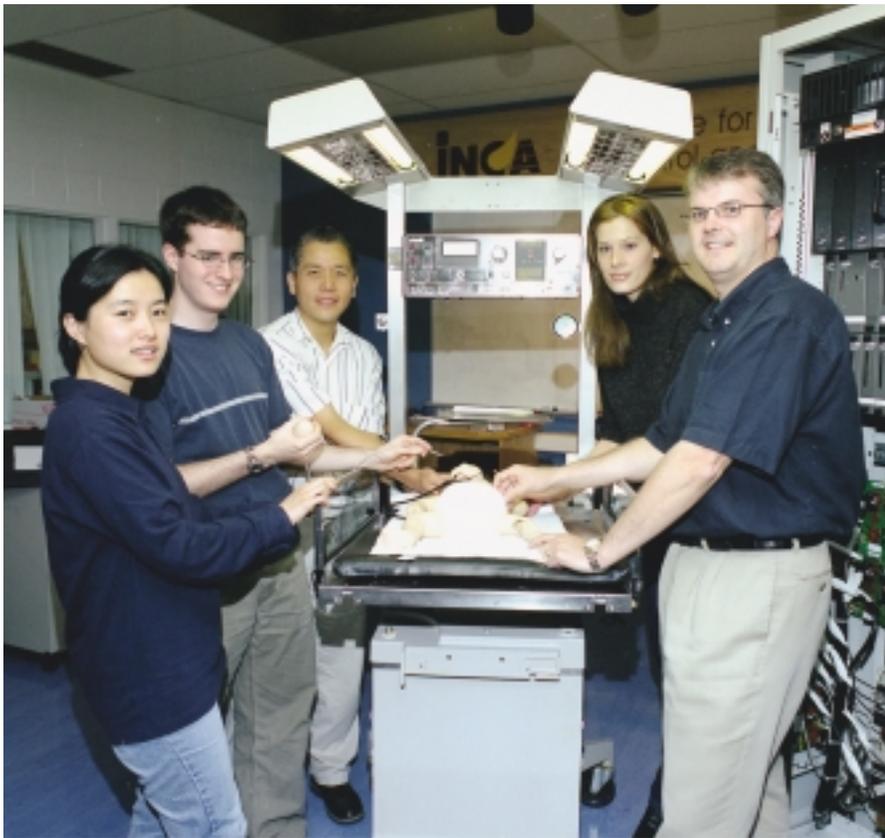


BENCHMARKS



Memorial
University of Newfoundland



That ain't no Cabbage Patch Kid: Drs. Siu O'Young and Vernon Curran inspect one of the mannequins that will be implanted with electronics to assist in teaching neonatal resuscitation. L-R: Xiaoqian Kong, Alain O'Dea, Dr. O'Young, Rose Wilson, and Dr. Curran.

Breathing easier

First it was a doll that could crawl, then one that would cry, and, inevitably, a doll that could wet itself.

Now, the Faculty of Engineering and Applied Science is working towards even more lifelike specimens – dolls that mimic sick newborns and their responses to resuscitation.

This is the Anakin Project: Memorial University's attempt to make it easier for health professionals in remote locations to update their skills in neonatal resuscitation methods through mecha-

tronic devices into mechanical ones.

Named after the child protagonist of the *Star Wars* saga, Anakin is a group effort of Engineering, the Faculty of Medicine, and the Janeway Children's Health and Rehabilitation Centre to develop computer software instrumentation packages that render neonatal mannequins more lifelike and improve their utility for distance education.

As engineering professor Dr. Siu O'Young explained, the idea is for health care professionals who travel to

Breathing see page 9

FSP0 Co-op Experience



Ocean and naval architectural engineering student Mark Hefford is a Bull Arm veteran. The Term 4 student was employed on his latest work-term by PCL Industrial Constructors Inc. to work on the *Terra Nova FPSO*, getting up close and personal with the megaproject.

As Mark explained, his role was to supervise the reinstallation of insulation blankets over the valves on all the pipelines. He was surprised at the enormity of the vessel, and impressed with the stratification of the labour force involved.

"I didn't realize the size of the boat itself – it's huge. It's just amazing how everything came together. And I didn't know anything about unions when I got there: I thought I'd go around and put the covers on myself, but that's not how it works; there's labourers, there's pipefitters – each person's got a role."

The Whiteway, Trinity Bay, native said that while the hours were long and the

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Message from the dean

As a field of education, a profession and a culture, engineering is rife with stereotypes. In our faculty, we work hard to overcome traditional perceptions, and we sometimes successfully change them. We're proud that the Faculty of Engineering and Applied Science is one of the most ethnically-diverse units on campus, and we would like it to be a more gender-inclusive one, too. In this regard, the efforts of Dr. Mary Williams, the NSERC-Petro-Canada Chair for Women in Science and Engineering, and her assistant, Carolyn Emerson, have been extremely worthwhile.

But what about attitudes? What peripheral behaviours are our future engineers acquiring during their engineering education?

It is often said that entrepreneurialism is something that cannot be taught, but can be encouraged. I would argue that if we are to become the best expression of ourselves as a culture where excellence, creativity and entrepreneurialism thrive, then we need to lead by example, be active in the community, and connect our academic excellence to a larger context. In this way, our ability to envision unique and appropriate solutions will be enhanced by our experiences and interaction with others. In short, by becoming more fully-realized human beings, we will become better engineers.

