Structural Spaghetti, What?

SHANE DUNN, WBRC, Intern Architect

On January 5th, 2010, ACE students of Hampden Academy and Bangor High School participated in a two part session on Structural Design at WBRC Architects and Engineers. Featured speaker, Xenia Rofes, P. E. LEED AP, presented structural concepts including basic building principles, common structural building materials, and various applications of structural design. Such knowledge is fundamental in establishing a clear understanding of structural building design and construction.

This first session was followed by a hands-on structural modeling competition in which students could create their own structure and apply the concepts that were taught. Students were given only dry spaghetti, marshmallows, and gumdrops to be used as their structural members and joints for their models. Students broke into groups and were given guidelines and criteria to build their structures to.

They were instructed to come up with a design able to withstand a set vertical load and account for seismic, or horizontal loading (simulated by moving the structure back and forth several times to simulate a seismic event) by providing triangular bracing, and to minimize structural joints (marshmallows and gumdrops).

Each group developed a unique design which tested the students’ structural understanding of key principles as well as their design creativity. There were varying degrees of success for the groups of students and their models. The winning design was a simple two level tower structure with cross bracing. This design had the least amount of materials in the model but the way in which they were assembled allowed for the most resistance to external forces.

From this two part structural design session, the one lesson that was revealed is that what might first seem to be more structurally sound can actually be weak if certain structural principles are not considered. The students were able to see first-hand the various factors and concepts that have to be accounted for in real world construction projects.

Above, Xenia Rofes, P.E. LEED-AP presents structural concepts to ACE students at a combined Hampden-Bangor session

Above, Hampden ACE students Jon Clements and Clayton Forrest work on their spaghetti tower structure

Above, Bangor team members (left to right) Isaac Walton, Blake Lufkin and Luat Tran work on the winning spaghetti structure which consisted of only one single noodle at each leg held together at the joints with gumdrops

Above, Mentors Robyn Savitske, Laura Wade, Shane Dunn and Rob Beal can’t resist joining in the fun
This Month’s Student are:

CHRIS FRANCIS, ACE Student—Hampden Academy

My name is Chris Francis; I am 16 years old and a junior at Hampden Academy. While not in school I do a wide variety of things. In the summer time I work at a summer camp and serve as a lifeguard. In May of 2009 I successfully passed a board of review for Eagle Scout having finished that, being the second Eagle Scout in my immediate family. Being an eagle scout I am still heavily involved in the Boy Scouts of America program in Maine and New England. I also greatly enjoy the outdoors and have taken fishing and hunting trips to Alaska and Africa.

After I graduate high school I would like to go to the University of Maine in Orono to study in their school of engineering. My brother is currently finishing up a degree in Construction Management Technology and I have always been interested in fields similar to him, although I am not interested in the same degree. My outlook would be a degree in Engineering; although I am uncertain of which specific discipline. I enjoy construction and being on the job site, but I enjoy the more technical side of the projects as well.

In ACE I hope to get my feet a little wet in these industries and hope to narrow my focus from the experience I gain from the program. ACE gives me the opportunity to explore my knowledge and ask questions to the people who already work in the field. From ACE I hope to take my experience and apply it to my education later

LAURA PASQUINE, ACE Student—Bangor High

My name is Laura Pasquine and I am a Junior at Bangor High School. I enjoy skiing, running, and swimming. I am involved in various groups at my school such as our Civil Rights Team, S.E.E.D. (Students Ending Environmental Destruction), and Envirothon. I swim year round with the Bangor Y and also enjoy volunteering at the Maine Children's Museum.

I am currently interested in a career in Environmental or Civil engineering. I think that ACE provides a unique opportunity to see what its really like to be an architect or an engineer. It's amazing to see how much thought goes into every little detail and how they all have to come together to make a building. I hope to come away from this project with a better idea of the process that engineers and architects go through to prepare myself for a similar career.
This program relies totally upon the generous support of our sponsors. By providing financial support and other resources, our sponsors enable us to offer this program at no cost to the school or to the students who participate. In this way, the best, most talented, interested and motivated students from all levels of society can participate in the program. We hope you will take a moment to contact our sponsors and join us in extending our sincerest thanks to each sponsor, for their very generous backing: They can be reached through their link on our website www.acementor.org/814.

The ACE Program started with only the one program, the support of only two corporate sponsors, WBRC Architects Engineers and the Cianbro Corporation, one organization, SMPS, and only five new mentors, Tom Figura from Cianbro, Rob Beal, Intern Architect, Paul Monyok, P.E., Jessica Brodeur, Junior Interior Designer and myself, all with WBRC Architects Engineers.

At it’s start, Hampden Academy was chosen as the venue for the inaugural program and upon it’s start, without any track record, we were hoping to have at least one student join the program. To our delight there were 16, of which four graduated and were awarded scholarships totaling $2000.00. That in itself was astonishing.

