



THE
UNIVERSITY OF
BRITISH
COLUMBIA

ingenuity

Faculty of Applied Science
Engineering News

Proactive research for the triple bottom line

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Successful managers have learned that it's no longer enough to focus solely on financial results—they must also consider environmental and social indicators when measuring their company's performance.

Mining Engineering Associate Professor Bern Klein is conducting proactive research to help the mining industry meet this triple bottom line.

As a researcher with the Norman B. Keevil Institute of Mining Engineering (see pp. 8–9), Klein's study aligns closely with the institute's vision of leading education and research in an era in which mining assumes a more responsive and responsible role in the world.

At the Antamina mine in Peru, Klein is currently serving as project manager as well as conducting individual research on a \$4.4 million project funded by Teck Cominco Limited and the Natural Sciences and Engineering Research Council (NSERC).

Approached by Teck Cominco with the goal of helping to limit its long-term environmental liability, Klein is developing a model that can serve the entire mining industry and enhance Canada's reputation as a research leader across the globe. Liability associated with existing mine waste facilities is estimated at \$3 to \$5 billion in Canada.

Leaching of metals from waste materials is considered to be the main impact of mining on the environment. Although most research has focused on metal leaching from acidic rock drainage, the Antamina mine, like several Canadian mines, is surrounded by carbonate rocks producing alkaline rock drainage.

Under alkaline conditions, metals such as arsenic, molybdenum, and to some extent zinc, are soluble and therefore cannot be removed from mine effluent using



Bern Klein (centre) manages the waste rock research project at the Antamina mine in Peru. From left: Henri Letient, Compania Minera Antamina; Stephane Brienne, Teck Cominco; and UBC's Ulrich Mayer, Bern Klein, Ward Wilson and Mory Ghomshie.

conventional lime treatment processes. This is of particular concern at the Antamina site; located in the Andes, the mine is set in mountains that provide drinking water for approximately 3,000 people living in local communities.

Klein is coordinating a team of five UBC researchers—Professors Ward Wilson, also from the Keevil Institute and Roger Beckie, Uli Meyer and Leslie Smith from the Department of Earth and Ocean Sciences—to develop a preventative waste management practice. Each researcher works on his own area of expertise—waste rock, geochemical modeling and groundwater hydrology.

The main objective is to provide an improved understanding of the long-term evolution of water quality and metal loading from the waste rock dumps as a function

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Message

from the Dean



Welcome to the fall 2006 issue of *Ingenuity*. In July, we were delighted to welcome Professor Stephen Toope as the 12th President and Vice-Chancellor of UBC. Prior to his appointment here, he served as President of the Trudeau Foundation, and before that as Dean of Law at McGill University. I have had the pleasure of meeting with Stephen on a number of occasions. We are excited by his arrival to UBC, and are confident that he will serve as president with great distinction and that the Faculty of Applied Science will benefit significantly from his leadership. Welcome President Toope!

The formal opening of the Norman B. Keevil Institute of Mining Engineering took place on May 3, 2006. The opening ceremony brought together government representatives, UBC dignitaries, industry partners, faculty, alumni, students and friends who celebrated the historic moment with the Keevil family. The unprecedented \$7.5 million gift from Teck Cominco and partners will help UBC Mining achieve its commitment to being a leader in education and research in a new era where mining assumes a more responsive and responsible role in the world. For details of the gift and the celebrations, please see pages 8 and 9.

At the UBC Okanagan campus, the School of Engineering continues to expand. We have recently appointed the School Director, Dr. Spiro Yannacopoulos, and six other new faculty members. And 104 new students began *Engineering One* this year, as other students advanced to *Engineering Two*. As well, construction will soon commence on a building that will house the school and will include state-of-the-art facilities to advance engineering learning and research. Please see the facing page for details.

We are also pleased to unveil our new UBC Engineering logo in this issue. You will likely see it appear in various places, including on our website. This is an important element of the branding of our Faculty. Engineering students and alumni have long associated with “engineering red.” Our new logo incorporates this colour, and is simple, clean and catchy—an entirely appropriate representation for engineering at UBC. Thank you to our Communications Manager, ErinRose Handy, for leading the development and implementation of the new logo.