In past issues of *Benchmarks*, we have brought you stories about students and faculty who are meshing their engineering education with their personal experience to create an enhanced understanding of both. Whether it's an extreme physical challenge or a volunteer activity, our culture benefits enormously from such leaders. In this issue, the story of Jennifer Smith, who crewed on a yacht across the Atlantic, sailing from Newfoundland to the Azores, is another such example of an engineer with the conviction that she is making a difference in the world.

When we get out and experience the world, we learn that there are many different perspectives and fields of knowledge that contribute to our social fabric, and we ought to recognize engineering's role within that fabric. Best of all, such knowledge can inspire us to greater levels of achievement – individually, and as a group.

Finally, I want to take a moment and express my appreciation for Susen Johnson's excellent work as the Faculty's information officer and *Benchmarks* editor. Susen is continuing her studies in law. We wish her all the best in her future endeavours.



Dr. R. (Sesh) Seshadri, Dean





CANCAM 2000

Dr. Michael Isaacson, dean of the Faculty of Applied Science and professor of Civil Engineering at the University of British Columbia, gave a keynote address on Wave Effects on Structures at the CANCAM conference on June 7. Mechanical engineers swarmed Memorial's campus as the Canadian Congress of Applied Mechanics was held in St. John's for the first time. In addition to four days of sessions on fluid dynamics, robotics and control, heat transfer, and more, conference attendees were treated to keynote addresses by Dr. Isaacson, Dr. Jim Boyle of the University of Strathclyde, Dr. Patrick Oosthuizen of Queen's University, and Dr. Samir Ibrahim of Old Dominion University. The social program was also popular, with attendees taking in puffin, whale, and iceberg tours; trips to the Colony of Avalon at Ferryland; and a closing banquet featuring entertainment by *Buddy Wasisname* and *The Other Fellers*.



New Lab

Dr. Ramachandran Venkatesan, Chair of Electrical and Computer Engineering, supervises as Shirley (Dongmei) Wu tries out a new program at the new Centre for Digital Hardware Applications Laboratory in the Engineering Building recently.

Saudi Official Visits

The second-in-command from Saudi Arabia's most prestigious technical educational institution visited Memorial's St. John's campus in May – the first such visit from a representative of the school.

Dr. Khedair Saud Al-Khedair, vice-rector of Academic Affairs for King Fahd University of Petroleum and Minerals, visited Memorial in conjunction with the university's Oil and Gas Development Partnership.

The purpose of Dr. Al-Khedair's visit was to identify opportunities for collaborations between Memorial University and King Fahd University, such as student and faculty exchanges, faculty sabbaticals, and industry affiliations. He toured facilities and met with officials from the Faculty of Engineering and Applied Science, the Department of Earth Science, the Faculty of Business Administration, the Department of Computer Science, Genesis Corporation, the Marine Institute, and the National Research Council's Institute for Marine Dynamics.

President Meisen said Memorial's new oil and gas initiative places a high-priority on relationship building with the established oil-producing region. "KFUPM is one of the best universities in the Middle East. The campus is extremely well-equipped and well-supported by

Saudi *see page 5*

Motor City Mania

The engineering students who participated in the Formula SAE event in Pontiac, Michigan are back on track after their first experience as Memorial University's representatives in the race car designing, building and racing competition. The 12-member team spent over two years fundraising, creating and testing their vehicle, and it all came together May 16-20.

The Formula MUN car garnered several successes, including passing technical inspection on its first try and participating in all events. Team member Gilles Gardner said the group was proud of its effort, and thrilled to learn

that the Big Three automakers who sponsor the event perceive it as an opportunity to harvest the next generation of motor sports engineers. He added everyone was surprised at the comradery of the competition itself, and the warm reception MUN team got from judges, organizers, and other teams. "Anybody who's ever done it realizes how much goes into it, so they were really supportive of us as a new entry. We just felt like we were there to learn and to have fun."

Formula MUN is now preparing for next year's event.

Oil and Gas Development Partnership Continues Apace

Last September they promised it. This September they're delivering on it.

Memorial's new Oil and Gas Development Partnership takes physical shape this fall when the Faculty of Engineering and Applied Science welcomes its first students into oil and gas engineering studies. Developed within the existing five bachelor of engineering programs (mechanical, civil, electrical, computer, and ocean and naval architectural engineering), the oil and gas options mark the achievement of an important goal laid out in the university's oil and gas plan last fall.

The university has been successful in recruitment of faculty for the new initiative, attracting several high-tech oilpatch experts. The newcomers include Petro-Canada Chair in applied seismology Dr. Michael Slawinsky; petroleum geologist and reservoir specialist Dr. Andrew Pulham; and professor in environmental science focusing on oil and gas operations, Dr. Kelly Hawboldt. In addition, engineering professor Dr. Ray Gosine, recently named to the Dr. J.I. Clark Chair in harsh environments research, will contribute to Memorial's strength in oil and gas. The new positions complement the university's existing expertise in ocean and ice engineering, underwater operations and intelligent systems, environmental protection and remediation, offshore safety, reservoir characterization, and simulation.

Memorial has designated two of its Canada Research Chairs to the initiative, a Tier I Canada Research Chair in petroleum reservoir engineering and characterization and a Tier II Chair in petroleum geosciences. A candidate

for the Tier II Chair has been identified (the aforementioned Dr. Pulham) and begins this fall. Two other Canada Tier I Research Chairs have been recommended – one in Asset Integrity Management, the other in Underwater Vehicles. Finally, the Oil and Gas Development Partnership will be headed by an executive director with considerable experience in the sector.

