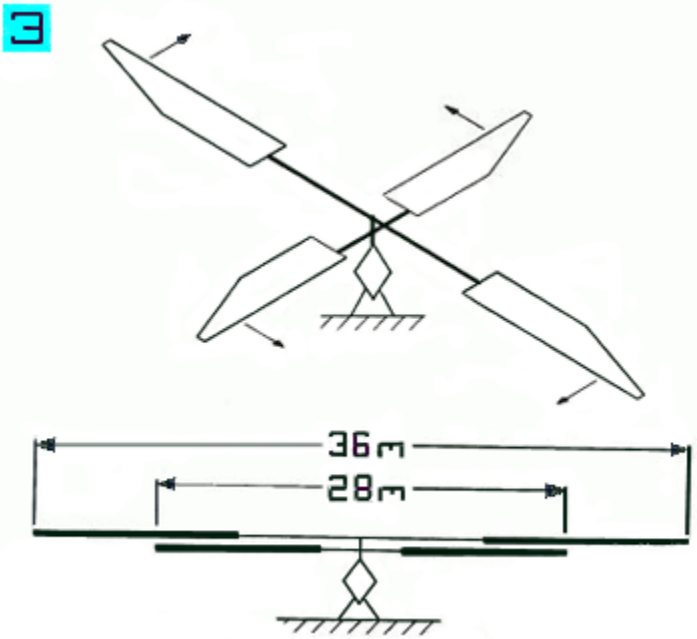

In the 2 1/2 years since we visited the Thunderbird, a major change took place in the rotors. The upper rotor's diameter was increased from 32 m to 36 m and the lower rotor's diameter was increased from 20 m to 28 m Naturally that forced an increase in every spar. UBC's spar segment length manufacturing capability did not. The main spar segment remained at 5.5 m and the tapered tip segment remained at 4.5 m. The total number of pieces to each spar was increased. The total length of each spar from hub to tip was gained by cutting the main 5.5 M spar segments to the lengths necessary. The tapered tip segment was kept constant for all spars.


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As explained in the 0101 E&C News, curing the 5.5 meter spar sections requires pretty good sized equipment that UBC doesn't have. Photo 4 is a recap of the standard electric home ovens that UBC put together to cure their spar sections. The photo shows not only the oven assembly but also a finished 5.5 meter spar segment.

The 4 people in the picture are left to right, Wesley Narciso, Team Leader Mike Georgallis, Graham Twigg and Anthony Floyd. All but Mike has gone on to other fields of endeavor. The team that is presently putting the Thunderbird together is shown in the following photos. Left to right they are: Jason Chak, Winson Cheng, Matt Hay, Graeme Housser, David Leung, Ivan Lio, and Cory Reid.

As usual, the project is so big that none of UBC's usual static test equipment can handle testing a 13+ m spar let alone a 17+ m. So improvisation takes place. Photo 5 shows a 13+ m spar in cantilever mode. The shopping bags are filled with the proper weight of sand representing the approximate load at the point that each bag is hung. The deflection shown is 1.65 m. The 17+ m spar deflected 3.4 m. By the way, these deflection were within 10% of calculated deflections. All 4 spars have been static tested by the shopping bag method to design load limits.

Assembly of one of the lower wings is shown in Photo 6. The red shirt and blue jeans belong to Graeme Housser. The hands on a cup of resin adhesive in the lower center belong to Jason Chak. They are in the process of gluing the polystyrene foam to the spar

and ribs. At this time everything is quite delicate, The ribs are polystyrene also. Hey! Trying to make a monster wing like this gossamer is not an easy job.

This article, however, was made easy by Mike Georgallis. I hope the two of us can finalize this program with a successful flight article in the 0503 issue of the E&C News. Wouldn't that be great!

Why Photo 7 is first! My PC gives me a fit when I try to fit in words and pictures after the main article has been finished and the main group of pictures positioned. I liken it to a bag of live frogs! All the pictures jump all over the place. Photo 7 is an exception. Mike figured that this photo was much more representative of the present thoughts. Mike worked on me to show it instead of the old sketch. It shows not only a more realistic rotor/wing look but includes the transmission and chain drive. The top view gives a size relationship to the rotors and gondola that enshrouds the recumbent bicycle seat system, chain drive and transmission. The left hand inset shows the seat, chain drive and transmission a bit clearer. The right hand inset shows the transmission in breakout. Note photos 5 and 6 wouldn't behave themselves. So they have the back seat!