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U of A Engineer

Keeping in Touch with Alumni

Set in STONE

Masonry chair established

Tackling the Tailing Ponds

Balance of Power

Everywhere a Sign

Message from the Dean

This year marks the 100th anniversary of engineering education at the University of Alberta. As with most significant milestones, this centenary celebration gives us an opportunity to reflect on our past, our present and our future.

In 1908, five students in the UofA's inaugural class began their engineering studies, under the tutelage of Professor William Muir Edwards. One hundred years later, the Faculty of Engineering's enrollment has grown by a factor of 1000 to approximately 5000 students—over 3800 undergraduate and just under 1200 graduate students. Our faculty complement has grown from one lone professor to over 180 of the top educators and researchers in the world. We are proud to provide more than $1.2 million in scholarships to new students each year and to host more than 45 research and endowed chair positions, including 12 prestigious NSERC Industrial Research Chairs—more than any other Canadian university.

Over the past century the graduates of our engineering programs, along with our professors and researchers, have been instrumental in advancing their respective engineering disciplines. The collective accomplishments of our alumni form a foundation of leadership and innovation that inspires each successive generation of UofA Engineers, who then in turn continue to add to this foundation. As a result of the hard work and perseverance shown by our alumni, faculty members and staff, the Faculty of Engineering has earned a reputation of excellence that reaches worldwide.

I'm sure you'll agree we have a great deal to celebrate as we gear up for our next 100 years. I encourage you to mark September 18 to 21, 2008 on your calendars for what promises to be an outstanding weekend of engineering events. Please see the back inside cover of this issue for more details on our Homecoming 2008 celebrations. No matter where your career has taken you since graduation, we hope you will be able to come back to campus and join us for this once-in-a-lifetime celebration.

Yours truly,

David T. Lynch, PhD, P.Eng.
Dean of Engineering

UofA Engineer
Winter/Spring 2008 Issue 25

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VISION To be one of the largest and most accomplished engineering teaching and research centres, a leader in North America.

MISSION To prepare top quality engineering professionals, to conduct world-leading research, and to celebrate the first-class reputation and outstanding accomplishments of alumni.

VALUES Dedication, integrity, professionalism, and excellence in teaching, research, and service to the global economy and community.

Did you miss us?

Due to staff changes, we have combined the Winter and Spring 2008 issues of *UofA Engineer*. Look for the Fall 2008 special centenary edition in your mailbox in late summer.

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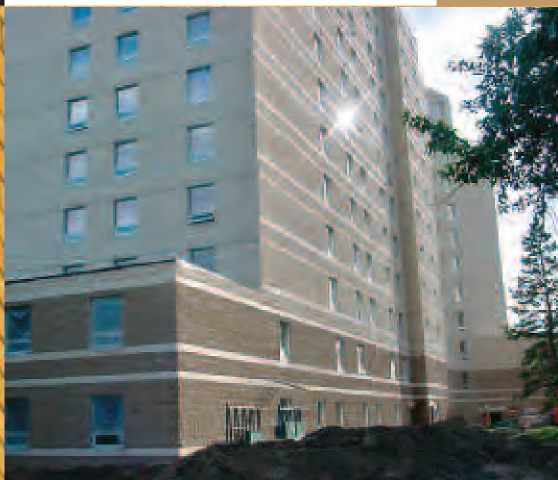
CORRECTION

In the Fall 2007 issue, the story on Bill Kay, "A Gift of Confidence', was incorrectly credited in the biography. Linda Goyette was the author

Set in STON

by Tarwinder Rai

South side of Lister Hall, University of Alberta campus.



The trowel that placed the first layer of mortar 32 years ago—when there were no researchers studying masonry at the University of Alberta—inadvertently set a course that has led to the establishment of the prestigious Masonry Contractors Association of Alberta (MCAA Northern Region) Chair in Masonry Systems within the Department of Civil and Environmental Engineering.

E

And that trowel belonged to Dr. Michael Hatzinikolas (Civil '77)—the first graduate student to study masonry structures with the department.

"Masonry wasn't a part of the curriculum back then," says Hatzinikolas. He began working on his PhD in Structural Engineering under the guidance of Prof. Jack Longworth (Civil '45)—Chair of the Department of Civil Engineering from 1974–76—and Dr. Joe Warwaruk (Civil '54).

Today, Hatzinikolas is recognized as Western Canada's most experienced masonry engineer. But he started out his career as an elementary school teacher.

After obtaining a degree in education from Greece in 1964, Hatzinikolas served as an officer in the Greek Army for two years. Deciding he "didn't like the second lieutenant," Hatzinikolas emigrated to Canada in 1966. He completed his Bachelors of Civil Engineering degree in 1971 and Master's degree in 1972 at the University of Manitoba. He then worked overseas for three years. Jetting back to Canada, he came to the University of Alberta to complete his PhD (1975–77).

"A lot of students came to study masonry at the U of A after me, and they have all gone on to become leaders in the masonry industry and education in Canada," Hatzinikolas points out.

"Longworth and Warwaruk accepted the challenge to supervise a student in a field they had no background or expertise in. They had the foresight to see that masonry was an important area of civil engineering.

"The masonry industry owes a lot to these two individuals. They saw the need to develop research in this area and they were the two that started the process and deserve all the credit. They were good teachers that became great friends."

This foresight, and the growing partnership between the MCAA Northern Region and the Department of Civil and Environmental Engineering over the past few years, has strengthened the department and the MCAA Northern Region to position itself among the best in masonry education.

MCAA Northern Region members Chris Ambrozic, (president of Scorpio Masonry [Northern] Inc.) and Kery Donaghey (Alberta Division Manager, Gracom Masonry), helped secure not only research funding, but an endowed position that will put Western Canada at the forefront of leading-edge masonry technology and design.

The MCAA Northern Region, formed in 1965, is an Edmonton-based contractor-driven regional association with membership representing masonry producers, union and non-union contractor interests in northern Alberta. Although regional in structure, it maintains a national and international focus on masonry issues. It has a history of providing a leadership role in masonry research and education, most recently through strong support of the Canadian Masonry Concrete Institute, Edmonton, and its relationships with the Department of Civil and Environmental Engineering. It maintains strong partnerships with other local, regional and national Canadian masonry associations, including the Canadian Masonry Contractors Association, the Canada Masonry Design Centre, and the Canadian Concrete Masonry Producers Association.

With ongoing support from Dr. J.J. Roger Cheng (Chair of the Department of Civil and Environmental Engineering), Dr. Alaa Elwi (a professor emeritus with the department), and the U of A's Faculty of Engineering, success is only a step away.

For Donaghey and Ambrozic the research and innovation derived from the chair filters beyond just masonry contractors. The benefits of the improved products will be felt by suppliers and users equally.

"Industry-wide, we've been getting organized to address issues that affect us globally. This is just one way to ensure our future growth is sustainable," says Donaghey. "We have a product available in the construction world that—if designed properly—is durable, cost-effective and lasts a lifetime."

MASONRY

Masonry is the building of structures from individual units laid in and bound together by mortar. Common materials of masonry construction include brick, stone (such as marble, granite, travertine, and limestone), concrete block, glass block, and tile. Masonry is commonly used for the walls of buildings, retaining walls and monuments. Brick is the most common type of masonry, and may be either weight-bearing or a veneer.

Examples of the two companies' masonry work and restoration can readily be seen across the U of A campus, from Assiniboia Hall to HUB Mall. Just by walking across campus, you get a feel for the kind of atmosphere masonry design can create.

"Masonry structures are a very important part of the construction world. Sixty per cent of the structures throughout the world still use masonry as a part of the building process," says Hatzinikolas. "You can't restore a 100-year-old building without having a clear understanding of how masonry works—otherwise, you would destroy the building.

"New construction systems have problems; masonry is a traditional system with most of the problems already worked out. We shouldn't be rebuilding structures every 20 years, but restoring them every 100 years. You can demolish a brick building and use the bricks again. Wood, you can't.

"A pressing issue facing the industry is that buildings constructed in Canada in the previous century now need to be restored. With the proper knowledge and tools, this can be done. Some historic buildings here in Edmonton that have recently been restored have suffered more damage than in the previous 100 years, all because they were improperly done." These can only be adequately repaired by engineers with a solid understanding of masonry, adds Hatzinikolas. "Educating engineers to use the products is the best way to go."

And that's where the trio—Hatzinikolas, Ambrozic and Donaghey—believe the new endowed chair's research will break traditional ground.

One River Park condominimums, overlooking the North Saskatchewan River and downtown Edmonton.

Masonry structures are a very important part of the construction world—60 per cent of the structures throughout the world still use masonry as a part of the building process. You can't restore a 100-year-old building without having a clear understanding of how masonry works . . . otherwise, you would destroy the building.

—DR. MICHAEL HATZINIKOLAS

Unique structural concrete blockwork.

> A pressing issue facing the industry is that buildings constructed in Canada in the previous century now need to be restored.
> —DR. MICHAEL HATZINIKOLAS

> Our motivation is to have this happen in every university. It's the oldest trade in the world, and in a fast-paced economy like ours, people go for quick fixes and not durability.
> —KERY DONAGHEY

> The masonry industry across Canada has seen an overall lack of design and research development over the past years. This position will provide the industry with a better understanding of systems and gives a venue to test leading edge material and better utilize our resources.
> —CHRIS AMBROZIC

While masonry is one of the most durable products available on the market, the construction industry doesn't fully understand its behaviour. This keeps it from being used more, say the contractors.

The MCAA Northern Region Endowed Research Chair in Masonry Systems will engage students with education and research in the masonry field, which includes masonry structural performance, masonry veneer, stone cladding, environmental separations, and restoration of modern and historic structures.

In addition to research initiatives, the chair will develop and offer undergraduate and graduate courses related to masonry and masonry systems, with a typical annual offering of at least one undergraduate and one graduate course.

"The masonry industry across Canada has seen an overall lack of design and research development over the past years," observes Ambrozic, who is a second-generation mason in his family and a red seal certified brick layer. Scorpio Masonry Inc. has been in operation since the 1970s, and he has owned and operated it for the last four. "This position will provide the industry with a better understanding of systems and gives a venue to test leading edge material and better utilize our resources.

"We realize by having the U of A in our backyard, the masonry industry will have the same benefits and garner similar milestones in terms of success as other construction options."

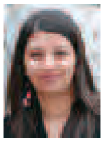
Hatzinikolas, who is most often credited with raising the bar on masonry design and construction in Western Canada, also owns and operates FeroCorp. For 22 years, this Edmonton-based company has manufactured and distributed masonry ties designed to facilitate the construction of masonry cavity walls. Hatzinikolas was formerly Executive Director of the Canadian Masonry Research Institute, and is currently an adjunct professor with the Department of Civil and Environmental Engineering.

Donaghey, another businessman with roots entangled in the masonry industry, says establishing an endowed chair in civil engineering is just the beginning.

"Our motivation is to have this happen in every university. It's the oldest trade in the world, and in a fast-paced economy like ours, people go for quick fixes and not durability," says Donaghey, who has 32 years of industry experience. "Masonry is the most durable product and lasts hundreds of years. You get longevity with this product."

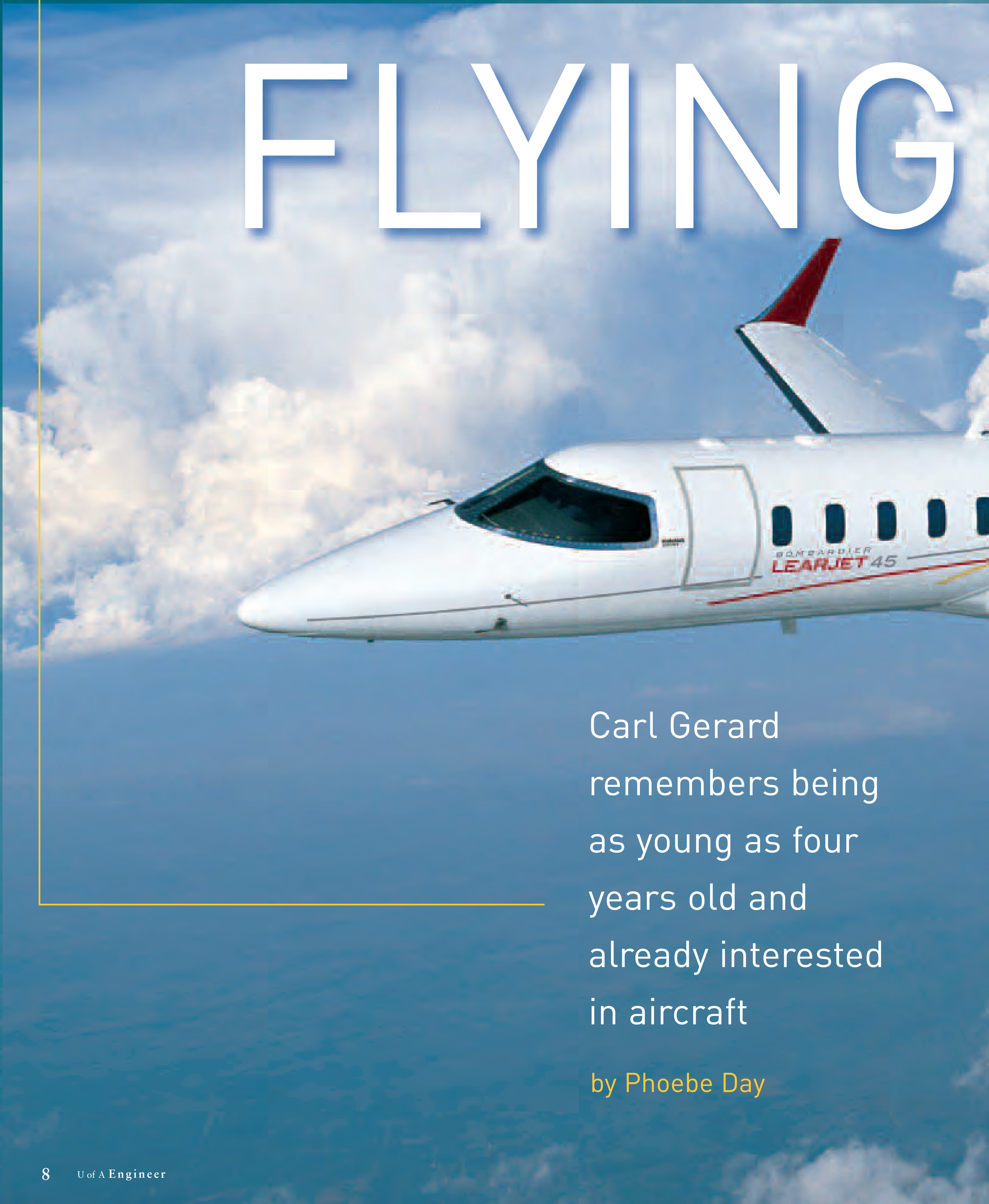
With industry ties already cemented within the masonry, everyone agrees the opportunities for research and product advancement are endless.

