

# U of A • Engineer

Keeping in Touch with  
Alumni



## Mechanical Petting Zoo

K-One is a K-Win

Double Dare  
Entrepreneurs

Top Jockey at Colt

The Forbes 500

# Greetings from the Assistant Dean

Welcome to the Summer 2006 issue of your *U of A Engineer* alumni magazine. This magazine is created and issued by the External Relations office in the Faculty of Engineering. Our mission is the advancement of the Faculty—informing, engaging, and involving our alumni and friends of the Faculty.

Over the past six years, we have vigorously pursued our goal of encouraging alumni to collaborate with us, building on the strong tradition of excellence in engineering. This partnership, along with a spirit of optimism and growth, has helped build the pride we share for the Faculty of Engineering. The ongoing involvement of Engineering alumni has been the foundation for our success.



Our desire to involve alumni with Faculty initiatives has led us to develop different opportunities for your participation. Whether providing design engineering cases for fourth-year design project teams, or arranging “engineer-in-residence” visits, alumni continue to shape our present and our future. Your impact is felt in our classrooms, labs, and lecture halls and around the world, as U of A engineers continue to influence the engineering profession.

Our commitment is to foster a lasting relationship with our alumni and to serve our engineering community in all its diversity. Please visit our website, contact us to find out how you can become involved, or come to one of our many alumni receptions held throughout the year. Don't forget to mark your calendar for our biggest alumni gathering of the year, Reunion 2006, held on the U of A campus from September 29 to October 1.

On behalf of the Faculty of Engineering, I thank all alumni, corporate partners, and professors emeriti for continuing to strengthen and improve your Faculty of Engineering for future generations.

**David M. Petis**

Assistant Dean, External Relations



Faculty of  
**ENGINEERING**  
University of Alberta

**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.*

## FEATURES

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In 2001, Beng Fook Lim (MSc Mechanical '99) started the K-One Group, a one-stop shop in Malaysia that designs, develops, and manufactures high-end electronic products. Lim has nurtured the company from its inception to a sales figure of \$4 million US in 2004. Last year it was ranked by Deloitte International as one of the 500 fastest growing technology companies in Asia Pacific. And K-One's key clients include all the "big boys" of electronics—Sony Ericsson, Nokia, Logitech, and Hitachi, to name only a few.



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Aaron Saunders (Mechanical '00) runs a mechanical petting zoo. Saunders, a project manager with Boston Dynamics, is working on some of the coolest robots on the planet—robots that swim underwater and climb walls. Many of their ideas come from studying the diverse motions of living creatures, including geckoes, cockroaches, and horses.

### 14 Double Dare Entrepreneurs

Gambling on a single web page paid off for Sam and Andy Prochazka (both Computer '01). Now, roughly 2,000 real estate sales agents and brokers in western Canada subscribe to RealPageMaker, software support for realtors. RealPageMaker has agreements with a growing number of real estate boards including Edmonton, Calgary, and Vancouver.

### 18 Marilyn's Loss, Engineering's Gain

Marilyn Monroe might have changed everything for T.W. Fraser Russell (Chemical '56, MSc Chemical '58). Although he may have missed out on the delights of Hollywood, he has done very well as an engineer. Dr. Russell is a renowned teacher, consultant for the chemical process industry, and chief engineer for a major research program on thin film photovoltaic cells.



Boston Dynamics

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### 21 Nova's Supernova

Valentin (Val) Mirosh (Chemical '68) was technically born into slavery, less than a month before the conclusion of the Second World War. Now he's the Calgary-based vice president of Nova Chemicals Corp. and the company's senior officer in Canada.

### 24 Top Jockey at Colt

An entrepreneurial aptitude and a lifelong love of making things led Larry Benke (Electrical '73) through a series of career-building milestones and, ultimately, to the leadership of Colt Engineering, one of the busiest hydrocarbon process and industrial facility engineering companies in the country.

### 28 The Forbes 500

*USA Today* reported late last year that Len Forbes (Engineering Physics '62) was 10th on a list of the top utility patent-holders in the United States. By his own estimate, Forbes has about 500 patents, many shared with colleagues from industry and academia, and all held by companies for which he has done contract work during his 40-year career.

### 30 Green Building—A Child of the 60s Helps Change the World

A champion of the cause, Ian Theaker (Mechanical '86) advocated for green building since his high school days in the 1970s. Now program manager for Leadership in Energy and Environmental Design (LEED) for the Canada Green Building Council, Theaker has plans for 112 building projects across Canada that are seeking LEED certification as green buildings.

## DEPARTMENTS

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Meet Pedro Gluecksmann (Civil '67).

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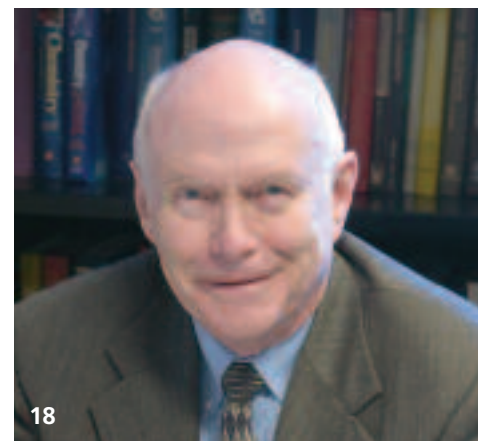
An enormous engineering challenge at the beginning of the last century led to the building of what was then the world's greatest irrigation system, largest human-made lake, second largest dam (after the Aswan Dam in Egypt), and largest raised aqueduct since Roman times.

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# Message from the Editor

It is my pleasure to introduce a new colleague, Matt Ferguson, who is development and communications coordinator for Mechanical Engineering. Ferguson has put together a four-page discipline-specific insert for this magazine. If you are a graduate of Mechanical Engineering you have received a special issue of *U of A Engineer* with this insert.



This insert features Dr. Peter Flynn's imaginative response to global warming. His research involves mobilizing 8,000 barges moving into the northern ocean in the fall, to pump sea water. It's a bold proposal but not an inexpensive one. Intrigued?

The insert also introduces grad student Erin Searcy who is spinning straw not into gold but into alternative fuels sources. These environmentally friendly sources of electricity result in fewer greenhouse gas emissions than traditional fuels.

You will also become familiar with a new combustion concept that has potential to reduce the fuel consumption of vehicle engines while significantly lowering some of the exhaust emissions.

If you are a graduate of a discipline other than Mechanical Engineering and if you are interested in this insert, please contact me at [sherrell.steele@ualberta.ca](mailto:sherrell.steele@ualberta.ca)

I hope you enjoy this special insert. In fact, I hope you enjoy all the content in summer issue of the magazine. Feedback is always welcome. Contact me at 780.492.4514 or at [sherrell.steele@ualberta.ca](mailto:sherrell.steele@ualberta.ca).

*U of A Engineer* is the Faculty of Engineering alumni magazine.

It is published three times a year by the Dean's Office and is distributed to Faculty of Engineering alumni, friends, and staff.

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*Cover photo:* LittleDog from  
Boston Dynamics.

Publications Mail Agreement  
No. 40051128

Return undeliverable Canadian  
addresses to:  
Faculty of Engineering,  
University of Alberta  
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# Dear Editor:

I am writing in reference to the article “Restoring NA337 A Labour of Love,” by Lois Hammond, in the summer 2005 issue of *U of A Engineer*.

The article contains errors in three places, as noted below, which are misleading and can confuse the real circumstances. The opening sentence of the article states, “... the Halifax bomber was raised out of its watery grave...” This statement is incorrect because the aircraft referred to is NA337, which, technically, is not a bomber.



**Halifax LV 907, Friday the 13th at the Yorkshire Air Museum**

The first two sentences of paragraph eight of the article state, “The only other Halifax in the world sits unrestored in the Royal Air Force Museum in Britain. ‘None exist intact today and this makes NA337 very, very special.’” says Tytula.

There are in fact three Halifax aircraft in the world today—a reconstructed BMk III bomber at Elvington, Yorkshire, the unrestored remains of a BMk II bomber, W1048, in the RAF Museum, Hendon, and the fully restored NA337 in the RCAF Museum at Trenton, Ontario. Yes, NA337 is special, but the real reason is obscured.

Consider the following. The writer refers to the R.C.A.F. Museum, Trenton, Ontario ([www.rcafmuseum.on.ca](http://www.rcafmuseum.on.ca)) and the article under the heading “The Move of The Halifax.” The article states, “After the Second World War all of the remaining Halifax aircraft were scrapped. Today, from a total of over 6,000 which were built, only three remain, two of which are in England: the first a composite rebuild which incorporates parts from other Halifaxes and another type of aircraft [the Elvington Mk I11 bomber, my addition], the second preserved as a crashed aircraft [in the RAF Museum, my addition],

and now NA 337 which will be the only technically correct Mark 7 aircraft in the world.”

Anyone following the progress of this mammoth task managed by Mr. Tytula over the past ten years will be aware that on more than one occasion there have been exchanges between the Yorkshire Air Museum in Elvington and the restoration team in Trenton, openly mentioned in restoration progress reports from the restoration team.

The Halifax Aircraft Association's web page ([www.halibag.com](http://www.halibag.com)) has a link, “Other Halifax,” which contains a write-up (although some information is incorrect) on Halifax LV 907, Friday the 13, which is located at the Yorkshire Air Museum, Allied Air Forces Memorial in Elvington, Yorkshire, just outside the City of York. This aircraft is a Halifax BMk I11 bomber fully restored to WWII condition. It is housed in the Canadian Memorial T-2 Hangar, a wartime Bomber Command hangar, the purchase and erection of which was funded by the Canada Branch of the Yorkshire Air Museum.

The writer also makes reference to Mr. Tytula's restoration progress report in “The ‘Halibag’ Newsletter,” summer 2000 issue. Here is a selection for background, ‘The final configuration of the restoration is not ‘cut and dried.’ NA337 is a MK VII A Halifax configured for special operations executive activities. Most Canadians flew MK 111 B (Bomber) Halifaxes and many members would like to see this aircraft presented as a MK 111. Some of the best examples of our indecisiveness are ... do we want HZS, a mid-upper turret, etc. For the present we intend to leave all options open.’”

The author may be excused for perhaps quoting Mr. Tytula out of context due to the technical nuances of the subject matter. On the other hand, some due diligence investigation of the two mentioned websites should have triggered questions that suggested clarification may be necessary before publishing the article.

For general information, and to clarify the difference between “B” and “A” types, the following is a brief explanation of the some of the “types” of Halifaxes produced:

Type “A” carried paratroops and supplies and/or special agents to be dropped to resistance



**Bomber Command Memorial**

groups in the occupied countries (what NA337 was performing when shot down), and as glider tugs. This type did not have the mid-upper turret installed to provide more room for personnel, or the H2S radar installed on the underside. The hole in the floor for the H2S was modified for dropping supplies or to function as the exit for paratroops. This is the type of Halifax pictured across pages 38 and 39 in the article.

The type “B” bomber is self-explanatory. The majority of Halifaxes built were this type, serving with 4 Group and 6 (RCAF) Group in RAF Bomber Command.

Type “C”, a post-war designation, is basically a cargo aircraft and used in the Berlin airlift.

Type “GR” is a Coastal Command version.

Regardless of these criticisms, the restoration of Halifax NA 337 is a monumental and magnificent achievement, of which Mr. Tytula, the gifted members of the restoration team, and the Halifax Aircraft Association and members can be justly proud. It will stand as an outstanding tribute to all the Canadian men and women who served in the Allied Air Forces during WWII, and a memorial to all who gave their lives on our behalf.

Ms. Hammond's article and its publication in the *U of A Engineer* are most commendable, and I thank you for it. We in Canada have a tendency to belittle our military participation in WWII, but we should be very proud of the part played by Canadians, particularly by 6 (RCAF) Group of Bomber Command. Memorials such as NA337, right here in Canada, will enable the next generations to better see and understand the role our country performed and the sacrifice paid by those men and women who served on our behalf.

Sincerely,

**KEN F. TOWNEND**

(Electrical '55)

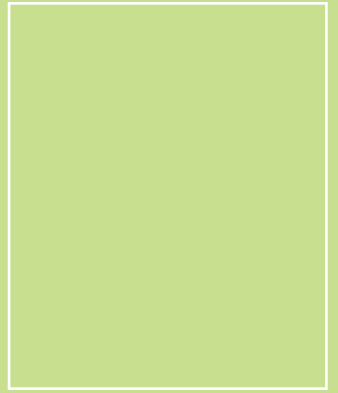
BY PHOEBE DEY

# K-ONE K-ONE is a WINNER



K-One's mobile phone gameboard.

**Beng Fook Lim** (MSc Mechanical '99) had unfinished business with the U of A. In 1981 he was a Master's student in engineering management when he learned his father had passed away in Malaysia. As the eldest son, it was his duty to return home and tend to the household. But when he left campus, he was one class short of completing his degree. Since his thesis was done and



**Beng Fook Lim**  
(MSc Mechanical '99)

All photos for this story are provided by K-One

knowing the course could be completed from anywhere, Lim left with the intention of finishing it from Malaysia. He just didn't know it would take so long.

Seventeen years later, after he was becoming known as an emerging entrepreneur in his country, he wrote a letter to the university. He explained he was one course short of his Master's degree, which was "way, way overdue." By that point, Lim likely didn't need the letters on his CV to further his career. He had already proved his mettle with such international companies as Mobil and Tyco Electronics. But Lim recognized that a graduate degree might set him apart even more. Given the go-ahead, he did the required reading and assignments and earned his degree 18 years after he started.

His interest in engineering began when he was a young boy. He was born in Ipoh, a town 200 kilometres north of Kuala Lumpur, to a family of 10 children. He took his early education in an Anglo-Chinese school in the region and remembers often dismantling

things and returning them to their original form. With six older sisters, the eldest boy often followed his father to work and watched as the seasoned mechanic performed his trade.

Lim left Malaysia for Sheffield, England where he completed his engineering degree in 1981. When he decided to pursue a Master's degree in engineering management, he considered a university in Oklahoma and the U of A. Edmonton won out and Lim settled into Hub Mall, where he became accustomed to the smell of cooking food wafting up to his small apartment.

Then came the news about his father. After taking care of things at home, Lim took a job with Mobil Oil Malaysia and ended up in various sales departments for eight years. With retail sales, he was in charge of looking after service stations. In industrial sales, he advised engineers about which lubricants would work best at different factories. Right before he left that company, he did a turn in corporate planning, which would serve him well in the years ahead.



An emergency portable car battery charger.