New infrastructure to support the plan is also in the works. Researchers in the Department of Earth Sciences are making extensive use of new oil and gas software – a \$13 million donation from Landmark Graphics Corporation. A number of faculty in Earth Sciences, Engineering and Mathematics applied for a major Canada Foundation for Innovation grant to install an immersive visualization room and the associated computers for simulation and visualization to further exploit all the capabilities of the Landmark software. A proposal to be submitted to the Atlantic Innovation Fund (AIF) sees the university taking a leadership role in a Pan-Atlantic oil and gas plan. In addition to strengthening ties with external partners within the existing Oil and Gas Development Partnership, AIF funding would assist in jump-starting other aspects of Memorial's initiative.

Professional networking on a regional and international scale has also been a focus for the initiative. A delegation led by President Meisen attended the Offshore Technology Conference in Houston in April to promote the OGD and to discuss joint research opportunities with a number of groups in that area. While in Texas, the delegation was hosted by Schlumberger at that company's research facilities in the

Houston and Austin regions. In May, Dr. Khedair Saud Al-Khedair, the vice-rector of King Fahd University of Petroleum and Minerals in Dhahran, Saudi Arabia, made a two-day visit to campus – the first by the Saudi enterprise – to identify opportunities for collaborations such as student and faculty exchanges, faculty sabbaticals and industry affiliations.

The master's in oil and gas studies, a course-based interdisciplinary degree program combining business, engineering, sciences and the social sciences, is in the advanced stages of development and expected to begin registration in January 2002. Integrating the latest scientific and technical knowledge with management and social issues in the area of oil and gas, the program's graduates will possess expanded core competencies, especially in strategic decision-making, enabling them to take on greater responsibility within the oil and gas industry. Admission to this program will be highly-selective and contingent upon previous relevant experience in industry.

President Meisen said he's pleased with the progress that has been made so far, and looks forward to the complete implementation of the initiative. "Memorial University wants to become a leader in oil and gas education, and is evolving as the centre for expertise related to the east coast oilpatch. Already we possess a commanding educational lead in a number of fields directly related to the responsible development of this resource, and we are committed to retaining this distinction."

Marconi, can you hear me?

On December 12, 1901, Italian inventor Guglielmo Marconi sent the first wireless transmission from Signal Hill in St. John's, Newfoundland, to Poldhu, Cornwall, England.

On December 12, 2001, St. John's will be abuzz as government representatives, radio club enthusiasts, and even the grandson of Marconi himself – the *bellissimo* Prince Guglielmo Giovanelli Marconi – will gather to reenact the momentous event as part of the "Receiving the World 2001" celebrations.

To celebrate, the Faculty of Engineering and Applied Science is collaborating with the provincial government and IEEE (the Institute for Electrical and Electronics Engineers) to host a contest for high school students across the Avalon Peninsula.

The contest will involve the construction of a simple crystal radio made from household goods such as a tissue box, toilet paper rolls, tinfoil, paper clips, and wire, to receive the around-the-world Morse code transmission from its St. John's location and origin, Cabot Tower on Signal Hill.

Engineering professor Dr. Siu O'Young explained, "We want the students involved to go back to fundamentals, to do more with their hands. And it introduces a lot of engineering ideas – being resourceful and creative, instead of just buying a fully functioning radio receiver.

"It's perfect for Newfoundland, actually – a radio that will work even during power failures."

Kits for building the radios have been created by the faculty and will be distributed to high school science teachers from the Avalon East School Board during a workshop this September.

At 7:30 a.m. on December 12, at Mile One Stadium, an antenna will be raised to mark the beginning of the contest. An hour later, when Governor General Adrienne Clarkson begins the formal schedule of reenactment proceedings by



INCA employee and engineering student Jeff Newhook supervises as Women in Science and Engineering (WISE) students Corinna Freake of Labrador City and Melissa Williams of St. Mary's put together crystal radio kits for the Marconi competition.

exchanging greetings with Her Majesty Queen Elizabeth II, contest participants will attempt to receive the transmission using their home-built radios.

Any radio that receives the signal accurately will be judged a successful creation, but Engineering is creating a computer program to assess which signal comes across clearest.

President Axel Meisen said he's pleased that the university is able to have a role in the celebrations. "Marconi's transmission is an historical event which marked the beginning of change that affects us every day and everywhere. I remember making a crystal radio when I was still in school, and the excitement of hearing faint and crackling transmissions from local radio stations. I'm sure that the participants will find the competition fun and challenging.

"It also provides us with another opportunity to introduce high-school students to Memorial University and to demonstrate our hands-on approach to learning."

Saudi *cont'd from page 3*

the Kingdom of Saudi Arabia and Saudi Aramco, the world's largest oil company, which is located adjacent to it. As our own oilpatch here on the east coast moves from exploration and production to development and processing, we can do a lot in collaboration with our colleagues in Saudi Arabia. Some of our strengths are offshore exploration, offshore structures, environmental

remediation, geosciences and entrepreneurship."

Despite the obvious differences in harvesting oil from the Saudi sands and the northeast Atlantic, Dr. Al-Khedair focused on the similarities between the enterprises. "Like Memorial, we are a dynamic, market-responsive university, and people feel we are important to the region."

King Fahd University of Petroleum and Minerals is home to 800 faculty and staff and 8000 students admitted through a rigorous selection process. The five-year academic programs include a foundation year of English as a second language for all participants.



Just like in the movies:
Faculty of Engineering and
Applied Science home to
technology highlighted in
Jurassic Park III

Dino-might!

A scene from a recent Hollywood blockbuster is being replayed, day after day, in the quiet halls of the Engineering Building.