"To have an endowed chair invest their knowledge and expertise into masonry design is great," enthuses Hatzinikolas. "There's no better way to educate the young engineers to feel comfortable to use the product. The chair will be encouraging people to use more masonry, which eventually will pay big dividends to the masonry industry. I'd like to see a professor who not only teaches masonry but focuses on masonry wall systems, encourages industry participation to advance the masonry industry and promotes historic restoration of masonry buildings."



Tarwinder Rai is the Communications Assistant for the Department of Civil and Environmental Engineering.

FLYING



Carl Gerard remembers being as young as four years old and already interested in aircraft

by Phoebe Day

HIGH

Bombardier Learjet 45

Carl Gerard remembers being as young as four years old and already interested in aircraft. As a small boy growing up near Whitewood, Saskatchewan, he would hear the roar of the yellow Cornell trainer, run outside and wave as it passed overhead. Later, as a teenager in Victoria, B.C., he joined the air cadets, continuing to nurture his love for anything that flew.

At 17, Gerard earned his private pilot license, without even telling his parents what he was doing because he knew they would be worried. But once he went solo, they became his first passengers when he took off from the Sydney airport, near Victoria.

That early start, as a prairie boy admiring the planes overhead, led to a stellar career in aerospace engineering. Gerard would go on to contribute to the design of some of the most renowned aircraft in the world.

Gerard joined the air force in 1952 right out of high school, and was posted as an aircraft technician in a number of Canadian towns. In Chatham, New Brunswick, at an operational training unit for pilots, he worked on one of the Royal Canadian Air Force's first jet fighters, the Sabre, as well as the Lockheed T-33 and the World War II Mustang fighter. Chatham was also where he met his wife, Angela.

By the time the young couple was posted overseas they had three daughters, all under the age of three. They spent four years in Marville, France, one of four RCAF bases established to support NATO's goals during the Cold War. Gerard was promoted to corporal and, among other activities, took part as a technical team member in a competition among NATO countries to see whose pilots had the best shot. As the non-commissioned officer in charge of the instrumentation group, Gerard was part of the Canadian team that took the title.

In 1956, the German Air Force had just been reinstated and equipped with the Canadian Sabre fighters. If Gerard's base in France was ever destroyed, his group was to become part of the Alhorn wing in Germany. "Many of our pilots and the German pilots were World War II vets and we all socialized," says Gerard. "It was a real experience to meet the people of that era and share their stories."

Gerard returned to Canada for a brief posting in Portage La Prairie, Man., and in 1963 was sent to the University of Alberta as part of the air force's Regular Officer Training Plan. He spent four years in Edmonton, returning to regular service every summer at nearby Namao, where he was the maintenance officer on the Hercules.

"Having been away from school for a number of years, that first semester took a lot of adjusting," he recalls. "I had been away from challenging classes like math and physics for a while. I went straight into calculus class and couldn't even remember how to factor."

Gerard settled in by the second semester, however, and even got used to his 44-hour weeks. He left the U of A, he says, with a Mechanical Engineering degree and a "good academic toolkit" that included the basics of economics, common law, and production management.

Upon graduating in 1967, Gerard moved to Ottawa and then Cold Lake, Alta., where he spent the next five years as a flight test engineer with the Aerospace Engineering Test Establishment. "It was phenomenal for a new grad to have that kind of responsibility," he says. He guided aircraft—such as the Dassault Falcon business jet—through a range of cold and hot weather experiments. In the winter, he would fly up to Fort Churchill, Man. and cold soak the aircraft in temperatures plunging below -50° Celsius. "We would let it soak all night and in the morning, look for leaking seals or any other damage done," he says. "We wanted to know if the battery would work, if the engine would start, or how the hydraulic pumps functioned in that extreme environment. We had to test everything."

He also tested a CF-5 fighter aircraft in blazing heat in Yuma, Arizona. With the

Carl Gerard and the production management team with a newly-manufactured Dash 8 Series 200.

Courtesy Carl Gerard

plane parked in the sun at 38° Celsius, cockpit temperatures would reach temperatures of 177° C—easily hot enough to bake a cake.

In 1972, Gerard packed up his large family—he now had three sons as well as three daughters—and moved to England for a master's degree in Structural and Aerospace Dynamics from the Cranfield Institute of Technology. He then returned to Ottawa as a structural engineering specialist for Canadian Forces aircraft. A highlight came in the late 1970s, when he served as the structural engineering specialist on the selection of Canada's new fighter aircraft program (the F-15 won).

Around the same time, Gerard and his colleague, Bill Lockhart, paid close attention to a damage-tolerance philosophy practiced by the United States Air Force. That methodology used recording equipment to measure flight loads and determine how many flight hours an aircraft could log safely before requiring an in-depth structural inspection. "Bill and I looked at how to apply this philosophy in economic terms to fit our Canadian Forces aircraft fleets. After I left, it became enshrined in air force practice. It was a nice contribution we made." The Canadian forces officially adopted the program in 1980, and continues to apply it today.

Gerard's last post with the military was in Nova Scotia, where he was the maintenance officer for the legendary Sea King helicopter.

At 44 years old, Gerard was already eligible for a pension. But instead of retiring, he joined IMP Aerospace, the largest military aircraft repair and overhaul firm in Atlantic Canada. He was hired to build up the company's engineering section. During his time at IMP, he helped win a proposal to service the Aurora long-range patrol aircraft—the Tracker, and then the Sea King.

He worked his way up IMP's ladder, holding a number of executive positions including Executive Vice President and COO IMP Aerospace, and also served on the board of directors. He collected a number of other titles, including chairman of the Nova Scotia CAD/CAM Collegium, and served as the Atlantic Canada member of the Advisory Board for the NRC National Aeronautics Establishment.

"As an executive vice president, I hung up my slide ruler and concentrated more on project and personnel management," Gerard says.

At an NRC advisory board meeting, a colleague asked Gerard to consider coming over to Canadian aerospace giant Bombardier, which had acquired Boeing's subsidiary in Toronto, de Havilland Aircraft of Canada. He decided to make one last pit stop before retirement.

But he arrived at a difficult time. The Boeing arm had gone through massive layoffs, and Gerard was forced to reduce the numbers even more. To complicate matters, Bombardier decided to launch its business jet at the same time. So while it was getting rid of aerodynamics engineers, it was hiring aerospace structural engineers.

Six engineering directors were reduced to four, and company morale had bottomed out. "The Boeing group had already been through the exercise once, and the de Havilland employees were still licking their wounds, so it was tough when Bombardier came in and did it again," Gerard recalls. "It was a very challenging period. The only way to build up confidence was to give people work."

While restructuring the engineering organization, Gerard modernized the design process. He introduced an integrated product development methodology—Concurrent Engineering. All the departments—manufacturing, finance, procurement—would sit down at one table, rather than operate as isolated units. At the time, it was an innovative concept.

Gerard also worked on a number of production programs, including the Dash 8 Series 200 certification, the Learjet 45 wing design ("for that little Lear wing, we needed 90 engineers") and the Global Express business jet rear fuselage design and final assembly ("the Global Express had a phenomenal range of 14,000 km; it went faster than the 747 and could fly from New York to Tokyo nonstop"), and, ultimately, the new 76 passenger Dash 8 Series 400 airliner.

When de Havilland designed and built the Global Express business jet and the Dash 8 Series 400, the company switched strategies in order improve its competitiveness. It lifted the veil of privacy on design and partnered with Mitsubishi of Japan, Allied Signal from the U.S., Pratt and Whitney from Montreal, France's Sextant and Westland from the UK. During this time the de Havilland engineering organization grew from 315 to more than 1300.

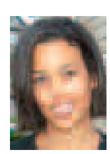
"This was a great team I had the privilege of working with—a team of superb, world-class engineers. Some of the de Havilland engineers had been employed on Canada's AVRO Arrow program," says Gerard. "Throughout my entire career, I was fortunate to work with experienced people. I used every darn bit and then some of what I was taught at the U of A and, as well, these people I worked with all became my teachers. Throughout my career it was like I went to school for 46 years."

He introduced an integrated product development methodology—Concurrent Engineering. All the departments—manufacturing, finance, procurement—would sit down at one table, rather than operate as isolated units.

Even after he retired in 1998, Gerard still kept a hand in the industry. He assisted author Stephen Armstrong on *Engineering and Product Development*, and wrote the book's foreword.

He now fills his days with golf (he gets in 60 to 70 games a year), travelling, volunteering with his church parish, and visiting his 19 grandchildren. Luckily, his three sons all live within five kilometres of his Halifax home.

"My whole career, I've been fortunate," Gerard says. "My work has been my hobby. In my boyhood days, I built 300 model airplanes, designed many of them by trial and error, and learned from mistakes. And in my career, I got to work on the real ones. It has been fantastic."



Phoebe Day is an Edmonton-based freelance writer.


Alberta
14
EAST
Wainwright

ISL Engineering and Land Services Ltd.

SIGNS SIGNS everywhere SIGNS

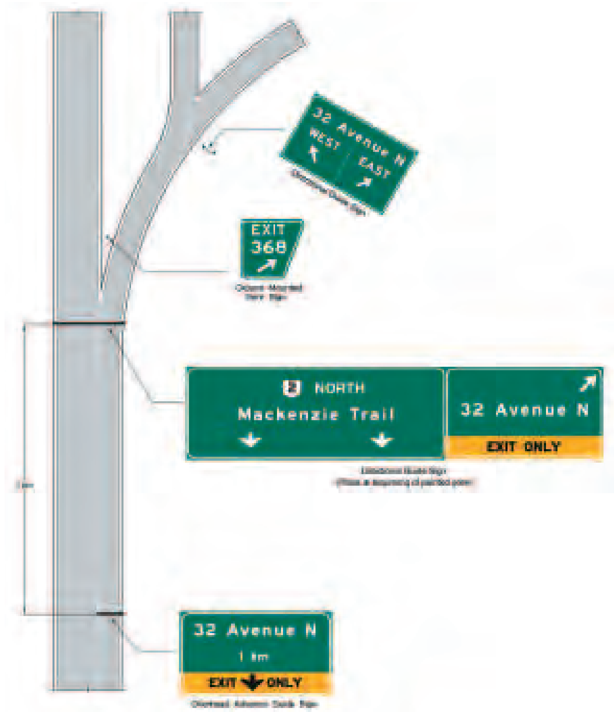
by Bronwen Strembiski

They regulate your actions, improve your safety, and guide you to your destination, but you probably never even give highway signs a thought. That's because Steven Melton (MEng Transportation '94) and his team give them a great deal of thought.

In fact, you could say that Melton wrote the book on the subject. He recently received a 2007 Showcase Award for Alberta's new Highway Guide and Information Sign Manual.

The project started as an update to the Urban Guide and Information Manual, but it eventually grew into an entirely new document. The new manual took about a year and a half to complete, as Melton worked to

Exit only (with single exit lane)



Excerpts from ISL Engineering and Land Services Ltd's Information Sign Manual

Tourist Destination Area Sign (Provincial Park)

Tourist Destination Area Sign (Recreation Park)

ISL Engineering and Land Services Ltd.

ISL Engineering and Land Services Ltd.

strike a balance between safety, mobility needs, and community interests.