His next stop, at the age of 32, was national general manager for the engineering group Renold, a U.K.-based company. From there he joined AMP Products, now known as Tyco Electronics, again as its national gen-



A scanner that can read and translate sentences.



eral manager for Malaysia. He was instrumental in growing Tyco Electronics Malaysia from a sales operation of about \$7 million US in 1992 to \$50 million US in 1999. As if that wasn't enough, at the same time he also held the position of director, automotive industry for the Association of Southeast Asian Nations for two years.

Near the end of his time with Tyco, Lim hit the books again. He finished his graduate degree and began looking into starting his own company. In February 2001, along with a Norwegian partner, Bjorn Braten, he started the K-One Group, a one-stop shop that designs, develops, and manufactures high-end electronic products. Lim has nurtured the company from its inception to a sales figure of \$4 million US in 2004. Last year it was ranked by Deloitte International as one of the 500 fastest growing technology companies in Asia Pacific. And K-One's key clients include all the "giants" of electronics—Sony Ericsson, Nokia, Logitech, and Hitachi, to name a few.

K-One differentiates itself by streamlining the process from start to finish. Other companies in the region focus on either manufacturing or designing, but not both.

As Lim explains, "Design and development is the engine that drives our business."

That puts Lim behind the wheel, setting the vision and the strategy of the company.

He admits when he first started the company, he had to make cold calls and knock on many doors. It helped that Lim built up an extensive network while making deals with multinationals when he was at Tyco.

"It gave me the opportunity to go back to my old customer base to try to win some deals," he says.

"We had to start small and we won people over—I think mostly we won their hearts."

K-One got its first break when Sony Ericsson asked it to design and develop a car cradle for mobile phones.

"It took us a couple of months and then they told us, 'since you've designed it, you might as well manufacture it.' It was a natural progression."

Since then the company has also created and built such items as a web camera, a pen that can scan, read, and then translate a sentence as well as home-care products like vacuums.

Currently, K-One's base is in Malaysia with four sales offices in Europe. In the next



A car cradle for mobile phones.

three years, they have big plans: they are looking to open a manufacturing and R&D plant in China, a manufacturing base in eastern Europe, and more sales offices in Europe and North America. Lim, who speaks Malay, English, and four Chinese languages and dialects, wants to turn the mid-sized company into an international global business operating on five continents.

With his combination of engineering and business background, Lim is capable of making that happen.

"It certainly helps that I can understand the engineering side, and that the engineers in the company know that I understand what they are working on. Because I have a team of design and development engineers I can count on, I am able to focus more on the business side."

His work has paid off—not only in dollar figures but also in national recognition. K-One has won a slew of awards in its short existence, including five honours given to Malaysian small- to medium-sized industries that have excelled in such things as sales performance, profit growth, technology usage, and innovation.

Individually, Lim was accorded the Entrepreneur of the Year Award by the Malaysia Canada Business Council in 2004. In 2005 he was named a finalist for Ernst & Young's Emerging Entrepreneur category in that company's Entrepreneur of the Year

Award. And in the fall of 2005 Lim returned to the U of A to pick up an alumni award of excellence handed out by the Faculty at the university's annual reunion weekend.

Although the campus blueprint has changed since Lim's days as a student, his impressions remain strong. He easily recalls Dr. J.C. Sprague (professor emeritus) and Dr. John Whittaker (Civil '62), two engineering professors who specialized in management.

"They were mentors to me and I'm always grateful to them for coaching me and for being patient with me."

Running a company like K-One has always been a dream for the father of two. Although he was the top man at Tyco Electronics Malaysia, he was still an employee drawing a salary.

"You can be very independent and allowed to make major decisions and set the direction of the company, but it doesn't belong to you. It is so satisfying to grow a small company that you own. I am very proud to be associated with all these big companies. Whenever I travel and look at what is written behind the Sony Ericsson package, I see, 'Made in Malaysia,' and know it is being made by us—K-One. It's very rewarding."



Phoebe Dey is an Edmonton-based freelance writer.

# MECHANI



The RiSE robot uses its compliant legs to climb a tree.

All photographs this story: Boston Dynamics

# CAL



The RiSE robot climbs a tree.

# petting ZOO

by Bruce White

It's a sight that amazes many a traveller to the tropics, often while they are laid up in bed with a stomach bug, staring at the ceiling. A little green lizard, eight or ten centimeters from head to tail—a gecko—effortlessly climbs the wall, and just as effortlessly begins to walk across the ceiling. Then, just as the viewer's amazement is wearing off, the gecko twists to one side and in a lightning-fast, upside-down dash snatches a housefly off the ceiling for dinner.

Such a small dramatic event would prompt Aaron Saunders (Mechanical '00) to reach for a camera and notebook to record the event.

Saunders is a 28-year-old project manager, working with 20 designers on some of the coolest robots on the planet—robots that swim underwater and climb walls. They get many of their ideas by studying the diverse motions of living creatures, including geckoes, cockroaches and horses.

“What makes a good engineer is someone spending their life building up a catalogue

of how things move, how things fit together, what the pieces are that make devices work. A good engineer is one who has that catalogue and can use it to build devices,” says Saunders.

“Great engineers, and I've worked with a few, are able to search through their catalogue in a creative way that nobody else is able to.”

Saunders and the robo-engineers at Boston Dynamics, located halfway between Harvard and MIT, have learned a lot about kinetics by studying the natural world. It shows in their robots.

LittleDog is a robotic puppy that seems hesitant and unsure of its balance as it walks across a room. BigDog likes the outdoors, where it runs on four flexible limbs the size of human legs, carrying on its broad back a load of supplies to a disaster scene.

Feisty RHex has the exuberance of a Labrador retriever as it bounds on its six semicircular legs over rough terrain and through water and mud. (But unlike any dog we know, RHex can swim underwater.) RiSE is a slow-motion Meccano cockroach that can climb a tree or a brick wall.

Most of the work at Boston Dynamics is financed by the U.S. military through DARPA, the Defense Advanced Research Projects Agency. Robots like BigDog and RiSE have obvious potential applications for the military, such as carrying payloads onto a battlefield or performing reconnaissance missions without risking soldiers' lives.

"Current methods are you either rush in with guns or blow up the building with bombs and people get killed," elaborates Saunders. "You send in a robot and it gets shot, well, a robot got shot. It's just equipment."

He adds that robots are ideally suited for some kinds of reconnaissance.

"The more information that police or the military or rescue people can gather from the environment, the better prepared they are to go in with the right equipment and the right strategy."

Military-nurtured technology can also turn out to have substantial civilian uses. For example, the Internet and GPS started out as military secrets.

Robots are finding their way into our gadget culture. A flying saucer-like iRobot retails for less than \$150 and will vacuum the floor while you're out at the movies. Sony's QRIO is a humanoid robot that can dance and play soccer. Toyota has developed robotic technology that allows a Prius to parallel park itself. Robots are exploring Mars, and helped search for survivors in New Orleans and at the World Trade Center.



Aaron Saunders  
(Mechanical '00)  
poses with RiSE.

Yet for Saunders, the robot age is barely getting started.

"Pretty much every major university in the world has some work going on in robotics. As for companies, our industry doesn't quite exist yet. We're at the forefront of what will become an industry just like computers. We're not quite there yet. We're living off research and development type projects."

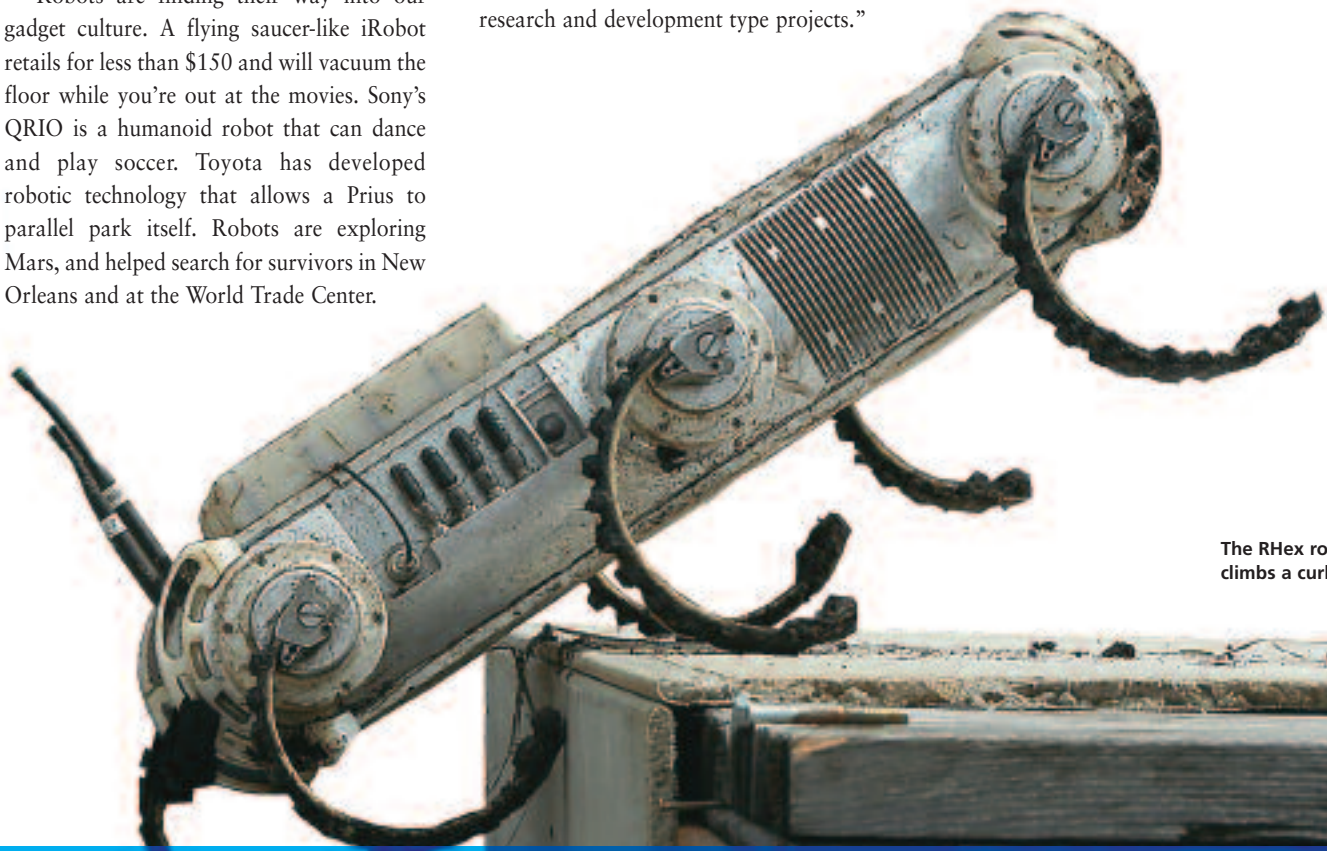
In a sense, Saunders began his personal research and development as a preschooler playing with Lego. And like most of his young colleagues in the robotics industry, Star Wars robots R2-D2 and C-3PO were his early inspiration.

Later at the University of Alberta, mechanical engineering was his only interest. In his first year, he joined a student group called the Autonomous Robotic Vehicle Project (ARVP), which was designing a robot that would be able to navigate an obstacle course.

"If there was one defining moment in my education, it was my involvement with student engineering projects, because I got to start applying my knowledge," Saunders recalls.

"And I got to do it early. I didn't have to study four years and then go into a job. As I was learning, I got to apply what I was learning."

At the time he joined ARVP, the group had produced a 23 kilogram electric robot, but Saunders dreamt of bigger things.



The RHex robot  
climbs a curb.

“Aaron and his Mechanical Engineering friends suggested to the rest of us (mostly in Electrical and Computer Engineering) that we build a 362 kilogram, gas-driven, hydraulically actuated monster of a robot called Polar Bear,” recalls James Smith (Electrical ’98, MSc Electrical ’01), another student on the project who does robot research at McGill University.

“Within weeks everyone had bought into Aaron’s vision for the project. Six months later we had the first version of Polar Bear driving inside the Mechanical Engineering machine shop.”

Saunders’ Polar Bear competed in the Intelligent Ground Vehicle Competition in Detroit, winning the tug-of-war portion of the contest so decisively that it has never been held since. Polar Bear, built for \$25,000 in parts plus abundant free labour, also won second prize in the design category two years in a row.

“Student projects like Polar Bear are a great learning experience for students,” says Leonard Swanson, an assistant dean at the Faculty of Engineering.

“These competitions provide tremendous networking and career opportunities and teach students how to manage projects and work as teams.”

Saunders credits Swanson, the adviser for student engineering projects, for helping to inspire him to pursue his passion for robotics.

After completing his degree at the U of A, Saunders earned his Master’s in mechanical engineering from the University of Victoria. His thesis was on underwater propulsion for robots. He spent time at Memorial University, where there are facilities for testing underwater vehicles. Later, he became a research associate with Smith at McGill, where his work with Professor Martin Buehler led him to join some of the top robot designers at Boston Dynamics.

“Aaron eats, breathes and sleeps robots,” says Smith.

“When the two of us get together, our wives roll their eyes and leave the room because they know the conversation always turns to robots and the next cool project to work on.”

There have been plenty of those. In his first year or so at Boston Dynamics, a company started by a former MIT professor, Saunders worked on the teams that designed four robots of ever-increasing capabilities.

“We’re building mechanisms today that are extremely complex in an amazingly short time, primarily because we can build them and move them around in the computer before we produce one,” says Saunders.

“There was a day when you had to build something five or six times before you could get it the point where it worked. More often than not, with a little bit of fitting, our prototypes work the first time that we build them. We can model every little bit and every little feature.”

The designers are driven by constant pressure from DARPA. Annual grants are contingent on producing robots capable of performing on a test course.

“If they’re not excited about what we are doing then we get dropped, so we’re always pushing the edge, pushing the envelope,” says Saunders.

“We want to do the hard things, like making running robots, things that are dynamic.”

So far, cockroaches are still better climbers than robots and much smarter; roaches manage to find their way around quite nicely without anyone pulling toggles or writing code. RHex needs human controllers within a few hundred metres to help it find its way around a large obstacle, aided by an on-board camera and limited telemetry such as orientation and compass heading.

“That will change quickly,” says Saunders. “BigDog will roam farther from

home as new capabilities are added. He already has cameras and laser rangefinders. The on-board global positioning system enables its handlers to plot out his route from A to B to C.”

BigDog and RiSE rely heavily on tactile feedback—in effect, a sense of touch—that allows it to measure the force its paws are applying to the ground, detect slippage, and to adjust its speed and posture from one suitable to walking on level pavement, for example, to one suitable for climbing over a mound of sand.

If you put a tree in the middle, BigDog should be able to “see” its way around. But it isn’t yet sophisticated enough to map its way around a more difficult obstacle without a human at the controls. As the mobility problems get solved, BigDog will add autonomy.