In *Jurassic Park III*, which opened July 18 and was number one at the box office, there is a scene in which a student creates a prototype of a dinosaur voicebox using a rapid prototyping machine. In the Engineering Building's Manufacturing Technology Centre (MTC), there are two such prototypers, including a laminated object manufacturing (LOM) machine that bears a strong resemblance to the technology used in the film.

As explained in the movie, rapid prototypers fabricate three-dimensional test models. In the case of an LOM, the machine uses a computer program to 'slice' a 3-D geometric shape (inputted into the computer through a CAD program) into parallel cross-sections. Then it adds one layer at a time of bond paper and resin until all the cross-sections have been built up into a solid replica of the original design.

Dr. Claude Daley, who oversees the MTC, expressed excitement that the pop culture sequel highlights this technology. "Creating a model for an extinct creature's voicebox is a creative usage of a rapid prototyper, for sure. But it's an excellent example of the far-ranging, practically limitless applications possible for this type of technology."

While the movie's prototyper enables humans to communicate with Paleolithic beasts, the MTC's are employed for projects that, while less dangerous, are just as critical.

"Manufacturers come to the MTC when they're thinking about new or better designs," Dr. Daley said. "Very often, they've invested a great deal into their idea or their business by the time they reach us, and so the development of models in this manner, with the use of a rapid prototyper, is an option that's both technically-reliable and economical."

The MTC has helped manufacturers such as ACAN Windows, Guigné International, Beothuk Wood Products, Continental Marble and Terra Nova Shoes. The centre's best-known success is its connection with Chris Griffiths, whose new single-mold acoustic guitar model (the basis for the Garrison Guitars enterprise starting up in Donovan's Industrial Park) was developed at the MTC.

The Manufacturing Technology Centre is located in EN-1010.

Memorial campus a WISE-r place



Austin Bursey, Engineering Technologist, explains an ongoing research project on telephone poles to a group of WISE students visiting from Sir Wilfred Grenfell College. L-R: Allison Reid, Megin Marshall, Stephanie Parsons, Amanda Parsons, Cathy Regular and WISE summer employment coordinator Christina Freeborn.

The WISE summer employment program enjoyed its twelfth successful year. The program, which pairs grade 11 girls from across the province with Memorial University supervisors, enables participants to get paid experience while exploring careers in science, technology, math and engineering. It ran at the St. John's and Sir Wilfred Grenfell College campuses from June 25 to Aug. 17.

Organized by the Newfoundland and Labrador Chapter of Women in Science and Engineering (WISE), and with support from HRDC, Industry Canada's PromoScience and MUN, this year's program also benefitted from support by Coflexip Stena Offshore Newfoundland Ltd., which enabled the group to bring five Corner Brook-based students into St. John's from July 25-29, to connect with their colleagues in the provincial capital.

Program co-ordinator Christina Freeborn, herself a former WISE student, says it's important to bring the two groups together. "We try to ensure a level of consistency between how the program is delivered in both Corner Brook and St. John's. This way, although they're working in one field, they gain exposure in others and realize the many different career opportunities available to them."

Co-directors Carolyn J. Emerson and Dr. Faye Murrin note the success of the program in encouraging so many former WISE students to return to Memorial for their post-secondary education and contribute their talents in science and engineering.

Working... for success!

So you've survived the labs and the exams, and landed a great job in the engineering or scientific field of your choice.... Now what?

Maximizing your professional potential and advancing on the job were foremost on the agenda at the recent Working for Success workshop, co-hosted by WISE Newfoundland and Labrador and the NSERC/Petro-Canada Chair for Women in Science and Engineering. Held May 12 in the Centre for Management Development, the event emphasized planning, assertiveness, and negotiating as crucial strategies to 'working smarter'.

Thirty-six students and professional women participated in the workshop, which used small group seminars, individual exercises and sharing of personal expertise to get the message across. A session on Skills and Strategies for Achieving Recognition, facilitated by Ali Sutherland,



event was a panel presentation from women established in successful careers: Darlene Whalen, vice-chair of the Public Utilities Board, Jane Kieley, manager of Broadband Systems in Aliant Telecom, and Alice Collins, an education professor and Memorial's associate director of Labour Relations, reflected on their own career paths and shared personal lessons. There was strong resonance with the panelists' insight, motivation and practical advice.

CWSE assistant Carolyn Emerson characterized the event as a great success. "There's a tremendous demand from women in science, engineering and technology careers for this kind of information. Particularly in terms of the balance

between home and work lives, women want to know how to use their time most effectively and productively to further their careers and move up the ladder in a way that satisfies them."

"Few university courses teach workplace strategy," added Dr. Mary Williams, the CWSE chair. "But how we interact on the job is every bit as important as the skills we contribute.

So we're trying to help by teaching women who want to know what practical steps they can take to make their professional lives more fulfilling and rewarding."



addressed the unique challenges for women in gaining recognition for contributions and achievements. Negotiating for Success, delivered by Jane Helleur, focussed on everyday win-win negotiations, and offered practical steps and tools for workplace usage.

During a networking lunch and case study, workshop attendees had the opportunity to apply their learning and connect with possible mentors and protégées. Rounding out the

The results of the workshop will be elaborated upon in a handbook being developed by CWSE and WISE for debut at the 12th International Conference of Women Engineers and Scientists next year in Ottawa.

Setting the standard

As Memorial's relationship with offshore oil and gas production systems like Hibernia and the Terra Nova FPSO deepens, so, too, does the Engineering Faculty's involvement in the infrastructure required to make such projects successful.