Melton is very modest when it comes to his contribution to the project. "This was very much a joint venture with the Technical Standards Branch of Alberta Infrastructure and Transportation," he says. Along with several key colleagues at Infrastructure and Transportation, Melton points to the hard work of a U of A Civil Engineering co-op student, Marlis Foth.

As with most projects, the first step was research. The team looked at similar manuals from across Canada and the United States, while also assembling and updating the data that already existed in other Alberta Infrastructure and Transportation documents.

An effective highway signs manual has to address every conceivable scenario on the road. To do this, Foth explains, "Some standard signing plans were developed for the common intersection and interchange configurations, and then basic principles and examples were provided to allow an individual to create a signing plan for any situation."

Human factors play the largest role in designing signs, says Foth. "All of the factors are based on an individual's ability to detect, read, decide, and react to the signs." To make it easier to detect signs, roadside clutter is kept to a minimum, and signs are colour-coded according to their purpose. For example, directional signs are green, and facilities and service signs are blue.

Because a driver has only an instant to read and process a sign's message, text is kept as short and simple as possible. Even the font can be crucial; Alberta now uses Clearview instead of Gothic, because U.S. research indicates that Clearview is easier to read and understand.

Sign placement is another critical factor.

Typical Rural interchange signing (parclo interchange)

ISL Engineering and Land Services Ltd.

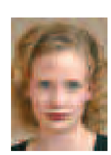
Once a driver reads a sign, he or she first needs to decide whether or not to act, and then needs adequate time to take that action. Within a few seconds, a driver going 100 km/h may have to change lanes, slow down, and turn off the road. To allow time for that, you need to create a formula to determine the best place to put each sign.

Above all, signs have to be consistent. A sign can accomplish much of its job purely through its colour and shape. For example, you don't have to actually read the word on that red octagonal sign. Your brain automatically puts your foot on the brake pedal.

Likewise, you shouldn't have to expend a lot of thought trying to find highway signs. If they appear in predictable places, you quickly learn where to look for them. "This is particularly important for drivers who are unfamiliar with the route," Foth points out. "Consistency is also important across other jurisdictions, whether it is Alberta, Canada or other countries."

ISL Engineering and Land Services Ltd.

The Highway Guide and Information Sign Manual will provide an essential set of tools for urban and rural municipalities throughout the province, and for years to come. Thanks to the work of Melton and his team, we will be able to go right on not thinking about highway signs.

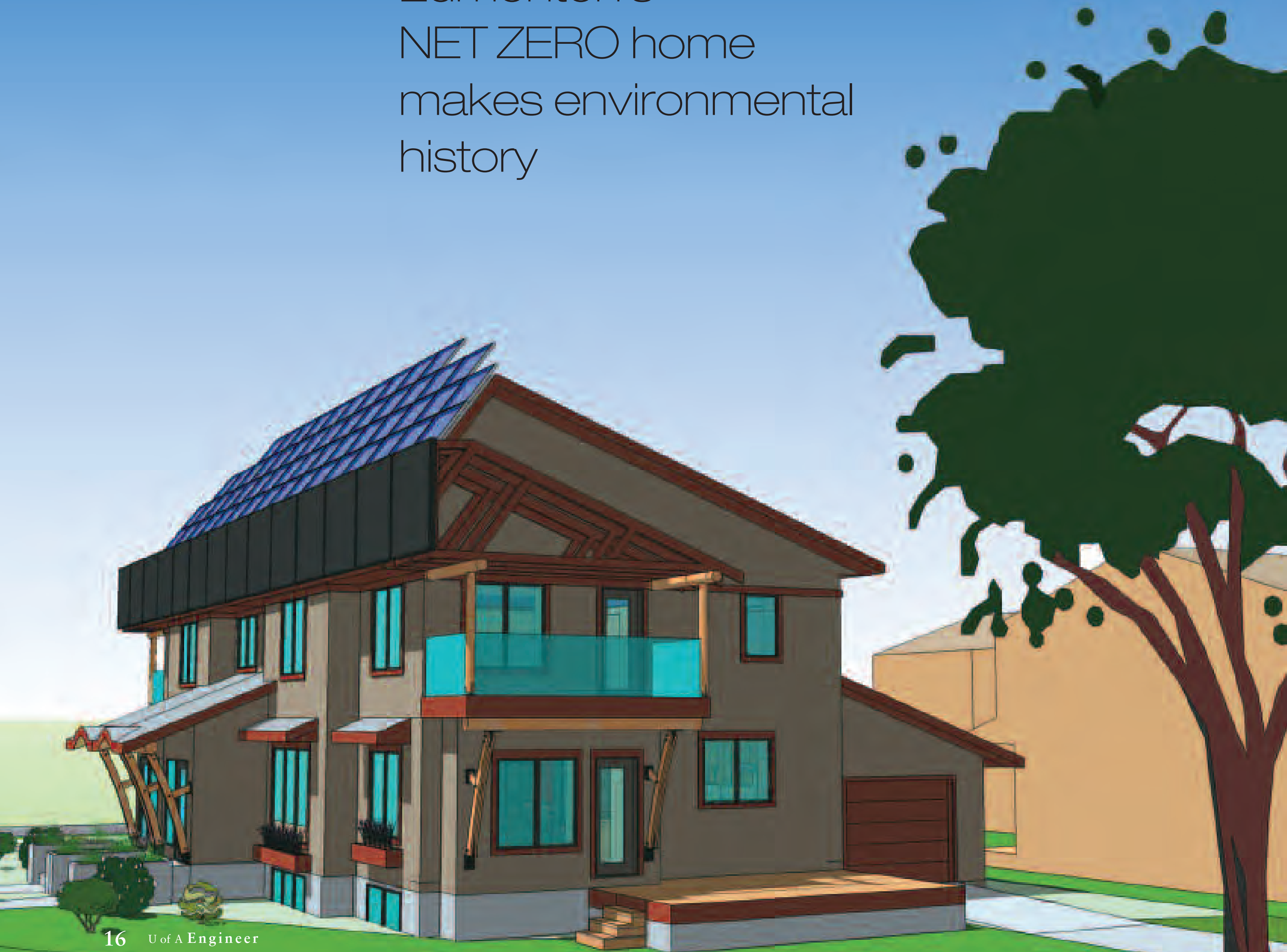


Bronwen Strembiski owns Connectation Consulting, an Edmonton-based communications and public relations company.

Balance of Power

by Caitlin Crawshaw

Edmonton's NET ZERO home makes environmental history



When temperatures dip this coming winter and many Edmontonians face huge heating bills, one house in the city will owe the natural gas company nothing.

Solar electricity modules being installed.

As of this fall, Edmonton will boast one of Canada's most energy sustainable homes—the Riverdale NetZero Project—thanks to the efforts of a team led by U of A Engineering alumni.

Electrical Engineering alumnus Gordon Howell of Howell-Mayhew Engineering, Inc., Peter Amerongen of Habitat Studio & Workshop Ltd., and U of A Civil Engineering alumnus Andy Smith are the central players in the creation of a Riverdale duplex that will produce all of its own heat and energy. It sounds amazing, but the principles are simple.

"It uses small amounts of energy to begin with," explains Howell. Triple-paned windows on the south, east and west sides of the house and quadruple-paned windows on the north side of the house greatly reduce heat loss. It is extremely airtight and incorporates a high-efficiency heat recovery ventilation unit. The house will have an R-value of 56 in the walls and 100 in the ceiling, in contrast to the average new house, which has an average R value of between 20-25 in the walls and 40 in the ceiling, says Howell. To illustrate how far building technology has come: an early 1950s bungalow would have been built with an R value of 4 in the walls and 12 in the ceiling.

In contrast, the super-efficient Riverdale bungalow "has such a low heat loss that it can be heated at night in the winter at 32°C with six hair dryers," says Howell.

The house includes an active solar heating system that produces 94 per cent of the heat used for hot water and 78 per cent of the heat used to heat the house. The remainder is provided during the daytime by electricity that the house generates through its solar electricity system, and at night through the city's electricity grid.

This energy consumption and production creates a "net zero" balance over the year because the house contributes electrical energy to the grid during the day, when it generates more than it can use. This counteracts the amount the house draws from the grid at night. The daily net production is greater in the summer and less in the winter, and is expected to leave the house with a slight annual electricity oversupply.

All photographs: Gordon Howell

Solar heating collectors being installed.

The group behind the Riverdale Net Zero Project was one of 12 teams across Canada—and four in Alberta—that competed to win a position in Canada Mortgage and Housing Corporation's "EQuilibrium Sustainable Housing" initiative to create a net zero energy healthy home. The selected teams are combining resource and energy-efficient technologies to create these homes across the country.

Howell, who is also a team member on two of the other three Alberta projects, points out that these 12 homes are the first of their kind in Canada -- no net zero energy houses have been built here before. The houses are leaders in changing our thinking about how we go about building our houses and other infrastructure, says Howell. "This is not a panacea; this is merely one of the solutions we need to seriously consider in resolving our energy delivery issues."

Even though the house is not yet complete, several people are interested in buying it. There won't be major restrictions placed on who buys the house, but Howell says the owners need to see themselves as part of the team. "We want someone there with whom we will have a relationship, because we want to know how well the house works and how well it hits our design goals,

Basement forms showing solar heat storage tanks.

Riverdale NetZero House nearing completion.

and we'll be measuring its performance for a couple of years."

"Because these are the first houses built like this in Canada, everybody's learning a huge amount. It's not like we've done a hundred and we know how it all works." Howell predicts that the house will come within just a few per cent of its goal, but the attitude and choices of the people living in the home will have a great affect on its ability to achieve a net-zero result. "If the family is aware of how choices affect energy consumption, we'll have an energy surplus. If the family is not aware, then we will have a small deficit. Notice how that has nothing to do with technology."

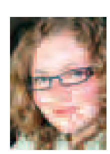
A long-time sustainability advocate, Howell leads by example: his own home has been very energy efficient since its construction in the late '80s. In 1995, it became western Canada's 1st solar powered home to sell electricity to the grid. Howell also organizes eco-solar home tours in Edmonton (there are about nine solar-powered homes and even more solar-heated homes) to show people what's possible.

Howell's environmental awareness plays a part in everything he does. His engineering career has focused on resolving the barriers to getting solar power systems connected to the grid. He has installed solar energy systems at the Alberta Legislature and has been part of a number of other solar projects around the province.

His undertakings are complex, but his philosophy is simple. "I want to help people prepare for the energy and environmental issues now around us. I've been saying this for a number of years, but we're seeing more and more these days. I'm happy to help people understand these things more clearly and to take action," he says.

And he hopes his environmental leadership spreads.

"I came across a wonderful definition of leadership the other day. It was: A leader is someone who causes other people to take effective action. I want to help others … take effective action, so each of us can make the decisions we need to make to reduce the environmental footprint that is causing this world to start going down the tube pretty fast."



Caitlin Crawshaw is an award-winning Edmonton-based freelance writer.

Paul Goud (Electrical '59, Professor Emeritus)

I was happy to receive the most recent issue of *U of A Engineer* and the 2008 calendar. As always, I enjoyed reading the magazine and admiring the calendar pictures and their explanations.

I particularly enjoyed the article on the Avro Arrow. I have an engineering friend, Rod Drysdale, who also worked on the Avro Arrow and has interesting stories about it.

As I recall, it was claimed that developing the electronic and armament systems for the Avro Arrow would require a similar amount of money to what was being spent on developing the plane itself. Also, after the Russian Sputnik launch in 1957, the USA was hysterical about being behind in the missile area and did not see a big future in fighter aircraft. President Kennedy made a big deal about the "missile gap" in his election campaign in 1960.

The Avro's cancellation was highly controversial, and I don't want to argue about whether or not it was the right decision in its full context at that time—namely, money being spent versus expected future payoff. Sadly though, the cancellation sent many highly trained Canadian engineers to the USA looking for jobs there.

Jim Saltvold (Electrical '64)

In the Fall 2007 *U of A Engineer*, you invited readers to tell you about significant milestones in engineering history. I regard the development of the CANDU nuclear power reactor as a very significant milestone.

Unlike the Avro Arrow, which you featured in the Fall 2007 issue, the CANDU reactor continued to receive government funding. Today there are at least 18 CANDU reactors producing power at five power stations in Canada, and another nine CANDU reactors in four foreign countries. These reactors produce clean power without emitting carbon dioxide.

Many U of A engineering graduates, including me, have had rewarding careers working for Atomic Energy of Canada Limited, a utility or a supplier to the nuclear industry. Energy Alberta has recently filed an application to build a dual CANDU reactor power station near Peace River. If it goes ahead, many more U of A graduates will have an opportunity to work in the nuclear industry. Therefore, I feel that an article on the CANDU reactor in a 2008 issue would be very timely.

Three websites where more information on the CANDU reactor are listed below. In the third website, the Canadian engineering community, on the occasion of its 1987 centenary, identified the CANDU reactor as one of the nation's top ten engineering achievements of the preceding century.