Like a proud parent, Saunders has a hard time saying which robot is his favourite.

“RiSE is amazing because it climbs better than anything I’ve ever seen. BigDog is the most advanced quadruped in the world—it’s capable of running and balancing over rough ground almost at the level of a human. RHex is amazing; it’s conceptually the simplest robot that we have at our company. It has six legs and one motor on each of those legs and the legs just rotate. I can’t say that one of them is my favourite—I love them all.”



*Bruce White (bruce@bizedmonton.ca) is an Edmonton-based business writer and editor.*

## Geckoes, Cockroaches, and Crabs Inspire Research

Robotics engineers like Saunders study the biomechanics of geckoes, those little green wonders. Engineers try to understand the compliance and flexibility of their limbs, the dynamics of how geckoes climb—pulling up and pulling in towards a wall, while loading their muscles with energy to push upwards—and how they sense the correct amount of force to use.

Geckoes’ ability to stick to walls and ceilings also inspires adhesives chemists looking to develop the ultimate Post-It note.

Geckoes use four legs and a tail to move around. Compare this to the movement of a cockroach, whose six legs act together as a pair of tripods. Or consider how some crabs climb out of the water onto wet rocks, propelled by little hairs on their limbs.



A photograph of two men in business attire sitting on chairs around a small, round, light-colored wooden table with a metal wire base. The man on the left is wearing a light-colored, vertically striped dress shirt and a dark tie. The man on the right is wearing a light blue dress shirt and a patterned tie. He is holding a black tablet or folder. Both men are smiling slightly and looking towards the camera. The background is plain white.

# Double Dare Entrepreneurs

by Debby Waldman

Sam Prochazka  
(Computer '01)



Andy Prochazka  
(Computer '01)

**Sam Prochazka** (Computer '01) was at loose ends. After spending a year in Kentucky and Calgary, working on control systems for Honeywell refineries in Fort McMurray, he realized that corporate engineering wasn't for him. Curious, energetic, and entrepreneurial, he was eager to generate his own projects. Prochazka handed in his letter of resignation and headed to Europe with his identical twin, **Andy** (Computer '01).

**T**heir plan was to take a brief holiday before returning to Edmonton, where they'd start a company to develop an orthotic device designed by their father.

But before they had a chance to get their start-up company off the ground, their potential investors backed out. Andy took a job with a local company, Eleven Engineering. Sam wasn't sure what to do.

Then his friend John Carter, a real estate agent, asked him to design a web page.

"I wanted an all-in-one software package, something that would automate my business and work as a client management and front-end marketing system, all the while helping me sell property," says Carter, who had met the twins a few years earlier and knew about their programming prowess.

With little else to occupy his time, Sam threw himself into designing a page that would meet Carter's needs. His twin brother helped on nights and weekends. They got such a charge out of the challenge that they decided to keep at it and create a product that could be used on a wider basis.

Late in 2002, about a month before they were ready to unveil their software, another local company introduced a similar product. But the Prochazkas forged ahead. As Sam says, "We had something special to offer, and we weren't about to give up."

The gamble paid off. Roughly 2,000 real estate sales agents and brokers in western

Canada now subscribe to RealPageMaker. The company is in talks with real estate boards in Toronto and Ottawa in hopes of expanding to those regions.

RealPageMaker allows real estate agents and brokers to offer their services over the Internet, which is where most people now start their search for property. Potential buyers can go to their agent's or broker's website, request information about the type of property they're interested in, and get an immediate response.

Potential buyers can also track price changes, search for foreclosures, conduct rolling home evaluations, and find comparable properties to help them determine what will meet their needs. Because RealPageMaker has agreements with a growing number of real estate boards including

The Prochazka's software is designed to immediately notify subscribers by e-mail, PDA, phone, or pager when a property becomes available.

Edmonton, Calgary, and Vancouver, buyers interested in those areas can access information as soon as a property is listed.

"We plug into the real estate data from various boards we work with, and we can pipe it through to the realtors' site," Sam explains.

"The main benefit of that is that the realtors no longer have to refer their clients out to mls.ca [the multiple listing services website] or any of the other real estate board-built MLS systems."

The Prochazka's software is designed to immediately notify subscribers by e-mail, PDA, phone, or pager when a property becomes

available. Potential buyers can log onto their agent's or broker's website and arrange to be notified about new listings as well.

However, because the real estate board's information is proprietary, agents or brokers have to give permission for clients to gain access to it. RealPageMaker has also simplified that process with a patent-pending invention. The software is set up so that if a potential buyer wants access, the agent or broker receives a phone call, and with the press of a button can grant the client's request remotely.

"From the realtor's perspective what it comes down to is time-saving and automation for me," says Carter, who used to spend three or four hours a day manually searching for properties for potential clients and then forwarding that information, in separate e-mails, to each one.

Because RealPageMaker allows buyers to find and weed out properties on their own time, Carter shows only half as many homes as he used to.

"I had one client from the United Kingdom who found me over the Internet," he recalls.

"We e-mailed back and forth over a couple of months. He was doing all his research on-line. He came here on a Friday and bought a place with cash on Saturday. Now he's in a high-rise condo downtown."

In November, Carter made a date with buyers from Nunavut who were coming to Edmonton on a house-hunting mission in January with plans to move to town in February.

"Without an interactive site, it's hard to do that," he says.

RealPageMaker is one of between 15 and 20 software companies to have contracts with the residential sections of both the Edmonton and Calgary Real Estate Boards.

"Those boards don't sign contracts with every company that comes along," says Keith Morrissey, the member service manager for the Edmonton Real Estate Board.

Morrissey says he respects the Prochazkas.

"They're smart and they're ethical. They keep us informed with regards to upgrades to their program and they clarify that their upgrades remain compliant with our wishes. And they ensure that their product development is compliant with our rules."

Designing technology to sell real estate wasn't what the Prochazka brothers had in

mind when they started studying at the U of A in the late 1990s. It was the era of dot.com millionaires, and they both figured they'd wind up with lucrative careers in Silicon Valley, complete with signing bonuses that included new cars and house down payments.

"I posted my resume on Monster.com during the height of the boom and within one day 15 recruiters had called and they were making offers," recalls Sam, who switched his major from electrical to computer engineering because of the opportunities.

Andy, a self-described dot.com era nostalgist, was attracted to computer engineering from the start.

RealPageMaker has provided them with a different kind of success, a foundation on which to build their own future businesses. The nine-employee company has a main office on Whyte Avenue in Edmonton, and satellite operations in Calgary and Vancouver.

"As I recall, it was the highest-demand engineering discipline in the Faculty. I envisioned a world of limitless opportunity after graduation."

The brothers decided to stay in school rather than enter the job force early. They assumed the market would be even more friendly to those with university degrees. But their timing was off. Not long before they graduated, the dot.com boom went bust.

"A lot of my friends who had lined up all these prestigious jobs lost them even before they started," Sam recalls.

"They had severance packages even before they began. It was pretty dramatic, and people were just struggling to find work."

Sam and Andy gave up their California dot.com dreams and started a "boy band" with a U of A music student. They rented thousands of dollars of recording equipment to make a CD. The venture lasted two months.

"Once we put down the vocal tracks, after putting in all this time and money, we realized

we could not sing in tune," Andy says.

It's hard to tell if he's kidding. According to Sam, who is older by six minutes, Andy's the one who inherited the musical talent from their mother, cellist and U of A music professor Tanya Prochazka, herself an identical twin.

Their father, Arthur Prochazka, is a neuroscientist and professor in the Faculty of Medicine. One grandfather was an engineer and the other was a businessperson, which could explain why the Prochazka brothers opted to study engineering and become entrepreneurs.

Their entrepreneurial spirit first manifested itself at Edmonton's Old Scona Academic High School, where they set up a discount convenience store to help students save money on lunch snacks.

"I'd ride my bike in with ice on my back, and Andy would have the soda," Sam recalls. "We sold everything out of our lockers."

"We could have continued on," Sam admits, "but we were adversely impacting the school store and decided to shut down."

Two years later, when the school store ceased operation, the boys were given a second chance—this time, legit. In fact, the teachers read their daily specials along with the announcements every morning. The brothers made enough money to finance a subwoofer system for their lockers which, as Andy puts it, "rumbled the foundations of the school."

RealPageMaker has provided them with a different kind of success, a foundation on which to build their own future businesses. The nine-employee company has a main office on Whyte Avenue in Edmonton, and satellite operations in Calgary and Vancouver.

Sam travels between the three cities. Andy, who left Eleven Engineering in April 2005, was in Beijing from August 2005 to February 2006. There, he studied Chinese and laid the groundwork for Sam and Andy Inc.'s next venture, a company that will manufacture medical devices. The brothers kept in touch daily, with Andy offering moral support and graphics expertise for RealPageMaker.

"We've got a fairness thing going," Sam says.

"Sam & Andy Inc., our corporation operating RealPageMaker, will be the holder of most of these companies regardless of who is actually operating them, and that's because we were raised having everything equal. I don't know whether that's to our detriment



or not, but to maintain good relations, things have to stay equal, and that's one of the ways we've discovered we can make that possible."

The brothers haven't always been so cooperative.

"When we were young, there was a lot of yelling and hitting," Andy recalls.

"As we got older, there was more verbal taunting. Whoever would react first was the loser, but it got to a point where neither of us would respond, and so the verbal torment became fruitless."

Or, as Sam puts it, "We discovered in our late teens that rather than squabbling constantly, it was much more effective if we actually worked together. It was very simple: two minds were better than one and we could out-compete most people if we worked together."

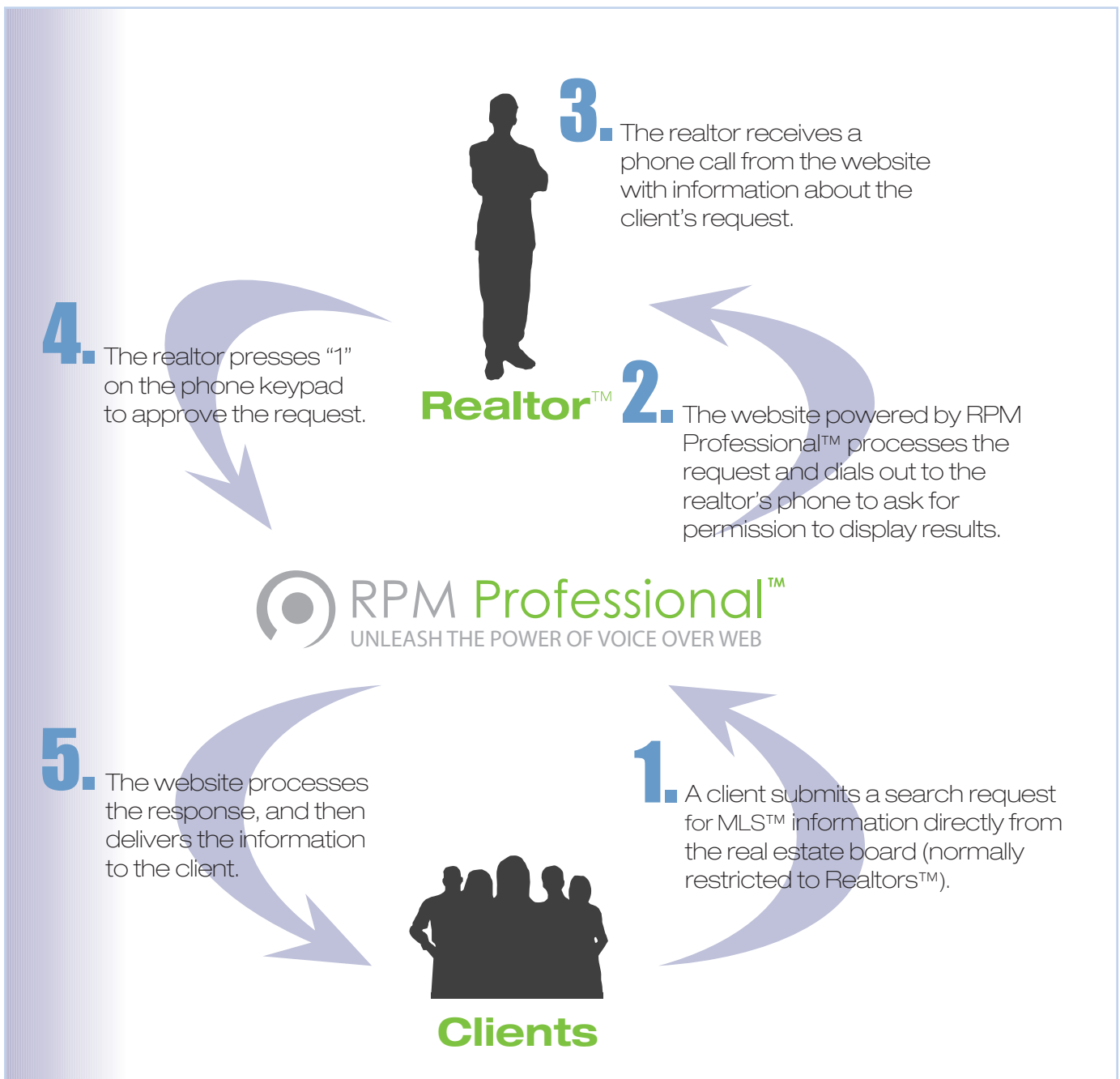
It's a philosophy that drives their current business and it is likely to play a role in each successive venture the brothers undertake.

