



ENGINEERING NEWS

Light sport aircraft engine project moves forward despite setback

By LSA Student Team and Don Pratt

The Light Sport Aircraft (LSA) project began in 2005 as an initiative of the Messiah College Flying Club, with the intention of designing a low-cost plane that could be used for medical missions flights. After an exhaustive search for a suitable engine, the design team chose the Rotamax rotary engine and secured an agreement with the Rotamax company to work with them on developing an aircraft version of their engine. Over the next four years, Messiah students designed and built an instrumented engine test stand, a reduction drive and an innovative mounting system. They also worked on the cooling and exhaust systems and spent hours testing the engine with various props under a variety of conditions. Just when we thought we had all the details worked out, the Rotamax company went out of business, sending the LSA engine team back to square one.

This setback was a tremendous blow to the project, but the students responded with determination and persistence. During the fall of 2009, the engine team regrouped and began an exhaustive search for a new engine. While many options were considered, the final choice was an HKS 700E, a two-cylinder, four stroke, carbureted engine intended for aircraft use. After a dealer discount was secured, the new engine arrived in the fall of 2010. Roughly the same size as the Rotamax, the HKS is just a few pounds heavier and about 5 HP less powerful but should have lower fuel consumption. One major difference is that the HKS turns in the opposite direction, so the Kiev "Hot Prop" chosen for the Rotamax will not work. Students have discovered that the Sensenich company, located in Lancaster and well known for their larger metal General Aviation propellers, is now producing composite props for smaller engines. We are currently trying to work out an agreement with



Ethan Meade '11 (left) and Andrew Basom '12 install the new HRS engine on the test stand.

Sensenich to supply us with props that we can try on our HKS. Students have also redesigned the unique three-point mounting system, originally pioneered on the Rotamax installation, for use with the HKS.

Although losing the Rotamax engine has had a major negative impact on the schedule for getting the LSA in the air, with a positive attitude and hard work, the LSA engine team has put the project back on track. We're looking forward to again hearing the familiar roar and seeing a group of students with their hair out straight, hanging onto the test stand behind Frey.

2011 Engineering Integrated Projects Curriculum Presentations By Tim Van Dyke

Again this year, the students in the Integrated Projects Curriculum (IPC) will give public presentations on their projects. They will discuss their projects and the work they have been doing on it for the past year or two. These presentations serve as an interesting way to find out what the students have accomplished, but also can introduce engineer-

ing activities and in particular Messiah College engineering to anyone who may be unfamiliar.

This year's presentations will be part of the School of Science, Engineering and Health's Symposium on Friday, April 29 from 9 a.m.–6 p.m. and will all be in Frey 110. All are welcome to attend.

If you are interested in hearing some

of these reports, but are unable to attend in person, you might be interested to know that all of the IPC presentations will be simulcast on the Web. You can hear the presentations, see the slides and even ask the questions of the presenters in real time. For system requirements and more details on the webcast, see the department Web page.

New GO Job Search Exercise Matches Students with IPC Projects

By Harold Underwood

(with special credit to Don Pratt, David Vader and Tim Van Dyke for their contributions to the GO job search process)

This spring, the engineering department launched a new initiative in the Group Orientation (GO) class of the Integrated Projects Curriculum (IPC) to better match students with one of the six specific IPC groups: communications, disability resources, energy, transportation, water and, the newest group, biomed. The idea was to efficiently pair each student with the group that can best utilize that student's unique skill set and personal interest. The process provides GO students with valuable experience similar to the job search they will encounter when they finish college, while allowing upper class project students to experience the hiring process from the "other side."

At the beginning of the spring term, project teams within each group considered their staffing needs for the coming year and prepared job descriptions (JDs) that were posted on the Collaboratory site. Likewise, each GO student prepared an IPC resume and distributed it to all of the project leaders and group advisors. During the second GO class, each of the six IPC groups made a short presentation highlighting the unique aspects of their group and showcasing specific projects.

Following the presentations, a "job fair" was held to foster face-to-face interaction between GO student candidates and student team members from the various groups. During the job fair, some GO candidates were invited for a "plant trip" to visit the work areas for specific projects and to have more interaction with project team members. When the job fair was over, GO candidates perused the JDs online and began applying for specific jobs. Special pages were set up on Sakai where GO candidates could check to see which jobs were still open and where project leaders could see which candidates were still available. Project leaders sat down with the list of GO candidates and decided which should receive job offers from their group. Candidates received and accepted job offers on yet another automated Sakai page that facilitated the process and kept leaders, advisors and candidates informed of the status of each job. While most job offers were the result of a GO candidate applying for a specific job, some candidates with well-written resumes received job offers from "headhunters" who were searching for candidates with specific skills and abilities.