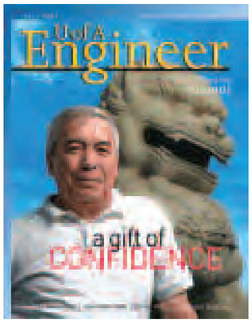
- www.aecl.ca/
- www.candu.org/candu_reactors.html
- www.nuclearfaq.ca/CANDUcountry.htm

Civil and Environmental Engineering

Rod Douglas (Mining '48)

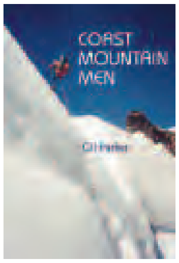
I enjoyed the most recent issue of *U of A Engineer*.

When I was located in Yellowknife NWT as Group Vice President of Northern Operations for Cominco Ltd. (1975 to 1980) we had the task of developing a lead zinc mining operation on Little Cornwallis Island in the high Arctic (lat. 75 degrees).



The team we assembled developed the idea of building the concentrator and power plant on a barge in Quebec and towing it up to the site. By doing this we were able to bring the mine into production a year early with a considerable saving on the construction costs.

The Dec. '81/Jan '82 issue of *Canadian Geographic* has an article by Tom Pullen about the 3000-mile tow of the plant.



Gil Parker (Civil '59)

While not about engineering, my new book, *Coast Mountain Men; Mountaineering Stories from the West Coast* is a compendium of 14 biographies of explorers of Vancouver Island and the West Coast of Canada.

Thanks again for the article you printed to complement my last book, *Looking through Glasnost*.

Chemical Engineering

B. W. Pedersen (Chemical '64)

Just received my copy and am sending my congratulations on a wonderful edition. I think you have truly captured the essence of what this magazine was meant to be: a vehicle to recognize the accomplishments of the faculty, its professors and its alumni (including those now retired).

Tackling the Tailing Po

It's no secret that Alberta's economic future will be entirely underwritten by natural resources

It's no secret that Alberta's economic future will be entirely underwritten by natural resources. But Dr. Dave Sego (Civil '72; PhD '80) believes profit must go hand in hand with a strong sense of environmental responsibility as Canada's richest province moves forward.

Such a conviction is right in character for the soft-spoken Sego, principal investigator for the U of A's $2.2 million Oil Sands Tailings Research Facility (OSTRF).

A professor of civil and environmental engineering, Sego helped launch this ambitious project in late 2005. But long before then, he learned to regard the vast Canadian oil sands with a combination of awe and profound respect. More than 177 billion barrels of recoverable oil remain locked within three massive northern Alberta bitumen deposits, and they will play a key role in Canada's long-term economic health and growth.

At the same time, Sego stresses the vital importance of responsible management—because Alberta's pristine landscape is its most precious resource of all.

Based at the provincially-owned CANMET Western Resources Centre in Devon, OSTRF is home to a small, dedicated squad of grad students who spend most of their waking hours trying to solve a vexing dilemma: how to counteract the negative effects of "tailings," a water-clay mixture about the consistency of thin liquid yogurt.

Tailings are sandy, insoluble mineral byproducts of the hot water process of oil sands extraction. They represent a serious problem, both to the major producers who draw oil from the Athabasca sands and to pragmatic environmentalists like Sego.

OSTRF students have embarked on a fascinating array of research projects, investigating everything from the "biological dewatering" of tailings to the impact of clay mineral-water bitumen geochemistry on tailings behaviour.

But they share a single goal: to significantly reduce the enormous volumes of tail-

nds

by Tom Keyser

A composite tailings prototype at the Syncrude site. The company is now reclaiming its entire east mine using a foundation of composite tailings. Full scale planting of the area will begin in 2010.

Courtesy of Syncrude

ings produced during extraction—about one cubic metre of tailings for every four barrels of oil. At the same time, they hope to dramatically speed up the reclamation process.

As his work led him to better understand the oil sands, Sego learned things that textbooks and lab research can't teach. "As far back as the early 1990s, I began to realize how inextricably the economic future of our province and our country are tied up with the oil sands," he says today. "I'm talking about the opportunities they will provide for all of us, our young people in particular."

At the same time, he concluded that industry and science need to work together to develop creative new strategies for limiting disruption of the land. In a nutshell, that's OSTRF's mission.

Ultimately, Sego says the goal is "to reach a point where we can return mature fine tailings to a condition of absolute stability, to create a natural landscape which would allow plants and animals to thrive. We want to take all the material from the discharge pipe to certification, where the land can be returned to the public in a stable, natural state."

There really is no alternative. Currently, Northern Alberta producers store their accumulated tailings in sprawling lagoons known as tailings ponds—vast pools of waste that have grown to rival Lake Erie in combined area. Such ponds are poisonous to fish, although toxicity subsides after tailings have been given two years to settle.

"The challenge of maintaining earthen embankments (to contain tailings) for hundreds of years is something I don't think our society is ready to face," Sego adds, clearly understating the case.

As things stand now, this material won't sustain any kind of reclamation. So the major challenge facing Sego, his students and his partners in government and industry is to find a way to remove water from the mix with, an eye to developing new landscapes.

"We do have to face facts," Sego warns. "The (original) landscape has been permanently altered. You can't extract materials on this scale and expect to put the soil back exactly the way it was. But we can manage it and build it into a sustainable landscape for the benefit of future generations."

According to reports, 42,000 hectares of northern wilderness have already been disturbed during 40 years of open-pit mining. Sego's personal ambition is to restore trees, shrubs, grasses and wildlife to as much of that land as possible. How? That's what he and his students intend to find out.

Dr. Dave Sego

It has never been Sego's style to attack or vilify major oil sands operators, though. On the contrary, he has recruited many of them to help. They have responded in kind, providing Sego with the cash, expertise and technical support he needs to chase his dream.

OSTRF's success serves as a textbook example of the exciting things that can happen when universities, government funders, and big corporations find themselves on the same page. Such high-level synergies aren't necessarily rare. But the wheels must be put into motion by energetic individuals who share an inspired combination of persuasion, determination and organization.

Sego was the person for the job.

Encouraged by colleague Dr. Norbert Morgenstern, now a professor emeritus at U of A, Sego began by casting his net upon the waters, scoping out potential sources of public cash. Eventually, he caught the ear of two government agencies—the Canadian Foundation for Innovation and Alberta Innovation and Science. Both were interested in helping out, as long as industry could be persuaded to put up its fair share.

About that time, Sego sat down to lunch with engineer Ted Lord, a senior researcher at Syncrude. Lord was extremely keen on the plan, and carried Sego's pitch to his bosses. Similarly impressed, they bought in.

From there, the ball started rolling in earnest. Sego and Lord soon recruited Suncor, Albian Sands,and True North Energy (which has since abandoned its oil sands project at Fort Hills).

Later on, Canadian Natural Resources and Deer Creek Energy (acquired by Total E&P Canada two years ago) climbed aboard, after agreeing to match contributions made by the original partners: $50,000 each for capital outlay and an annual stipend of $50,000 each for operating costs over a five-year renewable term.

OSTRF continues to pique industry interest, by the way. In the fall of 2007, Petro-Canada firmed up details for its own partnership agreement with OSTRF.

Thanks to the efforts of Hassan Hazma of the CANMET Western Resources Centre, room was found for OSTRF on-site in Devon. Meanwhile, OSTRF's industry partners continued to step up to the plate.

One company sent along one senior process engineer to draft the original capital budget and another to design OSTRF's $1.5 million process plant, which includes tailings

Ultimately, Sego says the goal is "to reach a point where we can return mature fine tailings to a condition of absolute stability, to create a natural landscape which would allow plants and animals to thrive. We want to take all the material from the discharge pipe to certification, where the land can be returned to the public in a stable, natural state."

Courtesy of OSTRF

A drum mixer is used to mix tailings.

storage tanks, a large rotary mixer, a reconfigurable deposition flume, and two hefty columns to facilitate large-scale saline testing.

"With this equipment, we can engineer tailings right to spec, using whatever chemical concentration or solids concentration best suits the student's experiment," chips in facility manager Nicholas Beier, a PhD candidate in environmental engineering who works closely with Sego.

Part of Beier's job is to co-ordinate the efforts of grad students who are anxious to run tests in the plant, which can process as many as 2,000 kilograms of tailings an hour. However, prohibitive operating costs (as much as $7,000 a day) mean the researchers have to carefully pick their spots, under Beier's watchful eye.

"Because of the cost and the large amount of materials needed to run a test, we ask our students to define the nature of their projects very carefully," Sego says. "Then, when their research reaches a certain point of maturity, we can go ahead. Nick sets things up to run a single test for three or four students, with results available to all."

Always quick to praise his corporate partners for the strength of their contribution, Sego believes they're getting their own back, both in terms of valuable research and fresh talent. Of nine researchers who had emerged from OSTRF as of late 2007, seven have since been recruited by the oil sands industry. The remaining two have returned to their studies.

Each OSTRF student is asked to discuss his or her research with industry reps during annual symposia at the Alberta Research Council.

"It's good for our corporate partners, because these students are in high demand. Oil sands producers are crying for qualified people and when they hire them from OSTRF they're getting some of the best," says Sego, who is already firming up plans for expansion.

Along with Beier, he is preparing to apply to the National Sciences and Engineering Research Council (NSERC) for funding that could open the door for more talented, highly qualified graduate students.

"Producers continue to build tailings ponds. But after so many years, they're starting to realize it's time to learn to manage (tailings) a different way," Sego sums up.

Now the challenge is to keep attracting top students willing to dedicate their careers to such esoteric studies. "I'd like to bring in a more diversified mix of research talent, particularly people from the rest of Canada and offshore," Sego says.

"Unfortunately, many foreign students, and even many from Eastern Canada, haven't yet grasped the important of our research. Because they don't live in Alberta, they're not really aware of the significance of the oil sands."

As Sego pursues expansion plans for OSTRF, you can count on him to do all he can to spread the word.

Tom Keyser is a Calgary-based freelance journalist.

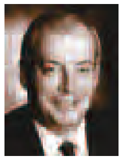
BANNARD, JEFF

(Electrical '80), PEng

was a member of a project team presented with APEGGA's Environment and Sustainability Award for excellence in the application of engineering, geological and geophysical methods towards preservation of the environment and the practice of sustainable development. Bannard worked as part of the Energy Systems team on the University of Calgary's Child Development Centre (CDC) which opened in October 2007. The four-storey 12,000-square-metre building houses a child-care facility and a full continuum of researchers, clinicians and frontline workers dedicated to child health and development, focusing on the first six years of life. The CDC is the highest scoring LEED-certified building in Canada and Alberta's first LEED Platinum structure, the highest level of environmental performance obtainable. The CDC is twice the combined size of all other cold-climate LEED Platinum buildings in North America. The energy systems include the envelope (walls, windows and roof), lighting and HVAC. LEED points were received for energy optimization, renewable energy, thermal comfort, light pollution control, ventilation effectiveness, elimination of hydrochlorofluorocarbons and halons, the use of CO2-based control for outdoor air, and controllability of non-perimeter systems.

CARTER, JAMES E.

(DSc [Hon] '04) PEng



has been appointed to the EPCOR board of directors. Carter is the former president and chief executive officer of Syncrude Canada. He recently retired from the company after 27 years—20 of them at the executive level. Carter played a prominent role in the growth of Syncrude, and the evolution of Alberta's oil sands and the community of Fort McMurray.

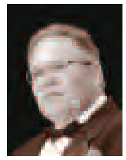
DIBATTISTA, DR. JEFF

(MSc Structural '95, PhD Structural '00) PEng

was recognized by the Consulting Engineers of Alberta at the 2007 Showcase Awards. He received an award of merit in building engineering for the $13 million PCL Centennial Learning Centre in the Edmonton PCL Business Park. As PCL's learning hub, the 2,430-square-metre building is a model of sustainable design, gold-certified under the USGBC Leadership in Energy and Environmental design (LEED™) Green Building rating system. The structural, mechanical, and electrical systems are exposed and incorporated into the architecture. The facility houses state-of-the-art training rooms, boardrooms, meeting rooms, offices, and a grand hall. DiBattista is a partner with Cohos Evamy in Edmonton.

GREENWOOD-MADSEN, TOM

(Electrical '83, MEng Electrical '87), PEng



has been presented with the APEGGA Outstanding Mentor Award in recognition of his exceptional achievement as a mentor. His professional experience spans the areas of power system planning and operations, and electric utility project management. He joined ATCO Electric in 1988, where he is currently Supervising Engineer, Transmission Development and Operations Planning. Greenwood-Madsen has been active in the APEGGA Mentoring Program since its inception in 2004. Since then he has mentored numerous people using thoroughness and care, according to testimonials from his protégés. He encourages protégés to determine their own course of action for meeting goals and objectives, and helps build their self-confidence by assisting them in identifying their own strengths and building upon them.

GROVER, DR. WAYNE D.