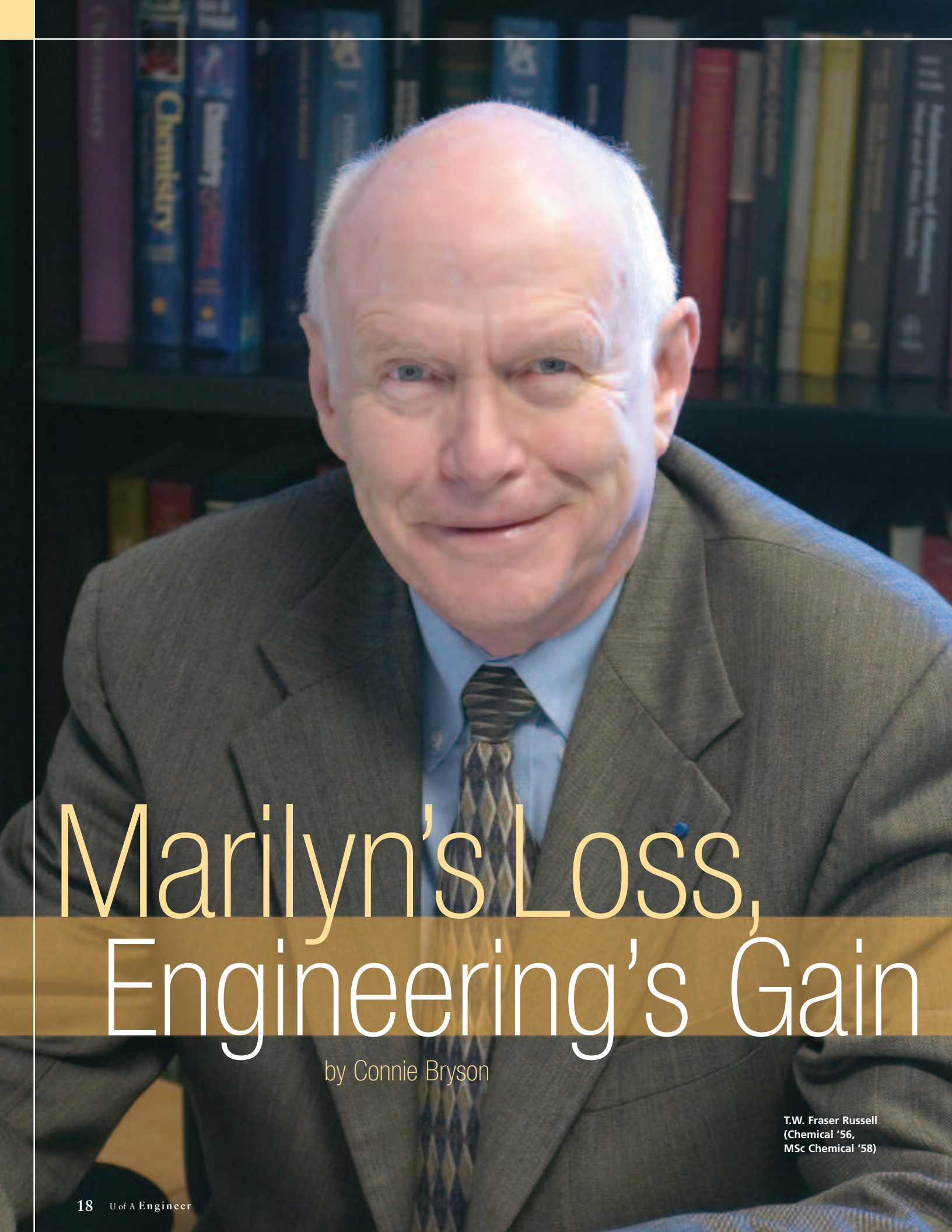
"There are three types of twins I'm aware of," Andy explains.

"There are the type who resent each other, who are constantly compared to each other and pitted against each other and grow up not really speaking to each other. There are the twins that finish each other's sentences and have a difficult time making outside friends. And there are the twins who get along, work well together, and are friends, and we are that type."



Debby Waldman is an Edmonton-based freelance journalist.





# Marilyn's Loss, Engineering's Gain

by Connie Bryson

T.W. Fraser Russell  
(Chemical '56,  
MSc Chemical '58)

Marilyn Monroe might have changed everything for U of A engineering student T.W. Fraser Russell (Chemical '56, MSc Chemical '58). In the 1950s, Russell was putting himself through school by working summers at the British American refinery (now Imperial Oil) in Edmonton. In the summer between third and fourth year, he was offered a job as a lifeguard at the Banff Springs Hotel.

“I went back and forth on that one: design a waste treatment plant or work at a beautiful hotel in the mountains. I ended up choosing the refinery. As it turned out, *The River of No Return*, a film starring Marilyn Monroe and Robert Mitchum, was filmed in Banff that summer. My replacement was hired to teach Marilyn Monroe to swim. It was the biggest mistake of my life. I still get a lump thinking about it.”

Maybe, but even by phone from his office at the University of Delaware, Russell delivers the story with a hint of a smile in his voice. Although he may have missed out on the delights of Hollywood, he's done very well as an engineer.

Dr. Russell is the Allan P. Colburn Professor of Chemical Engineering at the University of Delaware. He is a renowned teacher, consultant for the chemical process industry, and chief engineer for a major research program on thin film photovoltaic cells. He has been elected to the National Academy of Engineering and is a Fellow in the American Institute of Chemical Engineers.

But engineering wasn't always on his radar. As a high school student in Lethbridge, Russell had planned on becoming a pharmacist.

“I had a very wise uncle who pointed out that pharmacy was a job where you had to deal with a somewhat demanding public. He didn't think that I had the patience to do so and suggested I get a part-time job in retail service. I found a Saturday job at the meat counter at Eatons and quickly learned that customer service was indeed not my strong suit. I cast about for what would be closest to pharmacy; I hit upon chemical engineering.”

Russell took the train up to Edmonton in 1952 and settled into a single room in Assiniboia Hall.

“Those were a great four years,” he recalls, “both for the academics and the social life.”

It was at the U of A that Russell met his wife Shirley Ann Aldrich, who was studying



Working at Alberta Research Council in 1957, Russell adjusts the pilot pipeline used to study oil to water flow. EDITOR'S NOTE: This photo is taken from the book *Athabasca Oil Sands – From Laboratory to Production* by Mary Clark Sheppard, published by Geoscience Publishing.

education. After graduation, Russell took a job with the Alberta Research Council.

“It paid \$300 a month, which was a little less than the going rate, but you also got a Master's degree.”

Working with his supervisors Dr. George Govier (MSc Chemical '45) and Dr. Gordon Hodgson, Russell studied the flow of oil sands crude oil in pipes. This research produced the first papers published on liquid to liquid flow in pipes.

The work also brought him in contact with Dr. Karl Clark, the oil sands pioneer. Dr. Clark thought that Russell and fellow graduate student Al Sullivan should get to know the oil sands up close. So he took them on a trek to gather a “ton of oil sands” for laboratory research.

“Al and I wondered what we were going to do in the bush with this old guy,” recalls Russell.

After navigating down the Clearwater River to the sampling site, the three men began dynamiting and digging out the oil sand.

“It was a hot day and I conked about noon; Al lasted until 1:00 p.m. Clark, who had stripped down to a pair of paisley boxer shorts, continued on for the rest of the afternoon. After completing all the work, he made us supper and set up camp. He ended up looking after us two young tenderfeet.”

After earning his MSc degree, Russell went to work as a design engineer for Union Carbide in Montreal.

“There were only a few engineers working for Union Carbide Canada at the time, so those of us who were there were assigned projects that engineers would normally only be assigned after they had five or 10 years on the job.”

Russell was put in charge of the economic evaluation, process design, design drafting,



Dr. Russell poses with the first reactor built to deposit photovoltaic semiconductor continuously on a moving substrate.

construction, and start-up of chemical units to manufacture ethanalamines and glycol ethers.

“I enjoyed the work and appreciated the experience, but I could see that the corporate life was not going to give me the freedom and flexibility that Shirley and I desired. Besides that, I really wanted to teach. A PhD seemed to be the sensible choice.”

In 1961, Russell enrolled in the PhD program at the University of Delaware. The family, now including three young boys (Bruce, Brian, and Carey), moved to Newark, Delaware.

Although Delaware was supposed to be a three- to four-year proposition, it presented an environment that offered the intellectual freedom Russell craved, combined with the opportunity to work on practical problems. In his last year as a graduate student, he was asked to teach the senior-year design course. His success with that course convinced the administration to hire him as a faculty member. He has been with the University of Delaware ever since.

Russell’s early research efforts focused on multi-phase reactor design problems. This work led to consulting opportunities—first for Union Carbide Canada and later for many companies including the DuPont Company. In 2005, DuPont presented Russell with its Engineering Excellence Award, recognizing his guidance and technical leadership during 30 years of service as a consultant. This was the first time the award had been given to an engineer from outside the company.

In 1979, Russell was asked to take on the

directorship of the university’s Institute of Energy Conversion (IEC), which specializes in research on photovoltaic cells, used to convert sunlight to electricity.

“I recognized that a key issue for the photovoltaic industry is figuring out how to manufacture large quantities of photovoltaic modules cheaply. Otherwise, the electricity that comes from these modules is just too expensive. So we worked on laboratory-scale experiments to provide essential information for the commercial-scale manufacture of photovoltaic modules.”

As a result of this focus, the IEC made many significant contributions to thin film photovoltaic technology. In 1992, the laboratory was designated as a University Center of Excellence for Photovoltaic Research and Education, an award previously given to only two institutions in the U.S. Russell continues as the IEC’s chief engineer.

He is also involved in the commercialization of new photovoltaic technology as a

“A good teacher can make a huge difference in their students’ lives. Teaching can turn someone around so quickly—someone who is struggling or someone who doesn’t know what they want to do. I’ve always loved teaching.”

member of the board of directors of Colorado-based Ascent Solar Technologies. This development-stage company is working on photovoltaic modules for use in satellites and spacecraft. It is planning an initial public offering sometime this year.

“It’s exciting to see research move out of the lab,” says Russell. “I’d like to see this technology make a big impact.”

However, Russell considers teaching to be his greatest contribution.

“Of all the things I’ve done, I think teaching is where I’ve had the most positive impact. I truly enjoy interacting with students. My approach is to get each class to a point where they trust me, where they know

I’m not going to embarrass them. That’s when you can have an effective dialogue. Students will learn a lot more this way, compared to classes where they just sit and copy material that the instructor presents from a blackboard or from PowerPoint.

“And this takes time. You have to engage students. You must know them by name. You must draw them out. At first, you’ll get two or three of them interested. They’ll get the others interested. It’s greatly satisfying to have a whole class coming in to actively learn.”

While Russell’s teaching has won numerous awards, his most valued feedback is e-mails and letters from former students—and he receives a lot of them. Other treasured comments came from his wife, who was also a teacher. She took one of his engineering courses when she was doing her Master’s degree in education.

When Shirley Russell died in 1998, Russell wanted to commemorate her in a way that acknowledged both their contributions to teaching. He created an endowment for a teaching fellowship at the University of Delaware—the Fraser and Shirley Russell Teaching Fellowship. The award gives a chemical engineering graduate student, usually in the last year of his or her PhD, an opportunity for a supervised teaching experience in the undergraduate program. The student is mentored by an established professor.

“I thought that for the 50th anniversary of my graduation I’d do that same kind of thing at the University of Alberta. The Fraser and Shirley Russell Teaching Fellowship is being set up now, and we will have the first teaching fellow selected by September 2006.

“A good teacher can make a huge difference in their students’ lives. Teaching can turn someone around so quickly—someone who is struggling or someone who doesn’t know what they want to do. I’ve always loved teaching. I understand there is a great deal of pressure on faculty these days to raise money for research—so much so that teaching can take a back seat. It’s a shame. I hope that in a small way this fellowship can do something to change that.”



Connie Bryson is an Edmonton-based freelance journalist.









# NOVA'S *Supernova*

By Tom Keyser

One day during the early 1940s, a young Ukrainian student named Timothy Mirosh was striding alongside the fast-flowing Dnieper River. Suddenly, a thrumming sound drifted down through the clouds.

Then ear-splitting noise, chaos. Dust, shrapnel, and flying debris. Before Mirosh's blinking, disbelieving eyes, a German bomber had taken out a strategic bridge in his home district, near the historic city of Poltava, Ukraine.

Within another blink of an eye—or so it seemed in retrospect—the same student and his youthful bride, Anna, found themselves being shoved aboard a westbound boxcar, German soldiers prodding at their backs. For the next three years, the newlywed couple

Val Mirosh  
(Chemical '68)



endured a punishing life of Nazi slave labour near the city of Dresden.

So it happened that Walentin (Val) Mirosh (Chemical '68) was technically born into slavery. Fortunately, the infant's captivity proved to be brief and temporary. Less than a month later, the Allies won control of what later became East Germany.

"My mother and father wound up walking for 300 or 400 kilometres, with me barely a few weeks old, all the way to the American zone," explains Mirosh, now the Calgary-based vice president of Nova Chemicals Corp. and the company's senior officer in Canada.

"My parents were among millions of eastern European refugees who became known as displaced persons," says Mirosh.

"After the liberation, my father was smart enough to realize he could never go back to what was then Soviet Russia. In Stalin's view, those who'd been apprehended by the Germans had betrayed their country. It's likely my parents would have faced a minimum of 20 years in Siberia."

After a year or two in West Germany, the Mirosh family left Europe to join émigré relatives who had long since settled in Coleman, near southern Alberta's Crowsnest Pass.

Today, in his early 60s, Mirosh considers himself a citizen of the world, with ample reason. An avid amateur historian, fluent in Russian and Ukrainian, he holds German, Russian, and Canadian citizenships. He has done business throughout Latin America, Asia, and Europe. And, in one of life's piquant twists, he returned to Russia during the late 1980s, and bore witness to the crumbling of the government-controlled, centralized Soviet economy under Mikhail Gorbachev's perestroika.

Mirosh's low-key style belies the corporate influence he has wielded over the years. His multi-faceted career has taken him from the Mackenzie River Valley to the Argentinian pampas, from Taipei to Moscow.

An eclectic education equipped Mirosh for his kaleidoscopic professional life. After his father moved from Coleman to Calgary, to take a job as a steam engineer with the Canadian Pacific Railroad, young Val became a member of the first graduating class at Henry Wise Wood High School. Diploma

in hand, he continued on to earn his chemical engineering degree at the U of A.

Like most U of A engineers, Mirosh looks back with awe when he considers the sheer intensity of the program.

"As a youngster, you certainly have your eyes opened. The studies are a shock. I'll never forget that first year: 44 hours of class a week, including a half-day on Saturday. There wasn't a lot of slack time."

Dean Don Robinson and the rest of the faculty of the day made an indelible impression, helping the young gung-ho student grasp that textbook solutions aren't always as important as a firm command of the methodology.

**Technically born in slavery, Mirosh considers himself a citizen of the world. He has done business throughout Latin America, Asia, and Europe.**

"It was a rigorous program. But to my mind, it's one of the best groundings a person can have. When I went into law, my engineering methodology was absolutely applicable."

After adding an Master's degree in eastern Canada, Mirosh eventually returned to the Edmonton campus for his law degree. Thus uniquely armed with a double-barrelled CV, he set out on a colourful career path that invariably took him where the action was.

As a fledgling lawyer with Macleod Dixon, a prestigious Calgary firm specializing in international law, Mirosh helped negotiate the original agreements for the consortium which evolved into Syncrude Canada Ltd. Mirosh's client was the Alberta government. He spent several years hammering out organizational details for the project, which initially set out to determine the technical and economic feasibility of extracting bitumen from the Athabasca oil sands.