Moving forward, our goal was to start a team in the Portland area only and to that end we set out to recruit the additional mentor volunteers and funds needed for such an effort. Much to the program’s fortune, Matt Cyr, Dave Thomas, Chris Brown and Matt Tonello from Consigli Construction, Jack Carr, P.E., LEED-AP from Criteria-Mooney Engineers and Tyler Johnson, Intern Architect from WBRC’s Portland office stepped forward to head up the new team.

With two teams in place however, beyond all expectations, a third team was created at Bangor High School as well. For this, Red Webster of the Cianbro, Steve Pederson, Architect, Shane Dunn and Jill Simpson of WBRC’s Bangor office and Robyn Savitske, Architect all volunteered as mentors. With the inclusion of the Bangor High School team, the ACE Mentoring Program expanded to three teams in as many cities with more than 30 students.

We now find ourselves almost halfway through our second year and looking towards the future. As with all things, changes are part of the future. And so, the time has come to pass the reigns to the next leadership team so
that the program can continue to flourish and grow into what is certain to be a bright future for all those involved.

My sincerest thanks go to all of the Mentor Volunteers, Sponsors and Students without whose participation, this program would not have been possible and with whose continued participation it will continue to make a contribution to the industry and to the future of the students who participate.

For more information about the Maine program affiliates or to contact us, please go to www.acementor.org and click on Bangor, Hampden or Portland.

Gary Scott Frankel, AIA
Past President, ACE Mentoring of Maine
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The New Chair’s Corner

Well it has been nearly a year and a half since ACE of Maine was formed and we officially began formal classes at Hampden Academy. Since then we have added two new schools to the roster, both Bangor High School and Deering High School in Portland, thanks to the many professional volunteers, school principals and student’s that make the whole program work. Thanks too, to the original volunteers from WBRC Architects and Engineers and Cianbro for originating the program in Maine. With the helpful and time consuming efforts of Gary Frankel as our past Chairman, and the remaining team, and the help form ACE National, we were able to provide a meaningful and exciting first year at Hampden Academy. With continued support from Hampden Academy staff and participation from Hampden Academy students we are now in our second year of providing the program to the student’s and have repeat student’s participating.

Ace Mentoring is a means to foster interest in the Architectural, Construction and Engineering industries, thus the acronym ACE. But, it goes far beyond just fostering interest in these professional industries for the student’s. We have many professional engineers, construction professionals and architects that volunteer their time, showing the participating student’s what each of us do on a daily basis and how that work integrates with both community and the end users.

Many folks have seen and or read how our infrastructure has been neglected for too long. The recent bridge collapse in the mid-west brought particular attention to that type structure throughout the country, but we have many other bridges and roadways that need repair too. In the coming decades we anticipate a shortage of engineers and construction professionals to support the countries demand. At ACE we hope to provide interest to the student’s in these industries and help guide them to a career choice with boundless opportunities. If I’m not sounding passionate enough about this program, let me offer the following.

I’ve been involved with many projects throughout my career in the engineering and construction industry. What made it so exciting were the opportunities and challenges I was offered and faced with daily. I’ve had the good fortune to have a great wife, and family and an exciting career. One of my recent assignments involves development and construction of a testing facility for a proposed alternative energy. In my position I get to work with the Owner, the visionary scientists and professors developing the ideas, the architects and engineers. The project is just the beginning of a much larger vision of freeing ourselves of foreign oil and creating future long term, good paying jobs for the State of Maine. I really proud to be part of this exciting project and plan to bring the ACE student’s in the northern part of the state to the facility for a tour and education on what is done right here in the state of Maine.

Alternative energy and many new technologies emerging in the market will offer even greater opportunities for the future generations. With the new LEED requirements adopted by our government and most of our new clients more positions will need to be filled to develop, execute and document these activities. Many of those job opportunities will require technical or engineering backgrounds, thus our interest as professionals to educate our youth at any early age, guide (Mentor) them through design and construction process, show them examples of our work and develop the next generation of professionals.
As current Chairman for the ACE of Maine program, I’m looking forward to working with the current professional volunteers to expand and improve our program. As a group, we have a vision to expand the program opportunity to new schools and introduce more students to the program. This of course will require the participation of new professional volunteers, participating schools, and of course the most important, new students to make it all work.

Early on in the development of the program, we decided we wanted to make the issuance of scholarships a goal of the program. Although we, as professional engineers, architects, and managers handle business budgets everyday, fundraising is alien to most of us and involves a dedicated effort and plan. The board has agreed to create a board position dedicated to fundraising. We will be working as a group to develop ideas to develop budgets and raise funds. With the help of corporate sponsors last year, we were able to provide handsome scholarships to the participating student’s and with a more structured plan this year, we hope we can have similar results.