(PhD Electrical '89), PEng

was awarded the Alberta Ingenuity Fund Research Excellence Award at the APEGGA 2008 Summit Award Gala. The award recognizes professionals in academia or industry who have conducted innovative research in engineering, geology or geophysics that has been successfully applied to improve our economic and social well-being. A professor in the Department of Electrical and Computer Engineering, Grover has been active for 30 years as an inventor, researcher and educator in telecommunications R&D. For the last 20 years, he has been internationally recognized as a leading expert in survivable broadband networks. Grover has several landmark papers and inventions to his credit and a reputation for insightful and original work. He is known for his vision of self-healing mesh networks, and more recently as inventor and main proponent of the p-cycles concept.

KRYWIAK, DAVE

(Civil '77) PEng

accepted an award of merit in water resources and energy production from the Consulting Engineers of Alberta for phase one of the City of St. Albert's sanitary trunk sewer. Krywiak is with Stantec. The City retained Stantec Consulting Ltd. to provide interim in-line storage and conveyance to relieve existing surcharging conditions in the city's wastewater collection system and to provide for the long-term servicing of future development in the northwest area of the City. The project exceeded the expectations set in the previous feasibility study by identifying an alternate alignment and construction method, which resulted in lower construction costs and significantly less impact on the community.

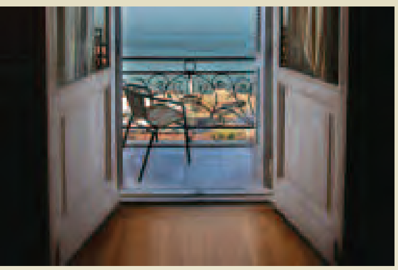
LEE, MICHAEL

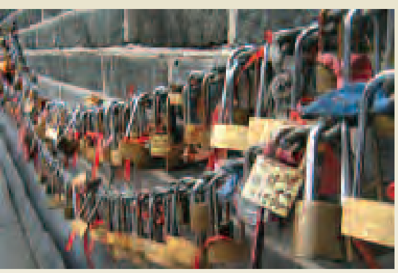
(Mechanical '82) PEng

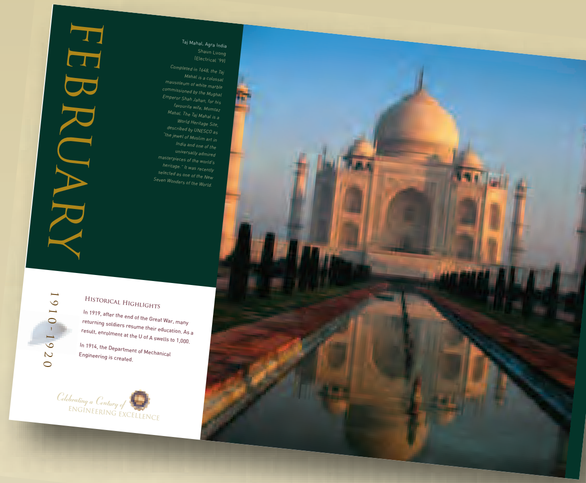
has been appointed president of Alberta Oil Sands Incorporated. He was formerly chief operating officer and co-founder of Platform Resources Incorporated. Over his 25-year career in the oil and gas sector, Lee held several senior-level engineering positions with EnCana Corporation, Burlington Resources Canada Ltd., Stampeder Exploration Ltd., and Amoco Canada Petroleum Limited. His expertise encompasses planning and budgeting, execution, and management of large capital projects, and exploitation engineering.

Do you have news to share?

Send your news of awards, appointments, and other successes to engineer.alum@ualberta.ca





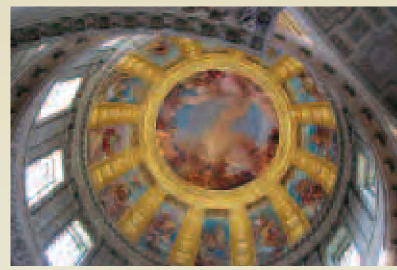


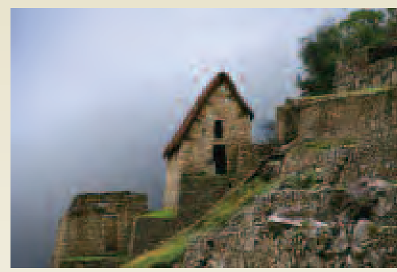
2008 Engineering Calendar

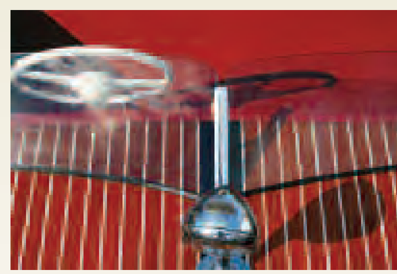
Thanks to those who contributed photographs to the 2008 Engineering Calendar. This specially themed calendar marks 100 years of history of the Faculty of Engineering and includes historical highlights plus messages from Engineering alumni.

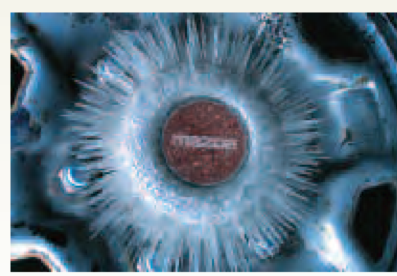
Your donations to the calendar will benefit the Engineering Students' Society. Thanks for your contributions to date.

Are you interested in participating in the 2009 calendar? Contact richard.cairney@ualberta.ca for further information.









2008 *Celebrating a Century of*
ENGINEERING EXCELLENCE

Faculty congratulations

Taking pride in achievement

BACKHOUSE, DR. CHRIS, PEng

Director, Engineering Physics Program
Professor, Department of Electrical & Computer Engineering

Dr. Backhouse was awarded the 2008 APEGGA Project Achievement Award for his achievements in developing state-of-the-art medical diagnostic systems. A member of the faculty since 1999, Dr. Backhouse has been developing lab on a chip (LOC) microfluidic technologies that have the potential to put the functionality of an entire lab upon a single microfabricated chip. This innovation will improve access to health care while providing a manufacturing opportunity for Alberta industry. The fundamental engineering challenge has been to reduce the cost of the technology so that it is accessible. Among other innovations, Dr. Backhouse's lab has developed the Tricorder Toolkit (TTK). True LOC devices, these chips are able to perform entire procedures in going from a droplet of a sample to a diagnostic signal in tens of minutes, including the labour-intensive steps of sample preparations, genetic amplification and genetic analysis. Dr. Backhouse's latest version of the TTK is less than $200 in parts, approximately 5,000 times less expensive than the conventional instrumentation.

BEAULIEU, DR. NORMAN PEng

Professor, Electrical and Computer Engineering

Dr. Beaulieu has received the IEEE Communications Society Edwin Howard Armstrong Achievement Award in recognition of his outstanding contributions to the analysis, design, and modeling of wireless communication system. The award is named in honour of Edwin H. Armstrong, the inventor and father of the complete FM radio system. Dr. Beaulieu joined the Faculty of Engineering in September 2000 when he became the iCORE Research Chair in Broadband Wireless Communications. He also holds a Canada Research Chair in Broadband Wireless Communications. His current research interests include broadband digital communications systems, ultra-wide bandwidth systems, fading channel modeling and simulation, communication theory, diversity systems, interference systems, and space-time coding. Dr. Beaulieu is a Fellow of the Engineering Institute of Canada, the Canadian Academy of Engineering, and the Royal Society of Canada.

BURRELL, DR. ROBERT

Chair, Biomedical Engineering
Professor, Chemical and Materials Engineering

Dr. Burrell has earned the Lifetime Achievement Award from the World Union of Healing Societies for his achievements in the development of revolutionary new wound treatments. In 1995 he invented Acticoat, considered one of the most significant advances in wound-care history, while working for Westaim Corporation's Nucryst Pharmaceuticals. Acticoat uses nanocrystalline silver technology and was the first commercial therapeutic application of nanotechnology in the world. Today, Burrell is researching ways to deliver nanostructured metal therapeutics, known to reduce inflammation, without the side effects that accompany some existing treatments. Dr. Burrell holds a Canada Research Chair in Nanostructured Biomaterials.

FLECK, DR. BRIAN, PEng

Professor, Mechanical Engineering

Dr. Fleck recently hosted eight episodes of CBC's "Project X", a television series focusing on the "cool side of science". As an expert in the field of energy combustion and fluid mechanics, Dr. Fleck has been teaching, consulting and researching in the area for many years. He has also worked as a spoken word radio host, part-time actor, a military instructor, and an environmental instructor. Many of the episodes of "Project X" were filmed at the University of Alberta – including in the wind-tunnel at the Department of Mechanical Engineering.

MASLIYAH, DR. JACOB

PEng, OC
University Professor, Department of Chemical & Materials Engineering

Dr. Masliyah was recently invested as an Officer of the Order of Canada. The Order of Canada, our country's highest civilian honour, was created in 1967 during Canada's centennial year to recognize a lifetime of outstanding achievement, dedication to community and service to the nation. Dr. Masliyah has contributed to technological and scientific advancements in the oil sands industry for nearly three decades. Holder of the NSERC Industrial Research Chair in Oil Sands Engineering for over 15 years, he has been researching the complex interactions between oil, water and sand particles to improve oil recovery from Alberta's tar sands. Equally important, he has shared his knowledge with his students and colleagues, and has fostered partnerships with industry leaders. His scientific contributions, as well as his leadership in national collaborative programs, have brought significant benefits to the Canadian oil sands industry.

NANDAKUMAR, DR. KRISHNASWAMY, PEng

Professor, Department of Chemical & Materials Engineering

Dr. Nandakumar was awarded the Frank Spragins Technical Service Award at the 2008 APEGGA Summit Awards Gala. This award is presented to members of APEGGA who are recognized by their peers for their integrity, expertise, and outstanding accomplishments in fields related to engineering, geology or geophysics. Dr. Nandakumar received his B.Tech. from Madras University in India, his M.Sc. from the University of Saskatchewan and his PhD from Princeton University. He has had a long and successful record of accomplishments in research, teaching and service to the profession since joining the University of Alberta's Faculty of Engineering in January 1983. Dr. Nandakumar conducts both fundamental and applied research in the area of computational fluid dynamics. He focuses on computer modelling of a variety of chemical, electrochemical, mineral and polymer processing operations commonly encountered in chemical engineering. He has published more than 120 papers in refereed, international journals and has delivered an equivalent number of conference presentations.

SUNDARARAJ, DR. UTTANDARAMAN

(Chemical '89), PEng
Professor, Department of Chemical & Materials Engineering

Dr. Sundararaj was awarded the Engineers Canada 2008 Medal of Distinction in Engineering Education in recognition of his innovative and effective teaching methods. Dr. Sundararaj began his career at the U of A as assistant professor in the Department of Chemical and Materials Engineering in 1994. In mid-1996, he accepted a research position at GE Plastics where, as a leader in Six Sigma—a business management strategy used by the company—he was responsible for teaching a wide variety of professional groups: scientists, operators, secretaries, and business leaders. He returned to the U of A in 2000, bringing with him the mental tools for teaching to a diversity of learning styles—visual, verbal, and kinesthetic. Dr. Sundararaj uses e-learning tools such as Web chats and demonstrations to supplement face-to-face instruction. He believes that knowledge comprehension and retention is dependent on the student being engaged—both by the material and by the teacher. He goes even further and helps to foster relationships between students so that they can generate ideas and solve problems together. He sets the stage for critical thinking by starting with real-world examples and, only then, presenting theory.

the Firebag Protocol

by Andrea Collins

A traditional fire bag is an intricately beaded cloth bag used by Aboriginal men to store their flints, pipes and tobacco. A woman would traditionally make the bag, and "all the skill and workmanship that went it into would demonstrate her love for her man," according to Melissa Belcourt-Moses, a Royal Alberta Museum cultural interpreter quoted recently in the *Edmonton Journal*.

The Firebag project near Fort McMurray may not be quite so vividly romantic, but it is infused with the passion, skill, and workmanship of a team of University of Alberta Engineering alumni and their colleagues. It also represents a unique project execution arrangement between Suncor Energy and its engineering contractors.

"Traditionally, petroleum companies manage a project and sub-contract out the auxiliary and technical services they need such as engineering," said Bernie Moore (Mech. Coop 1985), Suncor's Engineering Technical Director for the Firebag projects. "With Firebag, we've forged a partnership where we work collaboratively with our engineering contractors since the beginning of stage two."

This integration is reflected in Suncor's relationship with Jacobs Engineering. Suncor's project staff, including Moore, has been based at Jacobs in Calgary for the past five years. "We have project personnel from both companies working here but we never see it as a we/they situation. Wherever possible, we select the best person for each job regardless of their company of origin. We are all one integrated team."

The project's origins date back to 1964, when Suncor began drilling exploration wells on its first lease near Fort McMurray. Naming the project for the nearby Firebag River (where a native fire bag was discovered long ago), the company increased its lease and land holdings to further develop the resource.

In the 1990s, major technological advances in horizontal drilling made commercial development of the oil sands viable using Steam Assisted Gravity Drainage (SAGD) technology. The company conducted environmental scans based on SAGD, and committed its engineers, project managers and accountants to rationalizing the potential of Firebag and seeking the necessary regulatory approvals.