During the mid-1970s, Mirosh served as counsel for Canadian Arctic Gas Pipeline Ltd. (CAGP), one of the companies pushing hard for the controversial Mackenzie Valley pipeline.

"I was specifically involved with the engineering, financial, and environmental areas," recalls Mirosh. "My engineering training was a great help because I could communicate with our technical experts on technical issues."

The rising engineer/lawyer also prepared evidence, attended hearings, and conducted cross-examinations on behalf of CAGP during the federal Berger inquiry, which evaluated the potential impacts of such a pipeline. After three years of patient investigation, Justice Thomas Berger effectively killed the project, recommending that no pipeline be built along the Mackenzie for at least 10 years. Berger cited environmental concerns, while suggesting that any economic gains would certainly be offset by the potential violation of rights of Aboriginal Canadians living along the proposed route

"Looking back, (Berger's recommendations) may not have been such a bad thing. But I was disappointed at the time," Mirosh says today.

"After putting that much time and effort into a project, you like to see it come to a successful conclusion."

Subsequently, Mirosh occupied a number of senior executive chairs at what's now known as TransCanada Corporation, and also put in a productive stint as president of Alberta Natural Gas Co. Ltd.

Then came Moscow. When Mirosh first arrived in the U.S.S.R., few in the international community had the slightest clue how Gorbachev's startling plan for economic, political, and social reform would shake down.

In 1987, the Soviets had tentatively begun to invite foreign commercial interests into the country to explore joint venture opportunities. Canada, a more or less neutral player in the now-thawing Cold War, was welcomed with particular warmth. But no matter where they came from, visiting entrepreneurs never knew quite what to expect or how to proceed.

Nevertheless, Mirosh soon discovered common ground. As he puts it, the Russians were hungry to access Canadian technology, Canadian capital, and good old-fashioned Canuck know-how. Meanwhile, Canadian companies saw enormous opportunities in the new Russia, although they were hobbled by almost total ignorance of the country's legal system, business practices, customs, and culture.

"We took a position that said, 'Let's invest some time and money and try to understand this thing, to evaluate the business potential,'" Mirosh remembers.

He started by working his contacts within Gazprom, the state-owned natural energy monopoly. He checked in with the Canadian embassy, while simultaneously extending feelers to bureaucrats within the Soviet ministries of trade and development.

"Until that time, all Russian business had been conducted through government ministries," recalls Mirosh.

"But they were confused too. They had no idea what perestroika meant. They understood that the economy was to open up, but nobody had a clue about specifics. It was chaotic. People had no idea and many people in Moscow seemed dead set against it."

In spite of the negatives and the uncertainty, Macleod Dixon smelled opportunity and, in the end, was able to seize and exploit it.

As a multilingual lawyer, Mirosh played a role that now sounds deceptively simple. He and colleagues such as former diplomat Paul Drager, recruited from the commercial section of Moscow's Canadian embassy, acted as brokers, commercial matchmakers anxious to bring together business players from east and west.

"Initially it was a slow process," Mirosh says. "Those who tried to jump in and get rich quick didn't fare so well. We shied

away from that approach. We were able to see that this opportunity and this commitment had to be long-term. We wanted to do things right."

Not surprisingly, Macleod Dixon spent most of its time fostering relationships between oil and gas concerns, as well as forestry and mining companies. Before long, things were rolling smoothly enough to convince the Calgary office to open a permanent Moscow branch, which they did in 1990. Meanwhile, Mirosh returned to his Calgary base, making innumerable Russian trips in the years that followed.

These were confusing, exciting, stimulating times. And Mirosh clearly relishes the memories—even of the ubiquitous con artists, who seemed to turn up on every dimly-lit street corner.

"You'd get two or three people trying to sell you leases to the same resource," Mirosh laughs. "Each would say, 'I have the franchise to develop this oil field. Sign a contract with me and we'll both go to heaven together.' Oh, there were hucksters all over the place."

During those early days, North American visitors were typically sequestered in one large hotel in downtown Moscow. It was cordoned off with barbed wire, with KGB agents stationed every few feet.

"It was upsetting for some," recalls Mirosh, citing a particular U.S. businessper-

son who "was so spooked he wouldn't leave his hotel room."

"He left town after a single day. He told me, 'I've got to get out of here, I can't take it.' I suppose he had bought into the myth that the communists were determined to subvert the world."

In 2004, Mirosh returned to Calgary to join Nova Chemicals.

In the meantime, to bring things full circle, he had made it a personal priority to take his father home as well. After the Berlin Wall crumbled in 1989, the elder Mirosh began to feel comfortable with the prospect of revisiting his roots. Three years later, Val and his father returned to Ukraine, where the elder Mirosh tearfully reacquainted himself with long-lost cousins, nephews, nieces, and friends. Although much had changed, the old man was overwhelmed to discover that the house he grew up in, the old house near the Dnieper, was still intact.

"His first visit home was very emotional," nods Mirosh. "I still remember his words as we flew back to Alberta. My father said, 'This is like a dream. I still can't quite believe I've really been home.'"



Tom Keyser is a Calgary-based freelance journalist.

## errors and omissions

Andrea Collins, writer, would like to acknowledge the valuable research found in Marilu Walters' book, *CKUA: The Mouse that Roared*, which assisted greatly in the development of her article on page 34 of the winter 2006 issue.

There was an error in the photo caption on page 24 of the winter 2006 issue. The ATCO Electric team responsible for the Dover to Whitefish transmission line project are from left to right: Ben Korbutiak (Electrical '76), Simon Pang (Civil '89), Steve Brusselers (Electrical '84), Tom Bradka (Civil '96, MSc Civil '97), Stan Sladen (Electrical '93), Sett Policicchio (Electrical '79), Daryl Park (Electrical '92), and Sik-On Yu (Civil '74).

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2006 perspectives  
engineering

# Top Jockey

# at Colt

by Tom Keyser

**F**resh out of high school, an aspiring rock 'n' roller who grew up near the banks of the North Saskatchewan River was casting about for career options. He wondered whether his affinity for hot licks and power chords might not be his ticket to a prosperous future.

But in his heart, youthful keyboardist Larry Benke (Electrical '73) was less than confident that his Edmonton garage band could scale the musical heights.

Benke considered architecture but, in the end, chose to advance an interest in the then newly emerging field of electronics by applying to the University of Alberta Engineering Faculty. At the very least, he reasoned, he could acquire enough know-how to wire up his own vacuum-tube amplifier, something with enough oomph to coax maximum volume from his keyboards.

Before long, Benke was assembling and selling homemade amps as rapidly as he could crank them out, a cottage industry that subsidized his studies. As the years passed, however, rock music fell by the wayside. Instead, Benke's entrepreneurial aptitude and lifelong love of building things led him through a series of career-building milestones and ultimately to the leadership of the Colt Companies, one of Canada's largest hydrocarbon process and industrial facility engineering firms.

A pair of entrepreneurial visionaries named Ben van Zutphen and Jake Halldorson founded Colt in 1973, the same year young Benke aced his final exams at the U of A, turning in his last exam an hour early. Hired by Halldorson in 1977, the energetic

honour student climbed aboard as a design engineer. He distinguished himself on his first major assignment, planning and building an Edmonton distribution terminal for Colt customer Imperial Oil.

Elected president of the privately held company 22 years later, Benke added the title of chief executive officer in 2006. And, glancing in the rear-view mirror, it's fair to say that he and Colt grew to maturity together. As he moved up the ladder, the company evolved from a start-up operation above a welding shop to the single largest employer of professionals in the APEGGA register. Total staff (professional and non-professional) recently topped 3,500.

**"Today, I'd match Canadian firms up against anybody in the world. We have the experience and skills to match anyone. And it's all really happened in the course of a single generation."**

Based in Alberta with offices in Toronto, Sarnia, and Anchorage, Colt was among the first Canadian firms to stake a claim to Alberta's burgeoning oil and gas development in the mid-1970s. Today, Colt contracts for the engineering, design, and construction of projects in heavy oil and oil sands, pipelines, refineries, gas plants, petrochemical plants, and power-generating facilities.

"When I graduated from U of A, there really weren't any significant Canadian engi-

neering companies working in the field of hydrocarbons," Benke says.

"But as the years have gone by, our competency levels have really picked up. Today, I'd match Canadian firms up against anybody in the world. We have the experience and skills to match anyone. And it's all really happened in the course of a single generation."

A casual scan of Colt's job list turns up a truly star-studded roster of clients and high-profile contracts in the country's most dynamic sector, including:

- Genesee 3, the country's most energy-efficient coal-fired power generator, built for owner EPCOR;
- MacKay River, the \$290-million Steam Assisted Gravity Drainage (SAGD) in-situ extraction project, launched by Petro-Canada in September 2002;
- The \$1 billion Long Lake SAGD project, south of Fort McMurray. As of March, 2006, Colt was winding down engineering for Nexen Inc. at the jobsite, where Nexen and Opti Canada will operate as joint-venture partners.

Meanwhile, Colt maintains strong business ties with such major oil sands players as Syncrude, Shell Canada, and Suncor.

"Oil sands production projects are very facility intensive, requiring a great deal of engineering," notes Benke.

"Obviously, we're very much involved with a lot of the work going on near Fort McMurray."

It's no accident that the Colt ranks are crowded with U of A engineering alumni. More than 70 grads work out of the Calgary office, with at least another 100 based in the



Larry Benke (Electrical '73)



The EPCOR Genesee 3 power generator.

EPCOR

provincial capital. Beyond that, Colt has demonstrated its respect for school ties in a number of tangible ways, including development of the Certificate in Oil Sands Technology Program and a \$125,000 gift to finance the Engineering Faculty's Colt Engineering Design Laboratory.

"The number one thing I learned in engineering school is that you never give up," muses Benke, leaning back in a boardroom chair at Colt's Calgary headquarters.

"Just keep at it. You'll figure it out. Even things that seem impossible at the time can be accomplished."

With a passion to learn and a low-key style, Benke has always been a good listener.

Hired out of school by the California-based company C.F. Braun, Benke soon found himself in the thick of the action, working on design and construction for Imperial Oil's new \$300 million Strathcona Refinery. Benke now describes that job as an "absolutely wonderful" learning experience.

Following a stint with SNC, Benke hooked up with Colt in 1977, quickly finding his own comfort level. With the hip, energetic founders setting the tone, Colt's closely-knit team shared an edgy, can-do attitude that he found congenial in the extreme.

"At Colt, they tended to commit to jobs it would be easy to perceive were beyond their capabilities," Benke chuckles.

"They were always reaching to do something more and had a knack for delivering it."

In turn, Benke's own demonstrable ability and obvious self-confidence convinced his bosses to give their rising star increased responsibility.

Asked to design a state-of-the-art distribution terminal for Imperial Oil, Benke travelled with the client to its terminals throughout the company, to learn exactly what they were after.

"The technology was all the latest thing, except they were using traditional, pre-transistor switching devices known as relays," he remembers.

"When I added up all the features they wanted in the new terminal, I would have needed a cabinet of relays 2.4 metres tall and about 21.3 metres long."

Benke shakes his head. "Today, the chip in your pocket calculator could do that job."

To Benke's mind, the use of relays wasn't feasible. So he dug in his heels and argued in favour of programmable controllers, then a spanking new technological toy. But the customer balked. So did Halldorson.

**"The number one thing I learned in engineering school is that you never give up. Just keep at it. You'll figure it out."**

"Within a week, I got a call from Imperial. They sent out two senior instrument guys to audit my design," recalls Benke.

"After a meeting that lasted all afternoon, they gave me their blessing. Then Jake called and asked for a meeting. I had to pass his test, too."

In the end, Benke got his way and Imperial wound up with a fully functional terminal. In the mid 80s, while working as a Colt project manager, Benke led a series of projects for Syncrude. The company was experimenting with changing their mining technology to truck and shovel.

"It was very exciting. We were applying new technology—everything was either the first time, or the biggest, or maybe both. It amazes me today to see how those initial, tentative steps have now become the standard for

all oil sand mining operations. It was a very rewarding part of my career."

Having established a reputation as an entrepreneurial builder, Benke was next asked to establish a Colt Engineering beach-head in Toronto—his toughest assignment. He flew out on his own in 1988, "just me and my suitcases. I remember the whole experience rather vividly. It was a much-prized chance to test myself in the way Jake and Ben had." Benke pauses for effect.

"I wasn't there terribly long before I realized there was no oil industry in Toronto!"

Today, Colt's thriving Ontario offices in Toronto and Sarnia employ 300 people apiece. But back then, the company was faced with building a customer base from scratch while simultaneously attracting fresh recruits.

"It's not something I think you'd volunteer to do twice" says Benke.

Restricted by a tight budget, Benke remembers sweet-talking his brother, then employed by Edmonton Telephones, to fly east and wire Colt's new office because he thought the quote from local installers was "highway robbery."

After managing to land a couple of key contracts, Benke was able to breathe somewhat more easily, particularly after the Toronto office came in under budget on a job that included "a substantial risk/reward element" for joint venture owners Suncor and Ultramar in the early 1990s. Another high-tech distribution terminal, the task took 40 new staffers about 18 months to complete.

"That's the job that set us seriously rolling along in the east," he says.

"Today, we'd handle several similar, even more complex, jobs simultaneously."

Colt's president/CEO uses his own early experiences as a template for staff development strategies.

"I do try hard to perpetuate the can-do spirit that Zutphen and Halldorson brought to the company in the early days. My executive team is always trying to create opportunities for our younger people to grow their careers—just the way my bosses did for me. Being able to perpetuate that Colt value would be a wonderful legacy!"



Tom Keyser is a Calgary-based freelance journalist.

*U of A Engineering alumni are making an impact across Canada and around the world. "Virtual Engineer" features on-line interviews with alumni working outside of Edmonton.*

## Virtual Engineer

# Pedro Gluecksmann

*(Civil '67)*

### **What has been your career path from graduation to now?**

All through my career I have been working in the field of transportation engineering which comprises transportation studies, urban highway engineering, traffic engineering, and urban planning, and related fields.

### **What has been the most memorable/exciting/disappointing/challenging/rewarding aspect of your career thus far?**

In the profession, I got to be quite good at what I was doing, and gathered much experience to the point I was appointed assistant professor in the Central University of Venezuela, a position I held for four consecutive years.

### **What has been your proudest achievement, personally, professionally or socially?**

It has been 38 years since graduation. I spent at least 30 of these years actively in the profession. I gained many rewards and nominations. As well, as I wrote three books on engineering-related subjects. Now I have decided to explore other fields in the world of art (painting and sculptures) which is a very important aspect of my life. I have also embarked on a world tour with my own sailboat and visit many countries and cultures. I am also preparing a virtual magazine to share my experiences.