Engineering professors Ian Jordaan and Hesham Marzouk volunteer their time and expertise for the Canadian Standards Association – the not-for-profit association that develops criteria for development and certification activities within Canada, and harmonizes these parameters with its global counterpart, the International Standards Organization. Dr. Jordaan is vice-chair of CSA's Strategic Steering Committee for Offshore Structures, chaired by Greg Lever, technical services manager for Petro-Canada's Terra Nova project, and a member of the technical subcommittee on general requirements and design criteria. His colleague, Dr. Marzouk, chair of Civil Engineering at Memorial, works with the Offshore Structures Technical Committee.

The first of these teams, the Strategic Steering Committee for Offshore Structures, comprises academics, engineers and industry analysts who meet every few months and reform into smaller working groups according to the challenge. The relevance of their work to Newfoundland and Labrador is obvious, translating new research findings into standard practice for the nascent oil and gas industry, and carries enormous responsibility. While most of the 9,000 participants in the CSA are Canadian, international industry involvement is keen. "These are consensus standards between industry, government, academia, and various other specialists," Dr. Jordaan explained. "We have had designers and fabricators from Mobil in Dallas, Lloyds in London, Exxon in Houston, Amoco in Tulsa – all kinds of groups involved. It is in everyone's interest – we share this goal – to ensure this kind of work is performed well."

Dr. Jordaan noted the significance of the shift in recent years from a western- to eastern-Canadian focus. This is the



place to be for offshore oil and gas activity now, and we've been really successful at getting some of top people here involved." He adds as an example that Dr. Richard McKenna, director of ice engineering at C-CORE, is on CSA's general requirements and design criteria committee.

"We've developed some very special research findings relevant to the Canadian offshore – research on icebergs and ice in sea states and methods for determining design loads. So I was delighted when Greg [Lever] got this going, because it meant we'd have an opportunity to keep some focus on some of the really great work that's coming out of the research community here."

For his part, Mr. Lever says his involvement in the CSA Offshore Structures Standards initiative was prompted by the desire to have Canada move towards international standards. "For Canada to participate in the ISO standards development, we would have to have a current national standard to bring to the table. The CSA Offshore Structures Standards developed by Canada were past due for review and update, so it was important to reaffirm the current standards so we could actively participate in the development and adaptation of ISO standards on offshore structures reflective of the Canadian environmental loadings."

The CSA annual general meeting was held in St. John's in June.

Breathing *cont'd from page 1*

regional centres like St. John's to participate in neonatal resuscitation courses to access, instead, a mannequin at a local health site. Then, using a combination of the Internet and videoconferencing, these trainees would update their skills – at a distance.

“Normally, they have to come to St. John's and go through a set of maneuvers depending on different simulated conditions,” Dr. O'Young said. “The newborn might not be breathing on its own due to meconium in the airway, or because it's extremely undersized. The healthcare provider must be able to react to these different scenarios, by properly evaluating the baby's condition and performing the proper steps of resuscitation. Clearly the health care provider has only minutes following the birth of a child before irreparable damage may occur.”

Pediatrician Dr. Khalid Aziz of the Faculty of Medicine said this project will assist neonatal resuscitation instructors in the province to maintain their skill levels, and, by extension, provide skill updating to the healthcare providers they serve. “In centres with only 100 deliveries per year, less than 10 infants might require resuscitation. So that means the nurses and physicians who attend deliveries may only use their skills once a year. The Anakin Project will provide these people with a level of self-efficacy.”

On the engineering side, the INCA Centre is developing a package of computerized sensors, actuators, and microcontrollers to render the mannequins more lifelike. The mannequin will display vital signs corresponding to a predefined scenario set by the instructor via the Internet. In addition, it will respond appropriately to the trainee's attempts at resuscitation.

Wired to an ordinary computer in the trainee's work setting, the mannequins will send data to a St. John's-based ‘puppeteer’ about how the resuscitation is proceeding. If the proper steps of resuscitation (including providing warmth, clearing the airway, supporting breathing through ventilation, and supporting circulation with chest compressions) are performed in a timely manner, the mannequin will display the vital signs of a healthy newborn.

The mannequin simulators will appear to have lungs which rise and fall, stomachs that distend, and bodies that turn from blue to pink. They will also provide a heart beat and make crying or choking noises.

A randomized controlled trial is planned for this autumn to compare skill retention using the new, instrumented mannequin versus a training videotape.

Sponsors of the program include the Newfoundland and Labrador Provincial Perinatal Program, the Janeway Children's Health and Rehabilitation Centre, the Janeway Foundation, the Newfoundland and Labrador Centre for Applied Health Research, the Heart and Stroke Foundation of Newfoundland and Labrador, and Cahill Instrumentation.

Co-op *cont'd from page 1*



Collins, Hudson, and Hefford pose in front of “The Money Line” – the main pipelines that will carry the fortunes of the ocean floor to the boat.

location isolated, as a work-term, the experience really paid off. “There's a lot of innovative ideas there that are being tested for the first time, and I was up in this boat for four months, seeing everything, seeing how people work. Instead of looking at numbers on paper, I actually got to see it working firsthand. Instead of talking about how it should work, I was there to watch it.”

With construction completed on the FPSO, Mark won't get a chance to repeat his Bull Arm experience anytime soon. But after graduation in 2004, the engineering student plans to continue in the oil and gas field, preferably in Newfoundland.

Mark said he'd recommend the co-op experience to anyone. “It's a real opportunity, having these six work-terms, so you should try to broaden everything – broaden your knowledge, broaden your experiences.”