The Firebag site has an estimated nine billion barrels of recoverable resources, equivalent to one million barrels a day for 30 years. The Firebag pay zone is at 250 metres below surface—too deep for oil sands mining—so the project team relies fully on SAGD to extract the bitumen.

The Firebag project is designed in six stages, planned from 2001 to 2012. Stages one through three have been approved by the Alberta Energy and Utilities Board; an application for stages four through six is currently under consideration.

Stages one and two have been completed, with first steam from stage one in 2003 and from stage two in 2004. They now include four well pads, a central processing facility, and four pipelines, with a bitumen production capacity of 95,000 barrels per day. Suncor used a traditional business model for stage one, with Suncor overseeing project management and the technical aspects of the project, and outsourcing engineering work.

For stage two, Suncor created the Firebag Engineering Group in recognition of the

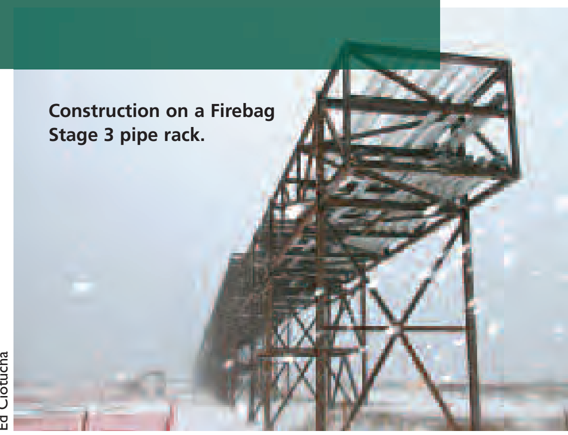
Sub foundation for the sulphur recovery project.

Ed Ciotucha

"We have a mini United Nations, both in the engineering office and at the construction site," says Moore. "They've come from far away, and they'll leave if there isn't enough work. We need to be creative with how we use them, so we don't lose them."

Karen Watson

Firebag Stages 1 and 2, with a digital version of the Stage 3 plant from a 3-D model superimposed on the plant site.



Construction on a Firebag Stage 3 pipe rack.

Ed Ciotucha

staged approach that would be used to develop this project. This group is responsible for both project management and the technical aspects of future Firebag stages. Jacobs Engineering was selected as the main engineering contractor for stage two and beyond. Because of the size and complexity of stages three through six, multiple Jacobs offices are providing engineering services, along with Colt Engineering and Washington Group Northern (WGN).

Stage three includes the field, central plant and infrastructure facilities to deliver 62,500 barrels a day of bitumen via SAGD technology as well as 160 MW of electrical power via cogeneration. It is expected to produce its first oil in January 2009.

Because it is such a massive project, Suncor decided to execute it differently. It chose Jacobs Engineering as its main engineering partner for several reasons, says Moore, "They were willing to work within our project execution model, and they prefer to work with clients over a long period."

The Firebag execution model has worked well. Stage two and a subsequent expansion project finished on schedule and on budget, an admirable feat considering the current shortages of manpower, rising costs and other challenges in Alberta. Construction of stage three is well underway and stages four through six are in various phases of engineering.

The core of Suncor's engineering group on the Firebag projects began with 25 staff members in 2001. Today, the project employs more than 600 from Suncor as well as its engineering partners, of which at least 5 per cent are U of A Engineering grads and coop students.

Constructing the infrastructure for the expansion requires 2,000 tradespeople and other workers a year, a human resource need expected to continue over the next three to four years. Workers are recruited from around the world, and projects are carefully scheduled to eliminate any lag time.

"We have a mini United Nations, both in the engineering office and at the construction site," says Moore. "They've come from far away, and they'll leave if there isn't enough work. We need to be creative with how we use them, so we don't lose them."

Because their workers must spend long stretches on the remote site, Firebag leaders have made comfortable housing a priority, along with baseball diamonds, an indoor hockey rink, gym, recreation centre, and high-speed internet. They are also adding an aerodrome, to enable their workers to go home faster and more frequently.

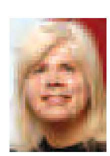
Project management for stage three will be handled by Suncor Energy; with engineering by Jacob, Colt, and WGN; and construction by Flint, Ledcor, and Colt. The project execution strategy is divided into five segments: oil treatment, steam/water, cogeneration, site development, and field development—each managed by an area project manager. Every stage of the project will be carefully evaluated on its safety, environmental impact, cost, schedule, quality, and organization.

New technologies are constantly being researched and tested. Firebag engineers, geologists and technical specialists are looking at ways to reduce water and energy consumption. "Some of the most promising technologies aren't ready yet, and may take as much as ten years to go from idea to commercial operation," says Moore. "We have to be careful about what new technology we use. This project is so big and so fast moving, we can't make mistakes. We have to land on reliable, effective technologies which we can implement now.

"Economics are a challenge as well. There's a huge cost to building the infrastructure, so we can't always afford to experiment. However, we do make changes as we go along. Each stage of Firebag has been a learning experience that has enabled us to improve our operations and our results over time. Hopefully, good ideas we develop now that don't fit into stages three to six will be used in future stages."

In 2012, when Suncor expects to complete stage six, the Firebag site should contribute significantly to Suncor's overall plans of producing 500,000–550,000 barrels of oil daily through a combination of oil sands mining and SAGD extraction.

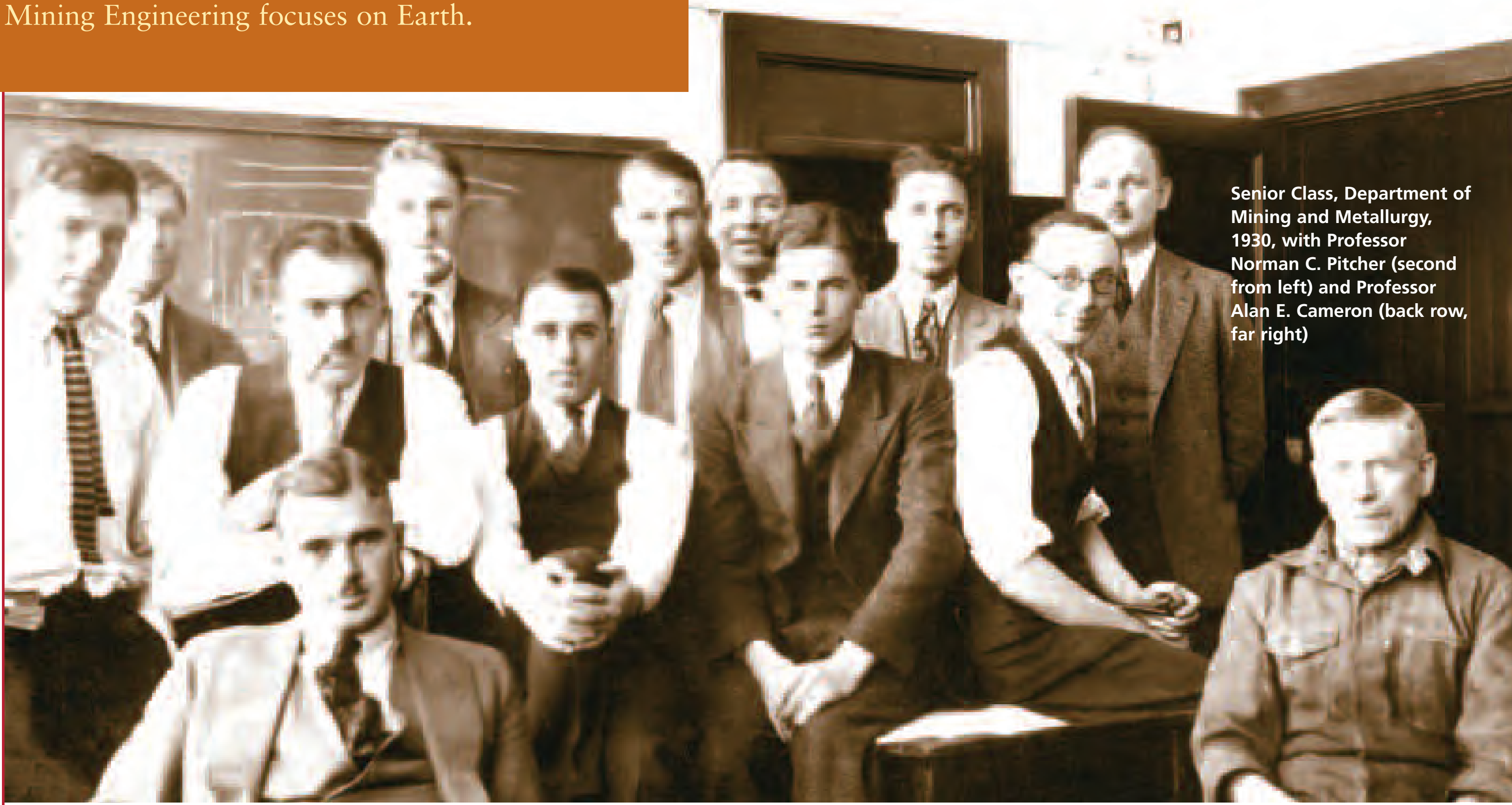
All that hard work and passion will create one very impressive Firebag.



Andrea Collins is an Edmonton-based freelance writer and public relations consultant

Mining Engi

The first in a series of Crosshairs stories on the themes of Earth, Air, Fire and Water, this story on Mining Engineering focuses on Earth.



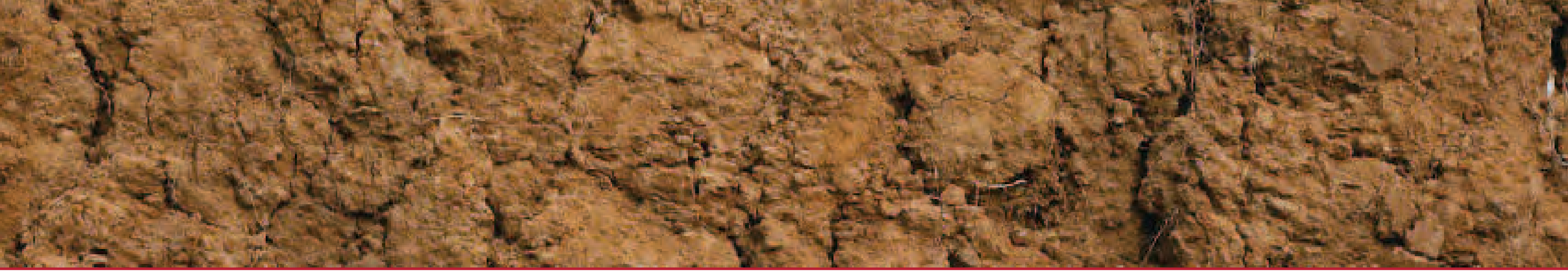
Senior Class, Department of Mining and Metallurgy, 1930, with Professor Norman C. Pitcher (second from left) and Professor Alan E. Cameron (back row, far right)

Coal seams lie underneath 80 per cent of Alberta's landmass. In addition to the hard black coal itself, each deposit holds viscous black oil and pockets of natural gas. For more than 100 years, coal and its byproducts have been a primary fuel source for our province and country, a top export commodity, a major source of employment, and a basis for Alberta's wealth.

It is no surprise, then, to learn that some of the earliest programs at the University of Alberta focused on geology and mining. They provide a rich seam of stories and engineers with a pioneering spirit.

John Andrew Allan was the earliest mining instructor connected with U of A. Born in Quebec in 1876, he arrived in Alberta in 1912 with a newly minted PhD in Geology from MIT. He was appointed professor of geology and mineralogy in the Faculty of Science at the newly formed University of Alberta. Two years later, in 1914, he became the first head of Mining Engineering.

Allan's career was a series of firsts. In 1925, he developed the first geology course in Canada specifically designed for civil engineers. In 1927, he wrote the first engineering geology paper to appear in the (Canadian) Engineering Journal and two years later published another



generates thought for fuel
neering

by Andrea Collins

article in the same publication on The Importance of Geology in Civil Engineering. "The day was coming," he wrote, "when the practicing civil engineer would invariably have the geological problem associated with the particular project on hand investigated by one qualified in that profession."

Allan taught at U of A for 40 years, and by all accounts was an inspiring teacher, but he did not confine his activities to the classroom. He headed countless field trips across Alberta, meticulously documenting his findings in publications, photographs, maps and scale drawings. He also brought back a large collection of minerals and fossils, making the geological museum at the University one of the best in Western Canada.

Allan was also a founding member of the Scientific and Research Council of Alberta (now the Alberta Research Council), and championed the inclusion of geologists as a separate wing of the Alberta Association of Professional Engineers (now APEGGA).

As a consultant, J. A. Allan took on many private projects, including work on the hydro-electric projects on the Bow River system that proved instrumental to industrial growth in southern Alberta. However, he is perhaps best known as the author of the first geological map of Alberta, published in 1926.

Allan first began mapping the geology of the province in 1910, but his work took on a higher profile when the provincial government contracted him to systematically map Alberta's mineral resources. This project lasted several decades, and led to a series of publications with maps. By the time Allan had finished his survey work in 1940, he had mapped an amazing 225,000 square miles, or approximately 74 per cent of the province.