As with a real job search process, both of those offering jobs and those accepting or rejecting them were sometimes faced with hard decisions and had the opportunity to apply some strategy. For example, a GO candidate receiving an offer could choose to accept the offer immediately or hold out for a preferred job. Likewise, project leaders could extend a single offer, hoping for a positive response from a candidate, but risking losing another potential hire if the first candidate rejected the offer. Some leaders chose to hedge their bets by extending multiple offers on a first-come first-served basis. All in all, the process was quite interesting to watch and seemed to closely mirror what students will experience when they graduate and begin looking for their first real job.

Based on student feedback and after observing some small glitches and quirks, engineering faculty may tweak the process somewhat next time around. But, in general, students seemed enthusiastic about the experience, and the department considers the new GO job search a success!

For more details, please see also thecollaboratoryonline.org/wiki/GO_Job_Search.

Genesis Solar Racing Car Featured in New Whitaker Center Exhibit

By Don Pratt



Don Pratt (right) shakes hands with Steve Bishop, director of the Whitaker Center for Science and the Arts in Harrisburg, Pa., as the former Genesis solar racing car is unveiled as a display item.

The 2001 Genesis Solar Racing Car is the centerpiece of a new exhibit called Move It! at the Whitaker Center Science museum. According to the Whitaker Center website, Move It! invites guests to take an inside look at real engineering in action by exploring products and industries from around the region and the world. In this exciting interactive gallery, visitors can also explore and experiment with engineering concepts—create and fly paper airplanes, race model cars, build bridges, operate a conveyor system, and much more. One of the "much more" items is getting an up close look at the Genesis Solar Racing car. With the shell mounted on the wall and the chassis on an angled rack beneath it,

visitors to the exhibit will be able to examine the details of the award-winning solar array, strong but lightweight space frame chassis, electric propulsion system, and onboard telemetry computer.

For historical and technical details of the Genesis car competition, please see the Messiah College Engineering Department website at messiah.edu/departments/engineering/news/archives.html.

The Whitaker Center exhibit will be a long term display, and we anticipate many thousands of visitors will have a chance to see the Genesis car and learn a bit about its history and the work of engineering students at Messiah College.

Saving Energy and Changing Lives

By Mike Zummo



Students Jose Vasquez (left) and Nate Nichols (right) use the Solar Pathfinder to assess the feasibility of solar photovoltaic panels on the roof of the hospital.

In our present age of high utility costs, reducing energy consumption has become a must. Homeowners and businesses alike seek ways to reduce energy. Cost savings and responsible stewardship of energy resources can be enhanced through an energy audit. This process assesses all components of a building that consume energy and analyzes them to find ways to conserve. Reducing energy usage can include replacing light bulbs with more efficient ones, upgrading to Energy Star high efficiency appliances, or ultimately installing a solar photovoltaic system. Since assessing energy usage is such a useful tool, students in the department of engineering and the Collaboratory Energy Group have been learning how to perform energy audits for a number of years. Through the benefits of cost savings and beyond, Messiah engineering students are striving to use their talents to help people and change lives.

The newest project students have undertaken is an energy audit for the CURE International hospital in San Pedro Sula, Honduras. CURE International, a non-profit organization with home offices in Lemoyne, Pa., works to transform the lives of children with disabilities and empower their families. CURE focuses its efforts in the developing world, through medical and spiritual healing. This healing is provided at strategically placed specialty hospitals

which CURE builds, staffs and oversees in ten developing countries around the world. These hospitals treat children suffering from conditions such as hydrocephalus, clubfoot, cleft lip and palate, brain cancer, tuberculosis, spina bifida and osteomyelitis. Since 1998, CURE has served and shared the gospel with more than one million patients around the world. The Honduras hospital opened in January 2009 and specializes in pediatric orthopedics. It is the first and only hospital of its kind in Honduras. During its first year, this hospital saw more than 4,400 patients and performed approximately 400 surgeries.

In September 2010, the Collaboratory Energy Group leader Nate Nichols became aware of CURE's desire to have an energy audit performed at its Honduras hospital. He immediately began to get the approvals necessary to make this happen. As the project developed, engineering alumni Tom Betteridge '07, Dave Hostetter '08 and Andrew Betteridge '09, all engineers at CenterPoint Engineering, became aware of this opportunity and wanted to offer their services. CenterPoint Engineering is a growing civil, structural, mechanical and electrical consulting engineering firm located just a few miles from Messiah College in Mechanicsburg, Pa. This interest quickly developed into a formal partnership. CenterPoint Engineering's president William Deloache not only offered the company's services to the team, he also allowed Hostetter to join the team as a technical adviser. Shortly thereafter, first-year engineering student and fluent Spanish speaker Jose Vasquez joined the team as well. Once team membership was set, the dates of March 12–19, 2011 were selected for a visit. During the remainder of the fall and winter, the team worked with the staff of CURE International to review drawings of the hospital, develop better understanding of the work and create the documents along with the procedures required for the energy audit process.