Another bonus? “You don't ever have to stay in school for more than four months,” he laughed.

Mark's supervisor from PCL, insulation field engineer Michael Collins (another MUN engineering co-op alumnus), said Mark exceeded expectations and easily gained the respect of the work force he had to manage.

Engineering co-op education co-ordinator John Hudson expressed appreciation to the employers involved for their commitment to the co-op program. “We would like to take this opportunity to thank Petro-Canada, PCL, and all other engineering companies and contractors for their valuable contribution to co-op education.”

From survival suits to swimsuits:

Engineering student crosses the Atlantic

Jennifer Smith has a special claim to fame: she may be the first woman ever to sail from Newfoundland to the Azores Islands.

A Term 7 undergraduate engineering student, Jennifer crewed in July of 2000 on a 38-foot C&C yacht from Manuels, Newfoundland, across the Atlantic Ocean to the Azores Islands – the ‘halfway point’ for transatlantic travel between Europe and the North America. The 1,130-mile transatlantic voyage took eight days and nights. She then sailed for two weeks from island to island before flying home to St. John’s to return in time for school.

Jennifer explained how her exciting trip came about. “We used to sail a fair bit in the summers, as a family, but I’d never done anything open sea. It’s just a totally different experience.”



Jennifer in her gear: “When you’re alone, you wear a survival suit to keep warm and a harness locked into the safety line around the boat. Because if you’re there for a four-hour shift and you fall over at the beginning of it, nobody’s going to know you’re gone until the end, and then there’s no way anybody could find you.”



Jennifer Smith and her father, Harold Smith, keep the tradition alive in Horta, Faial, Azores, where the wall outside the yacht club is decorated with the logos of all the yachts that make it there, for luck.

The engineering student travelled with her father, Harold Smith, who had crewed a transatlantic voyage previously and dreamed of taking his own boat across. Joining them were friends Peter Crocker, John Small and Billy Goodyear, who had varying degrees of experience sailing.

So what was it like being the only female on the boat?

“A couple of guys were joking around, saying ‘You’re going to be the only woman on the boat, I guess you’ll be doing all the cooking and cleaning’, but I was like, ‘No way, that’s what Billy’s for.’”

Jennifer told of how her father supported her one night when a crew member tried to make an issue of her gender by insisting she go below during rough seas. “Dad’s really good with that, so he drew the line,” she said. “I mean, I knew the boat better than they did; I pretty much grew up on it.”

Otherwise, it was happy sails for the duration. “The weather was pretty good. We had two days with confused seas, and one of our crew members got tossed and threw his back out. He didn’t move for two days. But then it got better: we went from survival suits to swimsuits.”

As a result of the injury, the crew had to manage the boat in two-hour shifts, tied on for safety and alone in the dark. “I liked that a lot, actually. You’re there in the pitch black with no light whatsoever and all the stars, and in the trail behind the boat there’s phosphorescence, so it sparkles. It was wild, I’ve never seen anything like it.”



First sight of land: Flores, the Azores.

In addition to the spectacular scenery waiting in the Azores, Jennifer says the journey itself held many visual treats. “We saw pothead whales, porpoise and dolphins, and turtles. You stand on the boat and you look around and it’s water for six nautical miles in all directions.”

So what did she learn from her amazing, possibly pioneering, experience?

“There’s one thing I didn’t realize: when you’re sailing coastal, you always have a forecast: you know the wind, the waves, what it’s going to be like for the next few days. But there’s no forecast for the middle of the Atlantic.”

Jennifer explained how a Burlington, Ontario, native named Herb Hilgenberg volunteers his time to collect and disseminate information to boats in mid-Atlantic. “He’s this retired guy who searches the Web to find the latest weather information. Every night he tells everybody where to go and if bad weather’s coming he routes them a different way. He’s awesome.”

A sailing enthusiast threatened by a violent storm during a trip to the Virgin Islands in 1982, Hilgenberg devotes his retirement to using ham radio to brief mariners crossing the Atlantic. He is licensed by Industry Canada, and communicates with an average of 50 vessels per day, seven days a week. His detailed and accurate forecasts have earned the trust of mariners throughout the world.

In addition to her happy memories and renewed sense of her own abilities, Jennifer got an unexpected benefit from her journey. She became eligible for membership in the international organization, Ocean Cruising Club (OCC) – a right reserved solely for those few who skipper or crew a cross-Atlantic sail of 1,000 miles or more, non-stop, port-to-port, in a sailing yacht of less than 70 feet. There are just over 1,500 members internationally.

As for the future, Jennifer said she plans to keep up with her sailing after she finishes her engineering education. “I can’t wait to have my own boat,” she said. “It’ll be the first thing I buy when I finish school and get out working.”



The Ghost, so named for the sense Mr. Smith has that his father and grandfather always travel with him.

More than meets the ice

St. John's may not have seen many icebergs this spring, but Alex Gardner certainly did.

The Term 6 ocean and naval architectural engineering student spent last term in a co-op position where he's had the opportunity to get up close and personal with the white giants, studying the deterioration of icebergs by wave action and collecting data on how changes in iceberg shape impact other berg characteristics.

Like a tornado chaser, Alex had to conduct the fieldwork portion of his work wherever he could find it. "My parents would say, 'So when are you going out next?', and I'd say, 'When I find an iceberg', he laughed. "I ended up in Tors Cove for a week and then near Twillingate – a place called Little Harbour – for about ten days."

A native of King's Point and Baie Verte, Alex said his experience growing up around the bay played an important role in his engineering education, particularly in terms of his preparation for this type of fieldwork.