Dr. Robert Wallace, President of the UofA (second from left), Dean Robert Starr Leigh Wilson, Faculty of Applied Science (second from right), and Dr. J.A. Allan (right), on a mining trip to Camp No. 4, 1930.

Though the first of these surveys was intended to gauge the province's iron ore deposits, Allan's discoveries forced him to conclude that while Alberta was poor in metallic minerals, it had abundant supplies of coal, natural gas and petroleum, as well as bituminous sands, gypsum, and clay. In 1932, in an article published in the Engineering Journal, he declared, "Alberta is essentially a fuel province".

Allan's field trips and survey projects attracted students from across North America. Among these was Alan Cameron, a Mining Engineering student from McGill, who assisted Allan in a project in the Kicking Horse Pass in the summer of 1912. When Cameron completed his degree in 1914, he joined Allan as a Mining Engineering instructor at U of A,

Geology students on a field trip in 1912.

lecturing in engineering and geology. (Gordon Kidd, the first U of A applied science graduate to specialize in mining engineering, received his BSc in 1916.) Cameron taught at U of A until 1937, including a stint in London in 1917-18 for the Khaki University established by U of A president Dr. Henry Tory. While teaching, Cameron completed his PhD from MIT in 1926.

During the summers, Cameron made geological explorations for private industry and government in northern Alberta and the Northwest Territories. As his career advanced, he focused on metallurgy and was active in both research and field studies. He served as secretary of the Research Council of Alberta for ten years before moving to Nova Scotia to become Deputy Minister of Mines and, subsequently, President of Nova Scotia Technical College.

Mining Engineering became a full-fledged department at the University of Alberta in 1920. Norman C. Pitcher, a McGill graduate in mining engineering, was lured away from Lethbridge Colleries in 1919 to head the new department. He remained its head until his retirement in 1955.

"He came with an enviable career already accomplished in the coal mining industry of Alberta where had risen to the top engineering and managerial positions in several of the principal coal companies," said Dr. Karl Clark at Pitcher's retirement ceremony.

Karl Clark

Norman Pitcher

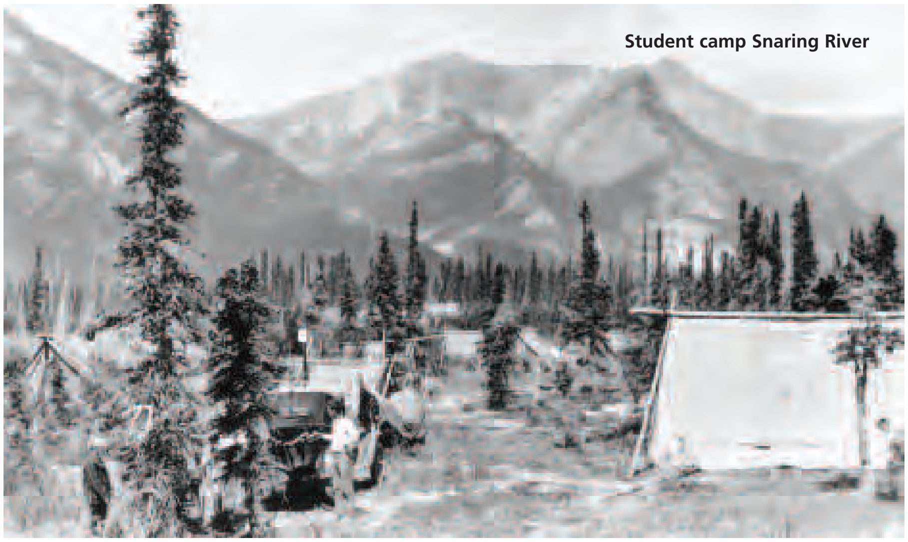
Those positions included work with the Dominion Coal Company and other mines in Nova Scotia, and, after his arrival in Alberta in 1914, the Canadian Coal Mines in Kipp, Beaver Mines in Lovett, St. Albert mine, and North American Colleries in Lethbridge. He was also chief construction engineer for Alberta Railroad and Irrigation.

While at U of A, Pitcher introduced the projects method of teaching, in which fourth-year students took a mining project and followed each step of engineering operations, from the sinking of the shaft to the development of a scale model. His students called him "a walking encyclopedia in mining matters."

The first engineering graduates with BSc degrees in mining engineering emerged in 1921, and the first MSc in mining was awarded that same year. In 1922, the U of A offered three options in Mining Engineering: coal, metal mining, and mining geology (courses in metallurgy were introduced in 1925). By the mid- to late-1930s, Mining Engineering had a larger enrolment than any other branch of engineering at the University.

Along with the development of an engineering faculty at U of A, president Tory established the Scientific and Research Council of Alberta (SIRCA) at the university. Its original aim was to carry out research related to coal and petroleum resource development.

A physical chemist named Karl Adolf Clark was among the first researchers recruited by the Council. Clark came to Alberta in 1920, following five years of work with the Canadian Geological Survey Mining Department in Ottawa. Through the 1940s, Clark's work with the research council was seriously limited by lack of funding (he became a professor at U of A in the 1930s, when the council's funding dried up completely). Nevertheless, he somehow managed to forge ahead in discovering new ways to extract oil from the tar sands. In 1929 he patented a revolutionary hot-water extraction process, and the first small-scale oil extraction plant using this process opened near Fort McMurray in 1949. The rest, as they say, is history.



Student camp Snaring River

Clark became head of Mining Engineering in 1945, when Pitcher retired, and served in this capacity until 1954. He then returned to the research council as a consultant for the next 10 years. Though he officially retired in 1964, he continued to consult with Great Canadian Oil Sands (now Suncor) until his death in 1966. A year later, in 1967, that company opened the first successful oil sands plant based on Clark's process.

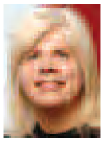
Another SIRCA researcher with a mining engineering background was Edgar Stansfield. British by birth and education, Stansfield also worked for the Bureau of Mines in Ottawa before arriving in Alberta in 1921. He worked at SIRCA until his retirement in 1946.

Stansfield's research on coal became known nationally and internationally. His primary area of study was on accelerated weather testing, a process to evaluate the ability of coal to resist disintegration when exposed to extreme weather. This process was of particular value to producers who wanted to export coal to distant markets. Stansfield also focused on tests to reduce the risk of dust explosions in coal mines, and perfected a method of making charcoal briquettes.

Stansfield produced more than 43 publications and made numerous presentations, including a keynote address at the World Power Conference in London in 1928.

Whether through pathfinders like Allan and Cameron, who laid the groundwork in the early years, or the powerful triumvirate of Pitcher, Clark and Stansfield who led it to renown in its first formal 26 years, the Mining Engineering department at the University of Alberta made its mark. Since those days it has morphed into many variations, from Mining and Metallurgy, to Mineral Engineering, to Chemical and Petroleum Engineering, to Mining, Metallurgy and Petroleum Engineering—but the foundation of its birth in Alberta, the "fuel province" remains strong.

Stansfield



Andrea Collins is an Edmonton-based freelance writer and public relations consultant.

Mining Engineers

Mining engineers perform some or all of the following duties:

- Conduct preliminary surveys and studies of ore, mineral or coal deposits to assess the economic and environmental feasibility of potential mining operations
- Determine the appropriate means of safely and efficiently mining deposits
- Determine and advise on appropriate drilling and blasting methods for mining, construction or demolition
- Design shafts, ventilation systems, mine services, haulage systems and supporting structures
- Design, develop and implement computer applications such as those for mine design, mine modeling, mapping, or monitoring of mine conditions.
- Plan and design or select mining equipment and machinery and mineral treatment machinery and equipment in collaboration with other engineering specialists
- Plan, organize and supervise the development of mines and mine structures and the operation and maintenance of mines
- Prepare operations and project estimates, schedules and reports
- Implement and coordinate mine safety programs
- Supervise and coordinate the work of technicians, technologists, survey personnel, and other engineers and scientists.

a turbocha frie

With sky-high oil prices and growing concern over climate change, many drivers still feel the need for speed. That's why many scientists—including Andrew Love (Electrical '96) and Todd Ratke (Mechanical '96)—are looking to find new ways to boost car performance while cutting back fuel consumption.

Love and Ratke are working—in France and Japan, respectively—on a project for Garrett Turbochargers, a subsidiary of Honeywell International. Garrett sells Variable Nozzle Turbochargers (VNTs), and Love and Ratke are working to design the company's next generation of electrical actuator, an important turbocharger component.

Turbochargers increase power and fuel efficiency in gas and diesel engines. They take energy from the exhaust of a vehicle and use it to compress air for the intake. This can increase an engine's power, improve its fuel efficiency, or achieve a combination of the two.

"On the commercial vehicles they're used to increase the efficiency of an engine, because on big transport vehicles, the fuel efficiency is very, very important," Love says. "And on passenger cars, it's a bit of both. Sometimes they're used to increase efficiency and sometimes they're used just to increase the power of the vehicle."

Love has been assigned to design electrical actuators for passenger cars, while Ratke creates electrical actuators for commercial trucks. An effective electrical actuator can allow a turbocharger to operate consistently and well under high temperatures.

An electrical actuator acts like the muscle of the turbocharger, Ratke says. "Basically what we're doing here is changing the internal shape of the turbocharger so that we can optimize the pressure drop and air flow to optimize the efficiency of the turbochargers through a range of engine speeds and load conditions.

"And therefore the turbocharger is acting in some conditions like a small turbocharger. So it's very efficient when the engine speed is

rged ndship

by Hanna Nash

low and the loading is very low. But when you step on the gas and you really need a lot of power, the turbocharger changes its shape and acts like a very large turbocharger. For that reason, it is now efficient for that different condition, where you need much higher air flow in the turbo."

Variable Nozzle Turbochargers have been available for 15 years, but they have traditionally been controlled by pneumatic actuators. These use air pressure to open and close the turbocharger's nozzle, rather than electrical motors. Love explains, "The controllability of the electrical actuator is much better because you can open and close the variable nozzle much faster and you can do it with more accuracy."

Although VNTs are currently twice as likely to use pneumatic actuators than electrical actuators, Love and Ratke feel that it's only a matter of time before the trend reverses. Pneumatic actuators cost less than electrical actuators to build and install, but can end up costing more in the long run. "With an electric actuator you plug it into a wire harness and you're done," says Ratke. "All you need is electrical power and a communication method. So it's a very, very low system cost. With a pneumatic actuator you need a vacuum pump, and you need switching valves, and hoses, and all these other things."

Years ago, pneumatic actuators could be found throughout a vehicle—beneath seats, in door locks, and in heating ventilation systems. These areas now use strictly electrical parts. The only place you'll find a pneumatic actuator these days is on the turbocharger.

> "People want components that are going to last much longer in the vehicle. That was one of the main factors in the new design."

Developers like Love and Ratke predict that their next generation of electrical actuators will come within 15 to 20 per cent of the cost of pneumatic actuators, and will prove far more reliable. "We built this actuator to be stronger and faster," Love insists. "And also to increase reliability. People want components that are going to last much longer in the vehicle. That was one of the main factors in the new design."

As global environmental concerns grow, Love and Ratke's work will become even more important. People will turn more toward efficient diesel engines, which all rely on turbochargers.

"In North America, turbochargers are traditionally found on pickup trucks, imported European cars and commercial vehicles and that's starting to change now," says Ratke. "With the global push to lower carbon dioxide emissions and the global push to have higher performance engines, turbochargers are starting to see more usage in markets traditionally where there hasn't been, like North America."

Love and Ratke are working with their supplier, Mitsubishi Electric, and expect to see their electrical actuators installed in new vehicles worldwide by 2009.

Interestingly, Love and Ratke first became friends while working together as teammates for the U of A at the 1996 Detroit Minivan Challenge. Neither of them could have predicted how far their friendship, and their working relationship, would eventually carry them.

Hanna Nash is an Edmonton-based freelance writer.

Mark your calendar

September 18 to 21

Homecoming 2008

This fall, the Faculty of Engineering will celebrate 100 years of engineering education at the University of Alberta. No matter what anniversary year you are celebrating, we hope that you and your classmates will join us for our centenary year.

The following events taking place during Homecoming 2008 are sponsored by the Faculty of Engineering and are complimentary to alumni and their guests. Unless otherwise noted, events will take place in the Solarium, located on the 2nd floor (Maier Learning Centre) of the Engineering Teaching and Learning Complex (ETLC). A full list of Homecoming 2008 events, including those sponsored by other faculties and by the University of Alberta, can be found at www.ualberta.ca/alumni/centenary.

Thursday September 18

Mechanical Engineering 50th Anniversary Celebration

4:30 p.m. - 7:30 p.m.
RSVP: register online at www.ualberta.ca/alumni/centenary
Contact: Linda Kelly at (780) 492-4160 or linda.kelly@ualberta.ca

The Department of Mechanical Engineering is celebrating its 50th Anniversary and we want all Mechanical Engineering Alumni to come and relive some great memories with us! Join us for a special evening as we remember the past, celebrate the present and look forward to the future.