### **What is so important and being good in English language and writing?**

This is a very important subject. Most engineering students and, for that matter, graduated engineers give little priority to the

English language and writing. As I found out later in life and in practising the profession, good writing is just as important as the technical skills. If you can't write, you can't express your thoughts; therefore, you can't write good reports, and thus you will be considered an engineer with little opportunity in the profession.

### **What have been your greatest disappointments or lessons learned?**

An important lesson learned is that when asked to define alternatives to a specific project I came to the conclusion that there can't be alternatives to an engineering project, since there is only one that is the best and the only one that works exactly as required. All other alternatives have some kind of consideration of economy, political aspect, personal likings, simplicity, corruption of some sort, etc. Most alternatives have nothing to do with engineering. Other alternatives fall short of the best thing.

### **How did your education or experience at Faculty of Engineering/University of Alberta equip you for your work?**

In the Faculty of Engineering you are taught the academic principles of engineering. If you need to know more in a specific field you must go to graduate school or go through the "University of Life." You must be very consistent, autodidactic, and get involved in as many associations as possible and be a promoter of projects and sound policies.



### **What are the greatest challenges facing the engineering profession in the years ahead?**

The Engineering profession auto-generates its own challenges because life without engineers would not be possible in the modern world.

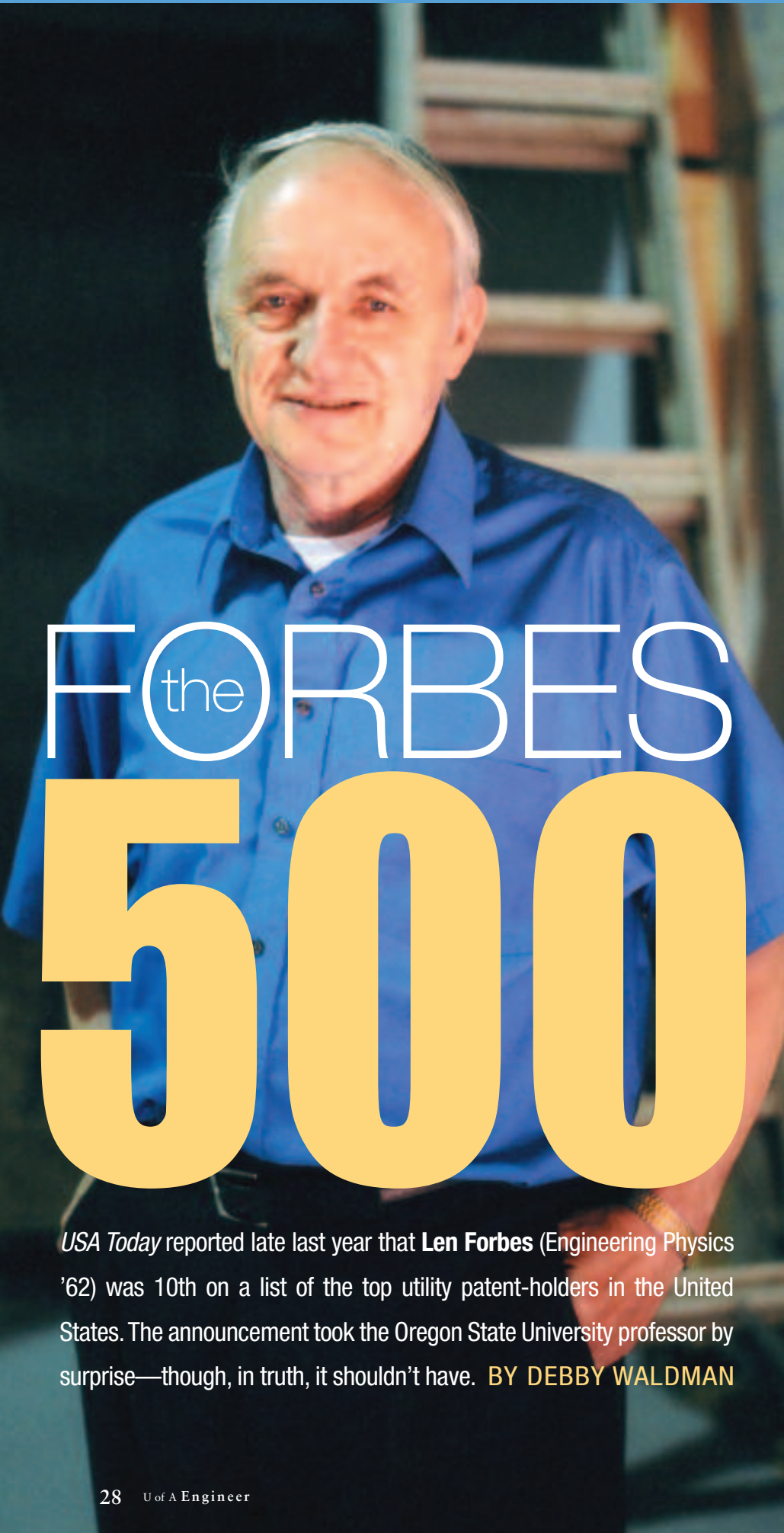
### **What emotional/sentimental/intellectual/professional connections/associations still remain with the Faculty of Engineering/University of Alberta?**

There is always the spirit of the profession this is the basic aspect of the pride of being an engineer. It takes some doing, especially to graduate and to become an engineer in the first place. I have always regarded being an engineer as the most important decision in my life.

### **What messages do you have for potential students, undergraduates, and young professionals just entering their fields?**

I'd like to provide encouragement for young engineers. Perseverance in improving the profession is paramount. Challenges will come. Watch for them, spot them in time to catch them, because if you don't, the challenge will quickly be taken up by someone else.

Be patient. Progress in the field of engineering comes all by itself. No new graduate can expect big responsibilities right away because it takes experience to master the profession. There is absolutely no substitute for experience.



# FOR the **FORBES** **5000**

*USA Today* reported late last year that **Len Forbes** (Engineering Physics '62) was 10th on a list of the top utility patent-holders in the United States. The announcement took the Oregon State University professor by surprise—though, in truth, it shouldn't have. **BY DEBBY WALDMAN**

**B**y his own estimate, Forbes has (or shares) about 500 patents, all held by companies for which he's done contract work during his 40-year career. Most are held by Micron Technology, an Idaho semiconductor memory manufacturer. Forbes has consulted for the company since 1996.

Micron was a new company then, looking for people with experience in semiconductors. By that time, Forbes had spent years working with some of the best people in the industry, something that might not have happened had it not been for the U of A.

"I was very fortunate," he recalls.

"There were a couple of guys who had gone to the University of Illinois and had come back and were professors at the U of A in 1961. That's where I learned about the University of Illinois."

Forbes spent a year in Illinois earning his Master's degree before leaving to serve in the Canadian Air Force for three years. In 1966, he returned to Illinois to earn his PhD.

There were about a dozen students in the lab where Forbes worked, all given the freedom to study various aspects of semiconductors. About a year-and-a-half into the PhD program, Forbes discovered a technique for characterizing impurities in semiconductors. The technique involved applying a stimulus to a diode and observing the time-dependent response of the subsequent electrical signal. The length of the response indicated a particular impurity.

And so, instead of sticking with his original dissertation topic, equivalent circuit simulation, Forbes focused on gold doping in silicon, a process to introduce gold into the semiconductor silicon to control the lifetime of electrons in the material. It was his first patent-worthy work, and it would have lasting implications on science.

"We were fairly young and we weren't being too careful about who we told about it," he recalls.

"Some other people picked it up and ran with it, and ran way ahead of us and made a significant refinement."

Those other researchers were at AT&T Bell Labs. They had the experience and resources to make a difference. They also had the sense of responsibility to credit the original sources, something for which Forbes is still grateful.





# green

## A Child of the 60s Helps Change the World

by Bruce White

**A**s an urban people, we spend much of our lives indoors. A substantial chunk of our environmental impact derives from our buildings: the land they use, the energy we consume to heat or cool them, the water we use while we're in them, and the effects of harvesting and manufacturing building materials.

Yet most of us probably don't give much thought to the environmental implications of buildings.

Not so for Ian Theaker (Mechanical '86), a U of A engineer near the heart of Canada's emerging green building movement. Theaker is the program manager for Leadership in Energy and Environmental Design (LEED), for the Canada Green Building Council.

Sharing a small, environmentally-friendly office at Vancouver Island Technology Park in Victoria, Theaker has within reach of his desk the plans for 112 building projects across Canada that are seeking LEED certification as green buildings.

Before Theaker and his colleagues certify a project for LEED, they carefully assess the building and its site. They look at the energy the building will consume for heating and

lighting, as well as water consumption both inside and out. They calculate how the natural light is used in work spaces and how solar heat is stored away in a thermal mass for winter. They look at the landscaping (lush, green lawns are a no-no) and what happens to the runoff oil drippings from cars in the parking lot. Inside, there are other issues to consider, such as air quality and the environmental impact of building materials—even how the toilets flush. It all adds up.

Using a point system, they assess the plans. The first step is LEED registration, awarded provisionally to the building if plans are up to scratch. Then, once the building is completed, it is certified as a LEED building. Successful projects are rated as either silver or gold buildings.

"From our point of view, a green building is first and foremost a very high-quality building," says Theaker.

"Green buildings are also commercially successful, because companies and people prefer to lease space in green buildings."

Portland, Oregon is the North American beachhead for the green building movement. A major developer in Portland has decided

to green all its buildings. Nike, the running shoe company based there, will have a green headquarters. And a Honda car manufacturing plant near Portland is a LEED gold building.

While green movements are nothing new to the west coast, they're now popping up in the most surprising places, including the Motor City itself.

"Ford Motor Company's original Model-T plant, the River Rouge plant, their biggest facility—they've decided they're going to have the largest green building in the world," Theaker says.

LEED is reaching takeoff velocity in Canada as well. The City of Calgary has a policy of designing all new buildings over 5,000 square metres to LEED certification standards. Vancouver also has adopted LEED, and other Canadian cities will soon follow.

Thomas Sutherland, a partner with Edmonton-based architecture firm Cohos Evamy, says LEED is on the verge of becoming mainstream in the public sector, but lags a bit in the private sector.

"Where you see it most on the private side is at the higher end," he says.

ng

Ian Theaker  
(Mechanical '86)





PCL's Centennial Learning Centre



The BC Cancer Research Centre

Bluefish Studios

In Edmonton, LEED projects include software developer Intuit Canada's headquarters and construction giant PCL's new Centennial Learning Centre.

While LEED has its champions in the design community, it still takes some selling from an architect to convince clients to go green.

Fees charged for LEED certification (currently between \$3,500 and \$16,000) can be an issue, as well as the documentation required for the certification process. Critics dismiss LEED as a "points-chasing exercise" and claim that its standards can be met without the expense and bother of registering. The biggest sticking point, however, is that green buildings are more complex to design and construction costs are higher.

"Clients whose budgets are stretched to the max are always at the end of the day trying to balance off whether they would rather purchase more space or would they rather purchase better space," Sutherland explains.

Currently, government and major corporations are the biggest adopters of LEED because they are willing to look at costs through the entire lifecycle of a building. But Sutherland,

one of more than 25 LEED-accredited professionals in his firm, predicts that LEED standards will become a mandatory part of all new buildings.

“Groups like the Green Building Council have an important role in making that happen. They’re like a standard-bearer, an avant-garde for the movement.”

Theaker has championed the cause of green building since his high school days in the 1970s, when he skipped classes to go down to the University of Toronto library to read about solar energy.

During a hiatus in his formal education between high school and engineering school, Theaker learned about buildings and energy from the ground up. He framed houses for a couple of years. He went to Fort McMurray to work for Bechtel as a construction assistant helping to build Syncrude. In the 1980s, he moved to Edmonton and went back to school.

In his final year at the U of A, Theaker was a research assistant for Dr. David Wilson, doing work for the Alberta Home Heating Research Institute. They tested six houses of various construction for their energy consumption in prairie conditions—doing automated blower-door tests to measure the leakiness of buildings.

“It’s probably one of the best databases around on what happens with building leakage when winds are from different directions, at different temperatures outside and different conditions inside, and different kinds of construction,” Theaker says.

After he graduated, Theaker threw everything he could fit into a pickup truck and drove to Toronto. His grasp of a new software application, AutoCAD, helped him get a job with MCW Consultants, a mechanical, electrical, and building engineering firm. He spent three years in Toronto and two more in MCW’s Vancouver office working on building mechanical systems before leaving the firm.

“They weren’t doing, to me, very interesting projects,” says Theaker. “I wanted to find the people on the coast who were doing solar building. In the course of that summer, I ran across the pioneers of this business in B.C.”

He began doing contract work, and soon had a long-term client in BC Buildings Corporation (BCBC). For BCBC, Theaker worked on natural lighting for offices and did one of the first studies of the energy consump-

tion and heat output of office equipment.

“Working with a group like BCBC is particularly rewarding because you’re working on actual problems with real buildings,” says Theaker.

“It wasn’t academic research, but getting out there to measure how things work in the real world.

“With building energy simulations, you’re trying to figure out how everything in a building affects its energy consumption—what the walls are made of, what the windows are, how much airflow there is, how much it leaks, how much water is used. In order to accurately model a building’s energy consumption, you have to know that building really, really intimately—ideally to three decimal places on several hundreds of parameters.”

In the 1990s, Theaker joined Sheltair Scientific Ltd., a new environmentally oriented firm in Vancouver. That led to the opportunity to help write urban design guidelines for Santa Monica, California, a green island in the great urban sprawl that is Los Angeles.

“They are serious about reducing their city’s environmental impact in every way—waste management, energy consumption, water consumption, planting more trees,” Theaker says.

The resulting Green Design Guidelines for Santa Monica is one of the pioneering documents of its kind. Completed in 1999, it contains 14 guidelines on water consumption alone, including collecting rainwater and grey water to irrigate landscaping.

After finishing the California project, which involved working for three years with a team of 13 people spread from the Gulf Islands to Texas, “I was pretty seriously crispy around the edges,” Theaker admits.

It was time for a sabbatical. Theaker wanted to meet the people who design and operate the world’s most advanced green buildings. Germany, Scandinavia, Holland, and to some extent Britain, are a decade ahead of North America in green building design.

Despite the movement’s current vogue, Theaker discovered many green building concepts aren’t really new.

“One of the hot issues right now is natural ventilation,” Theaker explains.

“You bring fresh air in under the floor near where the people are, and they breathe the freshened air and it picks up heat and contaminants as it rises up to get sucked out

of the top of the room. For the past six years, people have been touting this as the latest and the greatest. Well, this was done in the British Houses of Parliament in the 1870s.