"I think icebergs are amazing – they're totally unpredictable. So I enjoyed this work-term tremendously. I had to organize the equipment, transportation, and administration; I got to go outside; and I even got a half-decent tan!"

Part of two separate research grants for engineering faculty Dr. Mary Williams and Dr. Brian Veitch, his fieldwork involved setting up and supervising equipment to record iceberg behaviour.

"It's like time-lapse photography," he explained. "In each location I'd set up cameras onshore near a grounded iceberg and take a picture every half-hour over a number of days. Then, to complete the picture, I had to measure how big the bergs were, look at the currents, and log everything."

The undergraduate reported that, at one point, the berg at Tors Cove was an astonishing 15 metres high from the waterline, and 47 metres long on one side.

"We were also listening to the iceberg crack. In Little Harbour, we had some help from DFO to set up a hydrophone in the water just off the iceberg."



The hydrophone – basically, a microphone hooked up to a recording device – was an important component of the research, he explained. "Ice doesn't bend, it just goes. The neat thing about the hydrophone is you get to hear the cracks – like an early warning system."

"You can look at exactly the same thing for three days and wonder if it's going to crack today, but up until the moment it cracks, it doesn't budge."

Ironically, Gardner says, the first time a berg floundered during his watch was while he was gone to lunch. He had to settle for replay from the video camera.

"It didn't tip over, but it rocked and a good portion of it fell apart. You can hear it cracking on the hydrophone before you see it."

The engineering undergraduate reported that he's been inspired by his professors' research.

"Dr. Veitch's work on how the berg changes shape is important because changes to the top could make it tilt and impact scouring, which, of course, would have huge implications for piping and subsea installations.

"Dr. Williams – I'd love to do some of the things she's done – she's been to the Arctic and the Antarctic and she's actually drilled a hole in the ice and dropped a hydrophone in and listened to the ice crack up there."

"It's all quite new and potentially very, very useful."



The re-engineering of mechanical design

Over thirty years in the making, Memorial's mechanical engineering program is still a work in progress...and that's a good thing for students. Gone are the days when teaching focused on nuts and bolts interactions. Today, it's about automation and fabrication – getting three-dimensional products into students' hands for experiential analysis.

The faculty's Manufacturing Technology Centre is at the hub of this cultural adjustment, a place where students learn in a tactile way that design and analysis is an ongoing, iterative process, and that the achievement of a prototype is not the end of design work, but an important beginning. The administration considers this a crucial part of responsible engineering education, owing to the ambiguity involved: there are specifications, materials, objectives, and constraints, but also open-ended, sometimes under-defined visions of product.

As important assumption behind this view is that students come to the program with some history in design basics, be it tooling around in the backyard with a junior mechanic kit or salvaging Barbie dolls for parts. Mechanical Engineering department chair Dr. Mike Hinchey says students today *do* have that curiosity to figure out how things work, and adds it's the educator's role to push them beyond that.

Part of taking the students to the edge and beyond is the innovation in the mechanical technical experience modules, whose format was changed last winter to expose students from all disciplines to the full variety of labs – a radical



Future engineers at work: Term 2 students partake of the new design labs, now open to all disciplines in the B.Eng program.



interdisciplinarity in a profession known for specializing. In a series of 3-hour classes, approximately 184 students were introduced to lathes, mills, oscilloscopes, metal welding, pipe brazing, and panel and circuit wiring, and experienced the legendary lawnmower lab – in which students dismantle and then reassemble a lawnmower.

"Students appreciate these experiences a lot because they're quite different from anything else they do," Dr. Hinchey said. "It gives them some practical know-how that will help on work-terms and make it easier to understand certain theoretical concepts and some practical aspects of design."

Because the bulk of design engineering today is hidden from view, often encapsulated in a tiny chunk of microcomputer chip, the emphasis in this 'redesigned' design program is on enabling a multifunction team to work together — on marketing, product management, and manufacturing in an atmosphere of a 'virtual factory'.



Dean Rangaswamy Seshadri was referenced in ten different places throughout *The Design-by-Analysis Manual* produced by the European Pressure Equipment Research Council. A project of the European Commission Joint Research Centre, the manual establishes guidelines for the application of engineering design and analysis to typical pressure vessel structures under a variety of loading conditions.

Congratulations are in order for the families of Administrative Assistant **Barb Elliott** and Intermediate Clerk Stenographer **Nora Comerford**, both of whom recently had children.

Intermediate Secretary **Cathy Glynn** made it official this past June, marrying John Purcell in a civil ceremony at St. Kevin's Hall in the Goulds. Congratulations!

Paul Batstone, Program Manager for Co-operative Education in the Faculty of Engineering and Applied Science, made the news in Ottawa recently. While attending the Ottawa Centre for Research and Innovation TechnoTour 2001 for university co-op placement officers, Mr. Batstone was interviewed for a news report on the impact the technology industry's downturn was having on co-op programs. The piece aired on the local CBC supper hour news on June 8.

Undergraduate student **Michael O'Brien** was featured in a story in *The Telegram* in July. The 18-year-old was the subject of a study on the Future World Leaders Summit, an American government initiative designed to teach youth about government by bringing them to Washington, D.C., for a week of tours and focused research on international issues like arms control, trade, the environment, and human rights. At the end of the week, the participants, aged 16-19, presented their recommendations for government action.