Friday September 19

Mechanical Engineering Facility Tour

10:00 a.m. and 1:30 p.m.
Meeting Place: TBA
RSVP: Linda Kelly at (780) 492-4160 or linda.kelly@ualberta.ca

For those interested in a tour of the Mechanical Engineering Building, 90-minute tours will take place at 10:00 a.m. and at 1:30 p.m.

Class of 1948 Engineering Alumni Luncheon

11:30 a.m. - 2:30 p.m.
Union Bank Inn
RSVP: register online at www.ualberta.ca/alumni/centenary
Contact: Leanne Nickel at (780) 492-4159 or leanne.nickel@ualberta.ca

All engineering graduates from the Class of 1948 and their guests are invited to celebrate their 60th anniversary and reminisce with their classmates at a private lunch hosted by the Dean of Engineering.

Century of Engineering Excellence Reception

4:30 p.m. - 7:00 p.m.
RSVP: register online at www.ualberta.ca/alumni/centenary
Contact: Peggy Hansen at (780) 492-7050 or peggy.hansen@ualberta.ca

Join us for a special celebration of 100 years of engineering excellence at the University of Alberta. Kick off your Homecoming Weekend by reconnecting with Engineering classmates, professors, and colleagues. Dean David Lynch invites all Engineering alumni and their guests to join him for complimentary hors d'oeuvres and refreshments in the ETLC Solarium. A brief formal program will begin at 5:30.

Individual Class Gatherings

Many Engineering classes will be holding private dinners or other events throughout Homecoming Weekend. For information on individual class events or on how to become a class organizer, please call your department contact as noted below:

Chemical, Materials, Metallurgical
Katherine Irwin – (780) 492-1317
or katherine.irwin@ualberta.ca

Civil, Environmental, Mining, Petroleum
Erica Viegas – (780) 492-4004
or erica.viegas@ualberta.ca

Electrical, Computer, Engineering Physics
Jamie Reid – (780) 492-8351
or jamie.reid@ece.ualberta.ca

Mechanical
Linda Kelly – (780) 492-4160
or linda.kelly@ualberta.ca

Saturday, September 20

Dean's Engineering Alumni Brunch

9:00 a.m. - 11:00 a.m.
RSVP: register online at
www.ualberta.ca/alumni/centenary
Contact: Peggy Hansen at (780) 492-7050
or peggy.hansen@ualberta.ca

All Engineering alumni who graduated in 1963 or earlier, along with their guests, are invited to a complimentary hot brunch hosted by Dean David Lynch. At approximately 9:45, Dr. Lynch will give his commentary on the past, present and future of the Faculty of Engineering at the University of Alberta. Breakfast will be served until 10:30 am.

Open House, Tours, and Lectures

9:00 a.m. – 4:00 p.m.
Engineering Teaching & Learning Complex (ETLC), Maier Learning Centre (ground and 2nd floors)

The Faculty of Engineering welcomes alumni, prospective students and guests to Engineering Open House 2008. Take in displays from the four Engineering departments and numerous student groups and attend free lectures on a variety of engineering-related topics. Tours of the Engineering buildings will be available. For tour times, phone or e-mail the department contact as noted under "Individual Class Gatherings" on page 34, or contact your class organizer.

Centenary Gala Dinner – Engineering Cocktail Reception

5:00 – 6:00 pm
Shaw Conference Centre, Salon 8
RSVP: register online at
www.ualberta.ca/alumni/centenary
Contact: Peggy Hansen at (780) 492-7050
or e-mail peggy.hansen@ualberta.ca

Join the Dean of Engineering for a complimentary cocktail and mingle with fellow engineering alumni before the Centenary Gala Dinner.

Class Organizers

'48 Civil – Bruce Burgess

'48 Electrical and Eng Physics – Jack Scrimgeour, Keith Provost, Bob Mason & Bob Taylor

'48 Mining & Petroleum – Bob Spencer

'51 Chemical – Art Davison

'53 Electrical and Eng Physics – Ted Jacobs

'53 Petroleum – Roy Fisher

'58 Chemical – Don Thurston, Grant Olsen, Alex Sidjak, Bill Turner

'58 Civil – Ken Brown, Mike Morin

'58 Electrical – Bud Finley

'58 Eng Physics – Keith Stromsmoe

'63 Mechanical – Gary Faulkner

'68 Chemical – Bruce Burdenie

'68 Mechanical – Val Pohl

'75 Civil – John Lee

'78 Chemical – Gregory Gulayets

'78 Civil – Glen Davidson, Allan Kwan, Patrick Tso

'78 Mechanical – Tom Gooding

'83 Computer – Samson Mah

'83 Mechanical – Doug Cox

'88 Electrical – Mike Palamarek

in memoriam

The Faculty of Engineering sincerely regrets the passing of the following alumni and friends.

Alho, Laurie (Petroleum '53)
Andzelm, Darius (Chemical '03)
Bekevich, Dale (Civil '80)
Blackstock, William (Civil '42)
Blakey, Norman (Civil '41)
Boyd, Neill (Civil '57)
Brassard, Jules (Chemical '70)
Bright, Maurice (Civil '52)
Brown, Peter (Chemical '52)
Bullen, Ronald (Mechanical '61)
Burnard, Allan (Electrical '48)
Christensen, Dr. Gustav (Engineering Physics '58, Professor Emeritus)
Clarke, The Honourable Justice Philip (Civil '62)
Cochrane, Charles (Petroleum '56)
Dane, K. Allan (Electrical '55)
Evans, Glyn (Civil '50)
Falkenberg, Harold (Civil '52)
Farrell, Douglas (Civil '59)
Finlay, James (Mining '49)
Finnan, Ian (Civil '56)
Fuller, Patrick (Chemical '51)
Gorgichuk, Gerald (Electrical '69)
Grabow, Joseph (Civil '79)
Graham, Everett (Chemical '46)
Hadlington, Al (Electrical '50)
Hamilton, Norman (Electrical '51)
Hassink, Jan (Electrical '75)
Hrynchuk, Walter (Electrical '48)
Kelmer, Boris (Electrical '79)
Kereliuk, Stanley (Electrical '60)
Krebes, William (Chemical '57)
Labatiuk, Dr. Charles (Civil '77, PhD Environmental '92)
Leeder, Francis (Chemical '46)
Lipinski, Ted (Engineering Physics '51)
Meeres, L Stewart (Engineering Physics '49)
Murray, John (Civil '61)
O'Connell, Katherine M. (Civil '83)
Parry, Glyn (Mining '51)
Patton, Alexander (Chemical '49)
Petursson, Jon (Civil '64)
Pimblett, Brian (Civil '81)
Proctor, Gordon (Civil '47)
Robertson, Alan (Electrical '48)
Rouse, James (Civil '64)
Rowan, William (Electrical '44)
Rutz, Gordon (Chemical '61)
Sanden, Emil (Civil '46, MSc Civil '60)
Seto, Kin (Chemical '61)
Shandro, Michael (Electrical '40)
Shimek, Kenneth (Mechanical '81)
Short, Alan (Chemical '41)
Slupsky, John (Chemical '53, MSc Chemical '58)
Smith, Allan (Mechanical '66)
Speer, Raymond (Electrical '67)
Stevinson, Arthur (Electrical '45)
Tutty, Dale (Civil '72)
Wilson, Eric (Mining '39)
Wiltshire, James (Metallurgical '60)

The Faculty of Engineering was recently made aware of the following alumni who passed away more than a year ago.

Boswell, Bob (Civil '55, MSc Civil '66)
Buckingham, James (Chemical '47)
Hamilton, Wilmont (Civil '61)
Hrudko, Eugene (Civil '68, MEng Civil '69)
Kassem, Sam (Civil '77)
Livingstone, Donald (Chemical '44)
Low, John R. (Civil '62)
MacDonald, Malcolm (Civil '49)
Musgrove, Bill (Chemical '53, MSc Chemical '61)
Nawolsky, Russell (Petroleum '56)
Stephen, John (Electrical '49)
Ulveland, Ralph (Civil '56)

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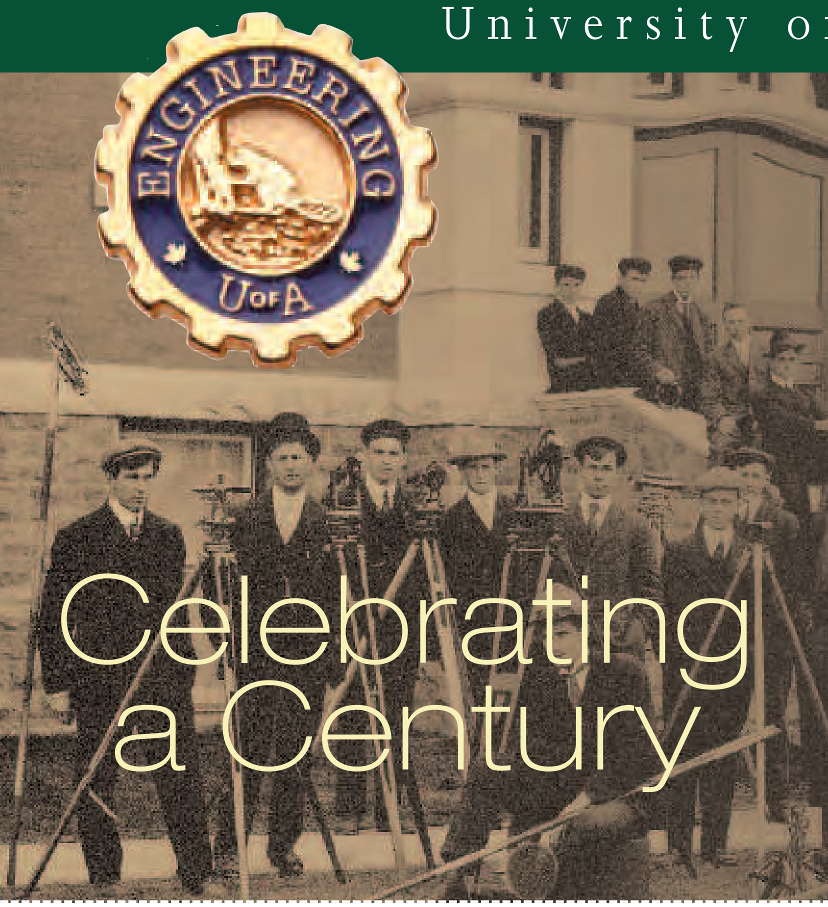

Celebrating a Century

This year, as we celebrate 100 years of engineering education at the University of Alberta, the 20,000th U of A Engineer will graduate. More than ever, a new generation of engineering graduates will be inspired by the accomplishments of those alumni who have graduated before them. But while the campus, the tools, and the technology may have changed, today's engineers share a common goal with their predecessors: to use human creativity and imagination, along with an understanding of natural phenomena, to solve the problems of society.

Today, the Faculty of Engineering at the U of A is recognized as one of the top engineering programs in North America, and the foundation of our success has been the outstanding tradition of our alumni supporting each new generation of engineers. We thank you for your continued commitment to our faculty.

If you have any comments regarding the Faculty of Engineering or would like more information on how you can support future U of A Engineers, please contact:

Laurie Shinkaruk, Acting Assistant Dean, External Relations
Faculty of Engineering, University of Alberta
c/o E6-050 Engineering Teaching and Learning Complex
Edmonton, AB T6G 2V4
Tel: 403.718.6394
E-mail: laurie.shinkaruk@ualberta.ca

I wish to make a gift of:

☐ $100 ☐ $500 ☐ $1,000 ☐ $2,500 ☐ Other $________

☐ Cheque (made payable to the University of Alberta) ☐ VISA ☐ MasterCard

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Name (please print): ____

Signature: ____

I have also enclosed:

☐ a corporate matching gift form from my (or my spouse's) employer

If you were an Alberta resident on December 31, 2007 and have already given $200 elsewhere, your combined income tax savings will be:

Your donation to the U of A	$100	$500	$1,000	$2,500
Your tax credit for your gift:	$50.00	$250.00	$500.00	$1,250.00

* To best meet Faculty of Engineering's needs, donations may be directed to endowed funds. Donations made to endowment funds are invested in perpetuity and the investment earnings are used to advance the specified purposes of the fund within the University.

I would like my gift to support:

$ __________ Faculty of Engineering in support of undergraduate student projects, new educational initiatives in all disciplines, and general student life enhancement activities.

$ __________ Chemical and Materials Engineering Fund*

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$ __________ Electrical and Computer Engineering Fund*

$ __________ Mechanical Engineering Learning Laboratory Fund*

$ __________ Mining and Petroleum Engineering Fund*

☐ I would like information on how to make a gift of publicly traded securities to support the Faculty of Engineering at the U of A.

☐ I would like information on how to include the Faculty of Engineering at the U of A as part of a will, life insurance, or other planned gift instrument.

☐ I have provided for the Faculty of Engineering at the U of A in a will or trust agreement.

Please return to:
Office of the Dean, Faculty of Engineering
University of Alberta
E6-050 Engineering Teaching and Learning Complex
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