I’m honored to be able to serve as Chairman for the next two years and look forward to providing future articles to discuss the board’s plans and accomplishments. With the current need for engineers, architects, and construction professionals, the ACE program allows student’s an opportunity to discover the exciting field of design and construction.

For more information about the Maine program affiliates or to contact us, please go to www.acementor.org and click on Bangor, Hampden or Portland.

Tom Figura, Chairman
ACE Mentoring of Maine
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Meet the Mentors

JACK CARR, P.E., LEED-A.P., ACE Mentor, Deering High Team

My name is Jack Carr. I am the General Manager of Criterium-Mooney Engineers which is part of a network of 72 consulting engineering firms in North America specializing in building technology. He has over 25 years experience in designing high-rise buildings and managing construction and engineering operations. His broad range of technical and management skills includes light and heavy industrial facility planning, capital investment analysis, and Department of Defense contracting. Mr. Carr provides a unique blend of technical, management, financial, and real estate taxation expertise having served in positions of CFO, COO, and CEO.

PAUL MONYOK, P.E., Civil, WBRC Architects Engineers, Bangor High Team

My path to a career as a Civil Engineer began at an early age in Pittsburgh, PA, where I was born and raised. From a young age, I enjoyed helping my dad tinker around the house fixing things or working on cars. I was also continually in awe of the large buildings and bridges every time we drove into downtown Pittsburgh. As I would look out the car window, I knew that someday I wanted to be a part of designing such structures. Now that I look back, I can understand why my high school notebooks are full of doodles of house, bridge, and building designs.

Throughout my education, I always excelled in math and science, and after having the opportunity to take part in an architecture apprenticeship as a junior in high school, I knew where my future was headed. I attended Penn State University in University Park, PA on a swimming scholarship, where I graduated with a bachelor of science in Civil Engineering. After my jun-

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ior year I got an internship with a company that built and rehabbed major highways. The experiences I gained at this internship pushed my Civil Engineering focus to highway design.

Once I graduated my first job was in Baltimore, Maryland. I was doing mostly intersection rehab to improve traffic flow or sight distances. At the time I didn’t know too much about the profession and the endless possibilities. In college, a civil engineering major will teach you the theories involved in the practice, however there is a lot more to Civil Engineering that you will learn on the job. I knew how to design a roadway from college but learned about drainage, detailing, permitting and many other aspects on the job. I continue to learn things everyday on the job.

As I moved with my family I moved to different companies. My second job was with a firm in Connecticut. I learned every company was different. In Connecticut I worked on roads but also some site design. I finally moved to Maine where I got my job at WBRC where I now focus on site design.

Where can I get info about the ACE Mentoring Program?

Go to our website, for:

Hampden:  www.acementor.org\814
Bangor:   www.acementor.org\953
Portland: www.acementor.org\902

Or, contact any of the team members via email at:

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### Here's the remaining Hampden Academy / Bangor High School schedule

Each session starts promptly at 2:30 and lasts until 4:30.

#### Hampden Academy

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<td>February 23, 2010</td>
<td>Featured: All Mentors</td>
<td>Field Trip to UTC</td>
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<td>March 9, 2010</td>
<td>Featured: Gary Frankel</td>
<td>Computer Skills Technology Lecture</td>
<td>1. To understand the software and tools used in the construction industry</td>
<td>Incorporate different ways of communicating your design for final the presentation</td>
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<tr>
<td>March 23, 2010</td>
<td>Featured: All Mentors</td>
<td>Field Trip to UTC</td>
<td>1. Collect buildings orientation on site</td>
<td>Start thinking about Materials</td>
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<tr>
<td>April 6, 2010</td>
<td>Featured: All Mentors</td>
<td>Work Session, Critique</td>
<td>1. Select materials for the building and continue developing design</td>
<td>Create a list of Materials used in project both exterior/interior</td>
</tr>
<tr>
<td>April 27, 2010</td>
<td>Featured: Tom Figura</td>
<td>Scheduling and Estimating Lecture</td>
<td>1. Collect revised floor plans showing sustainable elements and code corrections</td>
<td>Start Applying Costs to materials list</td>
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<tr>
<td>May 11, 2010</td>
<td>Featured: All Mentors</td>
<td>Field Trip to AEWC, Orono</td>
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<tr>
<td>June 11, 2010</td>
<td>Featured: All Mentors</td>
<td>Final Presentation</td>
<td>1. Full Presentation Duel</td>
<td></td>
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</tbody>
</table>

**for the 2009 - 2010 school year**

**Students** - remember that there are only **EIGHT** sessions left before the final presentations!

Parents, sponsors and friends, don’t forget to keep the evening of Friday, June 11th open and plan on attending as the students make their final presentations and the scholarship awards are announced.