Both the Newfoundland and Labrador Chapter of Women in Science and Engineering (WISE), headed by alumna **Jane Kieley**, and the NSERC/Petro-Canada Chair for Women in Science and Engineering, **Dr. Mary Williams**, will lend organizational support to the upcoming 12th International Conference of Women Engineers and Scientists, happening in July 2002 in Ottawa. A dynamic event held every three years in a different location around the world, the theme of this Canadian-hosted conference will be "Women in a knowledge-based society". Engineers, scientists, social scientists and students are invited to attend. More information is available at: <http://www.carleton.ca/wise/icwes12/icwes12.htm>.

In the News

Alumna Kim Keating, B.Eng 1998 (Civil) has been in the centre of the region's media lately. A safety engineer for Petro-Canada, Kim is featured in a new Petro-Canada ad series on the Terra Nova Project, where she works with the Total Loss Management (TLM) Team to create and maintain the systems that keep the oil production facilities safe for workers and the environment. Part of the commissioning team in Bull Arm, Kim is responsible for the commissioning of safety systems such as Firefighting, Firewater, and Fire and Gas Detection. She appears in tv, print, and radio ads for the company, Canada's third largest integrated oil and gas company.

the **BIG** picture
Stories behind the news

Sometimes the evening news doesn't capture the whole story about the offshore oil and gas industry. And sometimes, the whole story is actually a number of stories. Stories about how safety is a critical part of Terra Nova's operation... about how it is ingrained in our people and engineered into every detail of the FPSO. About the well-practiced emergency response teams, onshore and offshore. The CSA-approved safety gear worn by all personnel on the FPSO. The thorough safety training provided to our people. These stories may not make the evening news. But they're making the difference in Newfoundland and Labrador.

- From one of the 500 systems and sub-systems aboard the FPSO has been designed with safety and quality in mind.
- Our safety record is one of the best - in fact, it is three times better than the provincial average.
- There are 3000 tonnes of extra steel built into the FPSO hull to protect it from sea ice and icebergs.

THE FUTURE BROUGHT TO YOU IN PART BY
PETRO-CANADA

From the editor

I suppose I wouldn't be the first to point out the incredible, powerful lessons in nature. But re-reading a story for this issue, something struck me. Alex Gardner, a student researching icebergs for Drs. Mary Williams and Brian Veitch, said of his time spent, days on end, staring at bergs, trying to ferret out their secrets: "You can look at exactly the same thing for three days and wonder if it's going to crack today, but up until the moment it cracks, it doesn't budge."

I think I know what he means. Life is filled with that element of surprise, those sudden, rending cracks that destroy as they create – little moments of (what we perceive to be) chaos, often with their origins just under the surface, emerging, as it were, out of the blue.

No warning. No pattern. No clue. Or so it seems.

But like an iceberg cracking, many of the sudden cracks or surprises in our own lives are beautiful, too, for all their raw, transformative energy. Cataclysmic events like death, life, and all the versions thereof.

A few weeks ago, I saw something awesome on a *National Geographic* special: sperm whales sleeping. Have you ever seen this? These giants sleep in groups, vertically – noses down, touching the ocean floor – looking for all the world like gargantuan patches of grass.

If my time here at Memorial University has taught me anything, it is this: life is full of amazing examples of very special engineering, only some of which are consciously made by humans — like frozen rocks that fall apart, colossal whales that sleep nose down, and the immense capacity of humankind to create and adapt.

So thank you, everybody, for a wonderful time staring at this iceberg, and living on it, too. It's going to be an exciting few years ahead for all of us, I think: the oil and gas development partnership is heating up, the auv and robotics research is in high gear, and nearly every day I find out about another talented, insightful, or particularly kind person in this building.

So to those of you just starting to learn about Memorial Engineering through this newsletter, keep reading – there's a whole lot more on the horizon....



Susen Johnson



Sent to:



Alumni News

Howard Moyst, B. Eng. 1984 (Mechanical), graduated in May 2001 with a master of applied science in industrial engineering from Dalhousie University. His engineering services company, AIM Engineering, provides project management, industrial and mechanical engineering services. Since graduation, he's spent thirteen years with the Irving Group in various management positions, and three years with Michelin Tires Canada Limited. He's also pursued postgraduate studies at Delft University of Technology (marine) and UNB (business), and is writing several papers based on his thesis, related to the integration of design with manufacturing and construction. Former classmates can contact him at hmoyst@ns.sympatico.ca



Gordon Jin, B.Eng. 1982 (Civil), has been awarded the Canadian Pacific Railway Engineering Medal by the Engineering Institute of Canada (EIC) in Ottawa. An employee with the Department of Works, Services, and Transportation, Gordon received the medal in recognition of his many years of leadership and service to the EIC and its member societies. He was nominated for the award by the Canadian Society for Civil Engineering, in which he is active at both the provincial and national levels. He can be reached at JinGordon@mail.gov.nf.ca.



WISE (Women in Science and Engineering) Newfoundland and Labrador and the NSERC/Petro-Canada Chair for Women in Science and Engineering are proud to lend support to:

The 12th International Conference of Women Engineers and Scientists

July 2002

Ottawa

Theme: "Women in a knowledge-based society"

Engineers, scientists, social scientists and students welcome.

More information is available at:
<http://www.carleton.ca/wise/icwes12/icwes12.htm>

Did You Know?

Memorial's first Computer Engineering students graduate next spring!

Alumni:

We want to hear from you! Whether it's a promotion, new business, baby, marriage, traveling the world in a kayak, or an invention—share your great news with us, and let your fellow students know how they can get in touch with you. Contact the editor at one of the addresses indicated on the bottom of this page, or e-mail info@engr.mun.ca.

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