The goal of the March 2011 site trip was to travel to the hospital in Honduras, and perform an energy audit that would identify the key energy consuming components of the facility. The team specifically

gathered data about air conditioning, water heating and other major systems in place at the hospital. The data collected during the audit is currently being analyzed to help CURE International identify ways to reduce energy consumption, and improve the energy efficiency of the hospital, in an effort to reduce its utility expenses. All of the findings and feedback will be communicated to CURE International in the form of a written report. This report will include a detailed analysis of the information gathered during the audit, and suggest modifications, upgrades and projects which will help reduce or offset overall energy consumption.

The Collaboratory Energy Group, CURE International and CenterPoint Engineering hope the Honduras energy audit project is the beginning of a long partnership in which the Energy Group and CenterPoint Engineering work with CURE to implement renewable energy systems and energy reduction practices at CURE hospitals around the world. These systems and practices will create cost reduction that will allow more funding to go directly to increasing the hospital's capacity for treatment and surgeries for children. A preliminary estimate of energy savings for the Honduras hospital is approximately 10 percent, which amounts to \$2,500 annually. CURE estimates a cost of \$1,000 for a typical surgery and the resulting care for a patient at one of its hospitals. This projected savings would allow CURE to perform at least 2.5 more surgeries each year and share the gospel with many more children and their families.



CURE International's pediatric hospital, located in San Pedro Sula, Honduras, has served and shared the gospel with more than 1 million patients around the world.

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ENGINEERING NEWS • SPRING 2011 OUR MISSION

The mission of Messiah College is to educate men and women toward maturity of intellect, character and Christian faith in preparation for lives of service, leadership and reconciliation in church and society. Graduates of the engineering program will therefore be technically competent and broadly educated, prepared for interdisciplinary work in the global workplace. The character and conduct of Messiah engineering graduates will be consistent with Christian faith commitments. We accomplish this mission through engineering instruction and experiences, an education in the liberal arts tradition and mentoring relationships with students.

Messiah College Society of Women Engineers Group Attends Orlando Conference

By Sarah Jarnecki '11



Messiah College engineering students and advisor who attended the SWE conference in Orlando, Fla., including from left to right: Sarah Finney '12, Jamie Gerhart '12, Emily Lewis '13, Barbara Ressler, Sarah Jarnecki '11, Suzanne Smart '11 and Sara Finn '12.

Field trip! Young or old, students love to hear these words from a teacher. With that being said, imagine the excitement among us female engineers when assistant professor of engineering Barbara Ressler suggested attending a Society of Women Engineers (SWE) Conference in Orlando, Fla. After much planning, the day of departure finally arrived with seven women piling into Ressler's mini-van for a 16-hour all-night road trip. We arrived at our hotel

on Thursday morning, in time for the start of the three-day conference. Sweat-pants and T-shirts were traded for formal business attire, schedules were made and meeting times set. The event was held in the impressive Orange County Convention Center, a few blocks from our hotel. The conference consisted of instructional sessions, a career fair and even an engineering boutique that sold geeky items "only an engineer could love." Festivities officially began with a career fair opening reception designed as a "meet and greet" between the attendees and the companies represented at the fair. Refreshments and dozens of giveaways (including a stuffed Android) were provided, as everyone mingled and determined which companies interested them. The following day consisted of instructional sessions that included listening to a panel of women discuss maintaining a career along with a family, finding the right graduate school, preparing for an interview and moving from college to a career. While the instructional sessions

provided a wealth of good information, a highlight of the second day was the career fair that featured 100+ companies and grad schools! It was exciting for us to see all of the major companies such as Ford, Intel, Boeing, Disney, ESPN, Exxon, John Deere and HP, all waiting with recruiters to meet us, read our resumé and see if we were a good fit for their company. While the experience seemed a little intimidating, it was nevertheless one we felt well worth the time and effort of company scouting and resumé tweaking. As always, we also had fun bonding when the conference was not in session, going out to eat or doing homework in the hotel room. Attending the SWE conference was a tremendous opportunity for us to make connections in the workforce, glean advice from the professionals and gain experience in presenting ourselves to a company. We female engineers are exceedingly grateful for the time, effort and support both Ressler and the engineering department provided for us to attend this conference.