“Another thing we’re telling people now in terms of day lighting and passive solar is to make your ceilings tall and your windows tall so that light penetrates deep into the room and you don’t have to use electricity for lighting. Well, British cathedrals have been doing that for centuries—bringing light deep into a space.”

From Europe, Theaker took the long way home via southeast Asia, posting a 47,000-word green building and travel journal on the Internet as he went.

Returning to Vancouver, he worked on a pilot project for the B.C. government to build four primary schools across the province.

**“I grew up with all the values of the 1960s—the central ones that resonated with me were ecological.”**

They even talked about doing a green prison in Abbotsford, but that never happened, to Theaker’s great disappointment.

Like a rolling stone, Theaker’s career was soon on the move again—this time to the Canada Green Building Council and the LEED program.

In a way, he’s where he always wanted to be.

“I was born at the tail end of the baby boom in 1957,” he says.

“I grew up with all of the values of the 1960s—the central ones that resonated with me were ecological. It seemed obvious to me that the way we lived then, and now, was not something that we would be able to maintain as a species.

“One thing that resonated with me was buildings. They are a third of the ecological footprint of our society. Here’s a place where I could contribute, could use some creativity, and it was very worthwhile doing.”



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Edmonton-based business writer  
and editor.*

## From Parched Earth to Fertile Field: The Story of the Brooks Aqueduct

by *Andrea Collins*

**S**outheast Alberta—vast tracts of arid land, sagebrush and cacti, little rain, evaporation from heat and wind, runoff over the hard-packed ground—not a promising place to farm. Or is it? That’s the question the Canadian government officials set out to solve a century ago. They encouraged a business partner, Canadian Pacific Railway (CPR), to sink its resources into the case and invest in building an irrigation system to rival ancient Rome. After spending millions of dollars, the CPR threw up its hands and flung the land and the irrigation system back at a stalwart group of Alberta pioneers who continue to operate it to this day.

That engineering challenge, at the beginning of the last century, led to the building of what was then the “world’s greatest irrigation system,” featuring the largest human made lake, second largest dam (after the Aswan Dam in Egypt), and largest raised aqueduct since Roman times.

But let’s start at the beginning. The first recorded construction of an aqueduct was in Assyria in 691 BC, consisting of a dam and masonry channel that sometimes bridged val-

leys on arches. It was 56 metres long and watered the fields and palace gardens north of Ninevah. The Greeks built their first aqueduct on the island of Samos in 530 BC, but the Romans perfected the art and engineering from 200 BC on. Although ravaged by time, ancient aqueducts were built to last centuries. Roman engineers carefully chose appropriate materials, designs, and skilled workmen, and organized these complex forces to maximize the results.

The CPR engineers who built the Brooks Aqueduct should have heeded that example. CPR got involved when the Canadian government offered it incentives, mostly land, to build a transcontinental railway. But the land in southeastern Alberta appeared useless—so dry (with an average rainfall of less than 30 centimetres a year) no one wanted to settle there—and the railway would not have been able to profit from land sales or the transportation of goods.

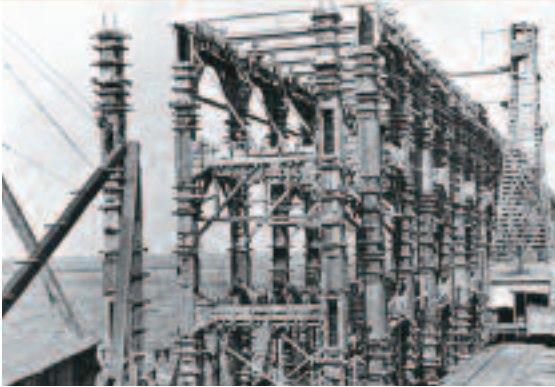
The federal government convinced CPR that the land only needed water to become fertile, and that CPR could obligingly provide that water if it became a licensed irrigation company. CPR fell for the ploy and, in an

agreement signed in 1902, was given 15 years to complete one of the modern world’s largest irrigation projects.

Fired with enthusiasm, driven by deadlines, and motivated by money, CPR engineers completed a number of small canals and wooden siphons before they began the Herculean task of building the massive Bassano Dam and the innovative Brooks Aqueduct over a span of four years. The designs were daring for the day and drew the attention of engineers and media from around the world.

The Bassano Dam consists of a dam and concrete spillway, designed to trap the waters of the Bow River at a horseshoe shaped bend. Built in 1910–14 at a cost of \$17 million, the complex project involved the removal of over half a million cubic metres of earth by horse and wagon, building a spillway comprised of 42,000 cubic metres of concrete and more than four million kilograms of reinforced and structural steel, and constructing a dam 2,200 metres long. The Bassano Dam remains the lifeblood of the Eastern Irrigation District (EID).

The water from the Bassano Dam flows east eight kilometres and then splits north and



E.I.D. Archives & Library

**The beginning of the construction of the aqueduct pedestals in 1924.**

east. Most of the water in the eastward leg ends up at Lake Newell, believed to be the largest human-made lake in the world with 225 billion litres of water contained in a depression 16 kilometres long and 6.5 kilometres wide.

But how to get the water from the reservoir to the land without losing elevation over the many small valleys along the way? This was the problem Hugh Muckleston, CPR's chief engineer on the irrigation project, had to resolve. Though there were several options available, Muckleston made a startling choice given the remote location and lack of men and machines: an elevated canal or aqueduct.

Not only had there never been a canal so long (3.2 kilometres), there had never been an elevated structure of such magnitude (20 metres high) built of concrete. Muckleston proposed a new design, a flume with a hydrostatic catenary curve mounted on 1,030 columns, complete with an inverted siphon to go under the CPR main line. A catenary-shaped flume had never been used in an aqueduct before, or tested in a water channeling system. However, Muckleston believed it would provide maximum stability and allow for a greater flow of water. He also chose to suspend the barrel, rather than support it from below. And he proposed that the barrel be constructed from reinforced concrete made from the newly developed Portland cement, a recreation of the hydraulic cement of ancient Rome. Portland cement was still at the experimental stage and was, as one engineer historian notes, "a material regarded with some suspicion".

Their failure to test the materials or design would come back to haunt the CPR engineers, as would their inadequate supervision during

construction. With money on the table, contractors grabbed whatever materials and men they could find, and went to work. Pay was doled out by the quantity of work, not the quality, so corners were often cut. With only 13 supervisors for 300 men allocated to 38 construction crews in the whole far-flung district, there was no one to blow the whistle. (One study, conducted years later, showed that where the specs call for a concrete pour of 20 centimetres deep in the barrel, many places measure only eight to 10 centimetres.)

According to F.G. Cross in a 1928 report, "Hustle was the order of the day and contractors were urged on to expediency by a penalty clause hanging over their heads in case they failed to fulfill their contract by a stipulated date. In other words—to take a deep breath was fatal."

The nearest lab for testing concrete was in Winnipeg, but impatient contractors rarely waited for the results and did not replace faulty

materials when the results were negative. In the first weeks of work in 1912, they used local gravel of inferior grade that soon caused crumbling. There was also little water at the site for mixing the cement, so it had to be hauled in by train from Suffield, 65 kilometres away. Steel reinforcing bars were also in scarce supply locally and were shipped out from Winnipeg at great expense.

But still the great edifice went up, metre by metre, to its completed length. Its reinforced concrete flume was 3,195 metres, with double expansion joints made of copper every 24 metres. The perimeter of the barrel was 10 metres, the top more than 6.86 metres, and the depth nearly 2.6 metres. Nine hundred thousand kilograms of reinforcing steel were used, and 18,579 cubic metres of concrete was poured. It took three seasons (1912–1914) to complete, at a cost of \$600,000. It supplied enough water to irrigate 50,600 hectares of land.

The aqueduct's construction riveted the attention of engineers worldwide. *Scientific American* published praise and details of the Bassano Dam, Lake Newell, and the Brooks Aqueduct in 1916, as did *Engineering News* and *Canadian Engineer*.

The glory was short-lived. The aqueduct was never able to deliver the 900 cubic feet per second (cfs) flow anticipated by its designers. It reached only a maximum of 640 cfs, mainly due to blocking and leaking of its transverse beams. It required major repairs shortly after its completion because of the design (which encouraged a concentration of alkali at lower elevations), faulty construction and materials, and the frost action and severe weather conditions of prairie Canada.

CPR maintained the aqueduct until 1935, and then proposed closing this gigantic white elephant. Drought-stricken farmers panicked and rallied, proposing to take over the ownership and operations. CP agreed, turned over the land, and gave them an operating loan of \$300,000. They surprisingly hired the original engineer, Muckleston, then a private consultant, to inspect the structure and make recommendations to their Irrigation Council prior to purchase. His report ends on an optimistic note: "I have been surprised at the excellent condition of this structure. ...I do not anticipate any further concentrated expenditure on

### Brooks Aqueduct Technical Statistics

Top width of barrel	6.86 m
Depth	2.6 m
Length	3186 m
Elevation drop (approx.)	1.7 m
Maximum height	18.6 m
Anticipated capacity	900 cfs (25 cms)
Achieved capacity	640 cfs
Perimeter of barrel	10 m
Walkways	2 feet (61 cm) on each side
Shell thickness	5 inches (12.7 cm)
Transverse girders	35 x 30 cm
Twin columns	6 m spacing
Expansion joint spacing	6 m
Footings (spread type)	
top	0.5 m x 0.5 m
bottom	2.5 m x 2.5 m
depth	2.6 m
Mean velocity	1 meter/sec.
Amount of concrete used	18, 349 cubic metres
Amount of reinforcing steel	900,000 kg
Construction costs	\$600,000

this structure which has behaved far better than I ever expected it to do.”

The massive repairs required in subsequent years belie that optimism, and suggest that Muckleston was trying to protect the CPR and his own reputation. However, the Eastern Irrigation District (EID), as it became known, carried on and is today widely known for its knowledge and expertise.

One of the EID engineers who tried to tame the “white elephant” was R.T. (Bob) White (Civil ’49), now deceased. White was a Brooks boy from birth. Like many locals, he viewed the Brooks Aqueduct’s graceful arches and sheer magnitude as his passion, his pride, and his nemesis. Though he moved to Edmonton to study engineering at the University of Alberta, each summer saw him back in Brooks, labouring on the aqueduct’s maintenance crews.

White’s first degree was mining engineering, which made him a valuable asset during his wartime service (1942–46), but on his return he completed a second degree, this time in civil engineering. His first civilian job drew him back to Brooks in 1949, where he would eventually serve as assistant engineer, chief engineer, assistant manager, and manager of the Eastern Irrigation District.

“Bob spent 40 years with the company,” recalls his widow Wanda White.

“He knew more about EID than anyone in the world. Even today, his grandchildren call it ‘Grandpa’s aqueduct.’ The aqueduct was his biggest challenge—he always worried it would fall down in the middle of the irrigation season. He was always trying to find ways to fix it.”

Early in his tenure, White was helped by the data for a major study of the aqueduct conducted by T. Blench from the Faculty of Engineering. Blench was able to identify the cause of the short discharge capacity and offer a few practical solutions. Many of the expansion joints were replaced by galvanized metal in the 40s and by hot-rolled copper V joints in the 50s, but the measures provided only temporary improvement. In the 1960s, EID began a major maintenance project under White’s direction to add additional reinforcing and replace all the concrete in the structure, a pro-

ject almost as taxing, and much more expensive, than building the original structure.

Despite this ingenuity, effort, and expense, the case proved hopeless. Nothing could compensate for the flawed design and construction. As White concluded in his 1983 historical review of the aqueduct, “The aqueduct was an engineer’s dream, but an operator’s nightmare.”

The Brooks Aqueduct was abandoned in 1979, replaced by an earth-filled canal that can carry 50 percent more water. However, its historic and engineering significance will not be forgotten. As David Finch, author of *Brain and Sinew*, says, “The Brooks Aqueduct was a major testimony to the ability of a group of people to triumph over a natural obstacle and bring huge sections of near-desert into bloom through irrigation.”

It can still be seen today, rising like a giant monolith off the surface of the prairie, eight kilometres southwest of Brooks. The basic structure has not shifted; its catenary curve design has withstood time and weather as Muckleston hoped. Named a national historic site in 1983 and designated as “one of 10 outstanding engineering milestones in Alberta” in 1987, it is now maintained by the Alberta government.

The aqueduct’s story is told in an interpretive centre nearby, and in the film “From Dust Bowl to Prairie Oasis”, written and produced by White’s granddaughter, Sheena White in 2004. At the film’s end she wrote, “It was the sheer perseverance of man and horse that brought the monumental structure from a vision into a reality.”

To fully appreciate this engineering marvel, travel to Brooks and stand in the aqueduct’s majestic shadow. When you look up, the brooding silence is broken by the imaginary echo of hammers striking metal, the creak of wagon wheels and harness, the shouts of men calling orders, and by the triumphant whoosh of water tumbling through the flume.



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

## Civil Engineering

### Cumming, E. Keith (Professor emeritus)

Walter Riva was one of my students when I taught at the U of A. Like many others in those immediate post-war years, he had a distinguished career. Many of his classmates distinguished themselves as senior executives in energy and construction corporations. Perhaps the most successful of all was Bob Stollery, who was responsible for developing PCL into a world class construction company and has had an outstanding philanthropic record.

I also have a personal interest in my son Kevin Cumming’s career. His bio could do with an update. He is now president of ATCO Midstream and has several awards for several projects for which he was responsible.

Finally, I wish to mention two of my classmates when I attended the U of A before going on to McGill: Harry Hole and his now deceased brother Bob. They built Lockerbie and Hole into a major mechanical contactor and have been very generous supporters of the U of A and the Citadel Theater.

### Matheson, W.G. (Bill) (Civil ’68)

Whenever I come across any article dealing with NA337 (published in the *U of A Engineer* summer 2005 issue) I am always reminded of my first visit to see her. At that time she was still in pieces and the shell holes were apparent.

Having been a navigator on that other bomber, the Lancaster, I was more interested in all the instruments that had been removed from her and laid out on a table than I was in the whole remarkable reconstruction scene around me. As I was identifying the navigational equipment and various other items that I recognized to my companion, I began to realize that I had an audience of volunteers who busy making notes of what I said. It was a remarkable experience for me and I relate it only to emphasize just how dedicated those volunteers were (and are!).

Just a small point . In the RAF/RCAF our flights were known as “operations,” not “missions,” which is an American term.

In any event congratulations to all involved in the rebuilding of NA337. A remarkable job well done.

### Electrical Engineering

**Verret, Sean (Electrical '00, MSc Electrical '04 )**

I was part of an adventure racing team that went to Chile and competed in the Patagonia Expedition Race, a 12-day, 795-km race by foot, mountain bike, and kayak. Our team finished in second place. Recently articles have been published in the *Calgary Sun* and the *Medicine Hat News*.