I am sorry to end this message on a sad note. As reported on page 14, the Faculty mourns the tragic loss of three young lives.

Kyle Donohoe, Nathan Hughes and Garreth Thomas, all undergraduate students in our programs, passed away in separate vehicular accidents during August and September 2006. The rapid succession of these young lives being cut short cannot but give us pause for reflection and remind us of the fragility of life.

As engineers, we have a strong tradition of service to the community. Among other things, we are charged with the responsibility of developing our safety codes, building our cities and transportation systems, and providing as safe an environment as possible for our communities. At times like this, we are impelled to embrace these values ever more tightly, so as to ensure a safer world for us all. On behalf of our Faculty, I extend sincere condolences to the families of Kyle, Nathan and Garreth.

As always, please contact me—by letter, telephone 604-822-6412, fax 604-822-7006 or e-mail dean@apsc.ubc.ca—if you are able to assist in the development of the Faculty, if you have any suggestions to provide or if you would like further information on UBC Engineering.

A handwritten signature in black ink that reads "Michael Isaacson". The signature is written in a cursive style and is underlined with a single horizontal line.

Michael Isaacson

Dean

To view past issues of *Ingenuity* and learn more about the Faculty, visit our website at <http://www.apsc.ubc.ca/publications/engineering.html>.

On the road to success

Positive attitudes, honest communications and community support fuel the School of Engineering

What would prompt a materials engineer to move his family from the prairies to Kelowna and leave behind 20 years of successful teaching, research and upper university administration?

“Being part of a newly established engineering school at a world-renowned university is an opportunity that doesn’t come often,” says Spiro Yannacopoulos, Director of the School of Engineering at UBC Okanagan.

“I’m excited to be part of making the school one of the finest in Canada.”

Yannacopoulos comes to the School of Engineering from the University of Saskatchewan where he has worked since 1986. Most recently Associate Dean of Graduate Studies and Research, he has also held positions as Department Head and Professor of Mechanical Engineering. An accomplished researcher, he investigates the engineering properties of steel and aluminum.

One of the greatest challenges Yannacopoulos faces in his new role as director is meeting the expectations that the new school will immediately produce the same high-quality education and leading-edge research established at the University of British Columbia over the past 90 years.

“By communicating openly and showing we are working towards this goal, we can meet the challenge,” he says.

In daily operations Yannacopoulos plans to create an encouraging environment that allows others to rise to their full potential. Foremost, he firmly believes in the power of positive thinking and its contagiousness.

“You have control of your attitude and it affects every interaction,” he says.

In helping others attain their goals, Yannacopoulos uses a three-part philosophy: first, recognize their passions, talents and motivations; second, work to create a respectful environment that fosters individual qualities; and third, make decisions that will not negatively impact others.

Yannacopoulos employs this strategy for leading all those involved with the School of Engineering—faculty, staff and especially students; he insists student interests be paramount in decision-making.

“The measure of our success depends upon how our students view their education and how well the business community considers them trained as engineers. Alumni and employer satisfaction will be key indicators of our success,” he says.

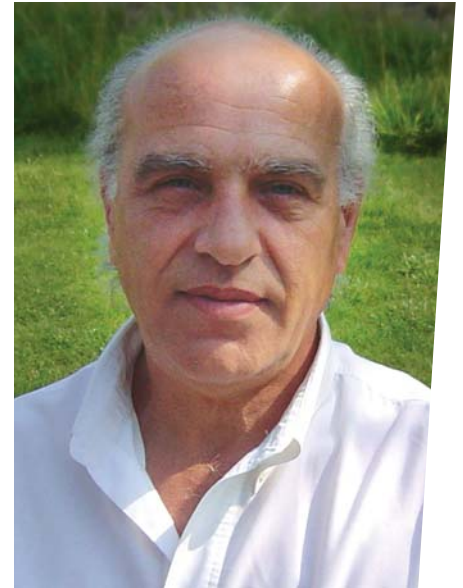
Helping students succeed and develop into professionals is Yannacopoulos’ greatest satisfaction.