EDITOR'S NOTE: Verret's guest column is archived on the Engineering website at [www.engineering.ualberta.ca](http://www.engineering.ualberta.ca).

### Mechanical Engineering

**Marks, Andrew (Mechanical '02)**

I have been accepted into the commercial animation two-year diploma program at Capilano College in North Vancouver. I am one of 24 applicants to be selected based on a 30-page portfolio which includes life drawing, still life, animals, caricatures, locations, etc. The program is highly competitive, with many local and international arts students applying. Graduates from this program go on to careers in film and television, usually working at animation houses in Vancouver, Toronto or the U.S. I am very much looking forward to this new direction.

**Schubert, Leigh (Mechanical '68)**

It is with real sadness that I inform you of the passing of a friend and former classmate on January 8, 2006. Lawrence A. Schienbein (Mechanical '68, MSc Mechanical '70, PhD Mechanical '74) died in Seattle after a long fight that ultimately overcame him. He was recognized worldwide as an expert in renewable energy and many related fields, and his early demise is a great loss to his family and friends as well as the whole world.

**LAWRENCE SCHIENBEIN** (Mechanical '68, MSc Mechanical '70, PhD Mechanical '74) passed away January 8, 2006, after a lifetime of distinguished research in Canada and the United States. During his career, he worked on a wide range of projects, including utility-scale wind turbine generator design, wind turbine and wind/diesel hybrid systems research and development, shipboard helicopter landing systems, and underwater and airborne-towed bodies, to name only some of the areas in which he worked.

Schienbein also co-founded Sustainable Energy Technologies, a wind energy business, where he was responsible for prototype development that led to the commercialization of technology for fuel cell and photovoltaic applications.

Among his achievements, Schienbein was especially proud of his contribution to wind energy; in the 1980s, he was regarded as the foremost Canadian authority in that field. He held management positions at wind energy firms in Ontario and California, frequently traveling between both countries.

“Lawrence always believed that the University of Alberta offered the highest standards in collegiate education and was very proud to have the U of A as his alma mater,” says his wife, Gwen. “Lawrence kept up with his former classmates both from his undergraduate courses as well as those who were in grad studies when he was working on his Master’s and beginning his Doctoral studies.”

## in memoriam

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

Batcheller, Derek (Chemical '54, MSc Chemical '62)  
Horne, Douglas (Civil '57)  
Graham, Michael (Electrical '82)  
Helmer, Ronald (Chemical '46)  
Honey, Ronald (Chemical '60)  
Houg, Chester (Electrical '62)  
Ibrahim, A. Majid (Civil '53)  
Law, Dennys (Chemical '43)  
Phillips, Sidney C. (Electrical '41)  
Reiten, Stanley (Electrical '43)  
Schienbein, Lawrence (Mechanical '68, MSc Mechanical '70, PhD Mechanical '74)  
Strum, Herbert (Electrical '51)  
Wasylyk, George (Electrical '69)  
Yuskiw, Ernest (Mining '61)

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

Baker, Andrew (Mining '37)  
Hindle, Walter (Electrical '37)

### *In memory of Herbert Allan Strum, P. E. (Electrical '51)*

Herbert Allan Strum, aged 81 of Fort Myers Beach, Florida passed away on August 30, 2002. Strum was born May 9, 1921 in Edmonton, Alberta to Harvey Allan and Ella Manetta Strum. He became a King's Scout in 1937 with the Boy Scouts Association. During WW II he proudly served for five years in the Royal Canadian Air Force and was discharged as a flight lieutenant.

He received the prestigious Webb Award for a paper he presented while studying at the University of Alberta. Strum immigrated to the U.S. in 1953 to assist with the implementation of the dial telephone system. For many years, before moving to Florida, Strum operated his own engineering firm, H.A. Strum & Associates, in North Muskegon, Michigan. His iron ring was one of his most valued possessions.



**ANSLEY, RALPH DR.****(Civil '59, PhD Civil '63)**

has been appointed to the advisory board of Petaquilla Minerals Limited.

**CAMARTA, NEIL****(Chemical '75) PEng**

has been appointed vice president, corporate communications and planning with Petro-Canada. Mr. Camarta will lead Petro-Canada's business planning activities and communications with the public, employees, government, and investors. Camarta has 30 years of experience with Shell Canada in a variety of senior leadership roles.

**ENGEL, CORY****(Chemical '94) PEng**

has joined the leadership team at PAS, a leading provider of advanced automation solutions, with immediate responsibilities for all of the Americas solutions sales. Engel brings experience in the sale and delivery of software solutions for the process industries, having established Matrikon in the U.S. and eastern Canada—regions accounting for nearly half of all Matrikon's global sales. Further, he has personally led margin improvement initiatives in these regions to reach gross margins of over 60 percent—the highest for any Matrikon region and division. Engel originally joined Matrikon as employee number 15 and has been instrumental in leading its growth since the late 1990s. His track record and extensive background in the markets served by PAS helps ensure that PAS can exceed its 39 percent revenue growth record of 2005 and achieve its 52 percent growth goal for 2006.

**GARDINER, GARY****(Petroleum '86) PEng**

has been appointed president and chief executive officer and director for Peregrine Energy Limited. Gardiner has over 20 years of

experience in the oil and gas industry. Prior to joining Peregrine Energy Ltd., Gardiner was with AEC/EnCana Corporation where he held various positions of increasing responsibility, most recently the position of vice president of the Fort Nelson business unit. In his career, Gardiner has prepared and managed operating and capital investments in excess of \$500 million per year and was responsible for the management of several multi-disciplined technical teams to exploit and produce oil and gas assets. Gardiner has extensive experience in oil and gas exploitation, production, and long range planning, as well as acquisitions, drilling, completions, and operations. Previous employers include the City of Medicine Hat, Suncor, and Home Oil.

**HAAS, DR. RALPH****(Civil '61, MSc Civil '63) PEng**

has recently been awarded the Professional Engineers Ontario Engineering Medal for Research and Development for his work in transportation and infrastructure. He has also recently been elected a Fellow of the Engineering Institute of Canada. Previously, Dr. Haas was named as a Member of the Order of Canada (1998), a Fellow of the Royal Society of Canada (2001), and a Fellow of the Canadian Academy of Engineering (1990). Haas is The Norman W. McLeod Engineering Professor and Distinguished Professor Emeritus at the University of Waterloo.

**HARRIS, KEVIN****(Engineering Physics '95) PEng**

has been appointed technology leader responsible for successful delivery of technology-based solutions for Sierra Systems' clients in the Edmonton branch. Harris is a senior architect with 10 years of industry experience delivering software solutions. As a technology leader,

he brings in-depth expertise in software architecture, web-based solutions, and systems integration. He has worked across a broad client base in both the public and private sectors including Workers' Compensation Board, Alberta Government Services, AADAC, City of Edmonton, Alberta Human Resources and Employment, and Owens Corning. Over the past four years, Harris has focused on successfully delivering advanced Microsoft.NET solutions for Sierra Systems' clients. His excellent team leadership abilities provide strong technical guidance to the Edmonton branch.

**KABARCHUK, JOE****(Civil '94) PEng**

has been appointed director for the City of Edmonton transportation and infrastructure division.

**MACLEOD, MICHAEL****(Mining '75, MEng Mining '76) PEng**

has been appointed to the board of directors for Adanac. Macleod has been an active mining engineer for 25 years. He has been responsible for major capital projects, feasibility assessments, and marketing and environmental studies. He will be responsible for all project development and operational activities, and for assembling and leading the team of professionals that will advance the Ruby Creek Moly project.

**MORGAN, GWYN****(Mechanical '67) PEng**

has become executive vice chair of EnCana. He has also been named a director of Alcan Inc. In addition, Morgan is the director of HSBC Bank Canada, a director of SNC-Lavalin Group Inc., and a member of the energy advisory board of Accenture Ltd. In 2005, he was named the most respected CEO in Canada by a survey of the country's leading CEOs.

**ROZAK, ALAN****(Mechanical '89) PEng**

has been appointed vice president of gas gathering and processing for ATCO Midstream.

**SEMCHUK, MARK****(Mechanical '81) PEng**

has been appointed vice president business development and corporate initiatives for ATCO Structures.

**SPADY, DARCY****(Petroleum '86) PEng**

has been appointed vice president, operations of PetroGlobe Incorporated, a publicly traded company with operations in Central Alberta, Canada and the Palo Duro basin of West Texas. Until November 2005, he was director of production optimization and vice president of Canadian operations for Columbia Natural Resources, LLC. based in Charleston, West Virginia. Before that, he was general manager of Columbia's Canadian subsidiary based in Fredericton, New Brunswick. Spady joined CNR in 2000, after working as sales manager for Schlumberger Oilfield Services in the Eastern United States, and was district manager for Dowell Schlumberger in the Illinois Basin and in several areas of Canada, including off-shore, the Maritimes, Quebec, and Ontario. Prior to this, he held various engineering and management positions for Dow, based in Calgary and Red Deer, Alberta, and for Schlumberger Wireline in Edmonton, Alberta.

**SYMINGTON, WAYNE****(Mechanical '78) PEng**

has been appointed senior vice president for development, engineering, and construction for ATCO Power.

# Time to Celebrate

## REUNION 2006

BY ALLYSON HAUG

### Come one, come all!

If you graduated from U of A in a year ending in a 6 or a 1, 2006 is your year to celebrate! Join us September 29–October 1 for Reunion 2006—the perfect opportunity to reconnect with former classmates, professors and friends, and to share school-day memories and future plans.

In addition to the many campus-wide events, the Faculty of Engineering will host several complimentary activities specifically for Engineering alumni and their guests. Plan now to join us for an unforgettable Reunion 2006. We look forward to seeing you in September!

#### Friday, September 29

##### Dean's Reception\*

4:30–7:00 p.m.

ETLC Solarium, 2nd Floor, Engineering Teaching and Learning Complex (ETLC)

Start off Reunion Weekend by reconnecting with Engineering classmates and colleagues. Dean David Lynch and Mrs. Lynch invite all Engineering alumni and their guests to join them for complimentary hors d'oeuvres and refreshments in the ETLC Solarium.

\*Watch your mailbox for your invitation to celebrate the Faculty's latest nanotechnology initiatives.

#### Saturday, September 30

##### Dean's Brunch

9:00–11:00 a.m.

ETLC Solarium, 2nd Floor, Engineering Teaching and Learning Complex (ETLC)

All Engineering alumni who graduated in 1961 or earlier and their guests are invited to a complimentary hot brunch, hosted by Dean David Lynch and Mrs. Lynch. Dr. Lynch will celebrate the accomplishments of our alumni and will speak on the past, present, and future of the Faculty of Engineering at the University of Alberta.

##### Engineering Open House, Tours, and Lectures

10:00 a.m.–2:00 p.m.

Engineering Teaching and Learning Complex (ETLC)

The Faculty of Engineering is pleased to welcome alumni, prospective students, and guests to Engineering Open House 2006. 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. The alumni hospitality lounge will be open to provide a quiet place to enjoy a coffee and catch up with old classmates.

For more information on any of these events, contact Allyson Haug at allyson.haug@ualberta.ca or by phone at 780.492.4159 (toll-free 1.800.407.8354).

#### Class Organizers

To make Reunion 2006 as memorable as possible, we need volunteers who will act as class organizers. If your class is not listed and you'd like to help organize a special reunion for your class, please contact Allyson Haug at allyson.haug@ualberta.ca or by phone at 780.492.4159 (toll-free 1.800.407.8354).

#### Class Organizers (as of May 3, 2006)

- '46 Electrical Engineering  
*Muriel Cheriton and Robert Proudfoot*
- '46 Chemical Engineering  
*Jack Cuyler and Doug Love*
- '46 Civil Engineering  
*Henry Kasten*
- '51 Chemical Engineering  
*Art Davison*
- '56 Civil Engineering  
*Harry Anderson*
- '56 Chemical Engineering  
*Dr. Ron Brown and Dr. T. W. Fraser Russell*
- '56 Electrical Engineering  
*Mathew Romanow*
- '56 Petroleum Engineering  
*Stanley Harper and Leonard Maier*
- '61 Chemical Engineering  
*Al Patterson*
- '61 Electrical Engineering  
*Gordon Domeier and Robert McLean*
- '66 Chemical Engineering  
*Jerry Lack*
- '66 Mechanical Engineering  
*Dale Brossert*
- '66 Metallurgical Engineering  
*John Scheffer*
- '71 Civil Engineering  
*Mike Yakemchuk*
- '71 Chemical Engineering  
*Robert Burns*
- '76 Chemical Engineering  
*Matt McCaffrey and Glen Tanaka*
- '76 Electrical Engineering  
*Glenn Stowkowy*
- '81 Chemical Engineering  
*Mark Semchuk*
- '81 Mechanical Engineering  
*Paul Dusseault and Duane Evans*
- '86 Chemical Engineering  
*Brian Harrison*
- '86 Mechanical Engineering  
*Jim Funk*
- '86 Petroleum Engineering  
*Darcy Spady*
- '96 Mechanical Engineering  
*Tim Humpke*
- '96 Metallurgical Engineering  
*Fenna Poelzer*
- '96 Mining Engineering  
*Fenna Poelzer*
- '96 Petroleum Engineering  
*Fenna Poelzer*

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University of Alberta  
E6-050 Engineering Teaching  
& Learning Complex  
Edmonton, AB T6G 2V4

e-mail: sherrell.steele@ualberta.ca



# University of Alberta ENGINEERING



## Help support student projects

The Formula SAE race car is one example of an undergraduate student project you could support as a donor. This project provides students with valuable hands-on experience applying their textbook education to a real-world engineering design problems. The skills acquired not only include engineering design, drafting, and optimization, but also project

administration, communication, cooperation, problem solving, time management, and mentorship. Costs of this project are considerable; thus, project sponsors become an essential component of the team's success. Sponsors not only provide the team with much-needed funds and mentorship, but also provide product, technical advice, and public exposure.

David M. Petis, Assistant Dean  
External Relations, Faculty of Engineering  
University of Alberta  
E6-050 Engineering Teaching & Learning Complex  
Edmonton, AB T6G 2V4  
Tel: 780.492.5080 Fax: 780.492.0500  
E-mail: david.petis@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

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_/ expiry date: \_\_\_\_\_

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, 2005 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:	\$42.00	\$209.00	\$418.00	\$1,045.00

\* 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\*

\$ \_\_\_\_\_ Civil and Environmental Engineering Fund\*

\$ \_\_\_\_\_ 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 & Learning Complex  
Edmonton, Alberta T6G 2V4

01879