His connection with tomorrow’s professionals will also benefit the School of Engineering. He recognizes and appreciates the support the professional community provides—especially the UBC Okanagan Partnership and its Engineering Advisory Council.

Extending gratitude to UBC alumni and administrators for supporting the school, the new director specifically thanks local engineers Dick Fletcher and Jack Van der Star, former Applied Science Dean Martin Wedepohl, as well as UBC’s former Deputy Vice Chancellor Barry McBride and Dean Michael Isaacson for their vision, dedication and guidance as well as their work to create an innovative program.

Beginning with *Engineering One* and *Engineering Two*, students in each year take a common curriculum and learn basic interdisciplinary engineering principles with an emphasis on project-based, team learning.

Following second year, students specialize in civil, electrical or mechanical engineering and can opt to participate in Engineering Co-operative Education, which integrates academic



Director Spiro Yannacopoulos.

study with supervised work experience.

With 104 new students, the school recently hired seven additional faculty members and a laboratory manager. The school now comprises 148 students, 15 faculty members—including Yannacopoulos—and three staff. UBC Okanagan also has a dedicated engineering co-op coordinator and a development officer.

The school also offers Master of Applied Science, Master of Engineering and Doctor of Philosophy programs. With expertise in civil, electrical and mechanical engineering, faculty research includes microelectronics, wireless location and transportation planning. (For new faculty research interests, see p.15.)

With estimated completion fall 2008, the School of Engineering’s new facilities are currently being built on the east end of campus and will provide ample space for learning and research.

Engineering programs re-accredited

The Faculty is pleased to announce that all eligible programs have received re-accreditation from the Canadian Engineering Accreditation Board (CEAB).

The CEAB, a standing committee of the Canadian Council of Professional Engineers (the national organization of 12 provincial and territorial associations that regulate the practice of engineering and license engineers in Canada), serves to evaluate the nation's undergraduate programs to ensure they meet or

exceed standards for educating professional engineers in Canada.

"We're delighted to receive the positive feedback from the accreditation committee," says Associate Dean Perry Adebar, who managed the accreditation review. "The CEAB holds engineering programs to the highest standards of professionalism, and we are proud to meet their requirements."

Each program completed a detailed questionnaire prior to the CEAB's visit last November. During their visit, the team examined the academic and professional

quality of faculty members, adequacy of laboratories, equipment and computer facilities, as well as the quality of student work. It also performed a qualitative and quantitative analysis of the curriculum to meet CEAB standards.

All of our eligible undergraduate engineering programs—Chemical and Biological Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Physics, Geological Engineering, Integrated Engineering, Materials

Engineering, Mechanical Engineering and Mining Engineering—received accreditation.

The accreditation decision for the UNBC/UBC Environmental Engineering Program will be made in June 2007 as this newer program will complete its first cycle this fall.

A special thank-you goes out to all those who prepared for the CEAB review and to the CEAB for ensuring quality standards of engineering education across Canada.

Proactive research for the triple bottom line... [Continued from page 1](#)

of pile structure and composition. On the basis of this study, they will develop proactive waste management strategies to minimize long-term environmental impact and mine liability.

Additionally, the team plans to develop closure strategies for the mine.

"It's a great team to work with—technically strong and communicative," says Klein. "The challenge lies in managing an international research project of this scale with five different investigators. It's very different than managing a single project within my own lab at UBC."

Klein's individual research focuses on how weathering affects minerals in the rock. With waste rock from 25-ton test piles, Klein runs 30 lab-scale experiments, each containing about 200 litres of rock in plastic drums. He uses an electron microscope with image analyses software to get quantitative mineral information from these samples. The mineral analyses helps Klein build descriptive models for predicting how minerals will leach.

"We must accurately predict how two rocks with the same chemical compositions will react differently to weathering so we can correctly classify waste rock as either clean or dirty," says Klein. "It's imperative for maintaining a clean water supply."

Mineralogical factors such as variation in the rock, grain size and location of metals disseminated

throughout the rock or along fracture planes determine whether or not metals will leach.

Mineralogic characterization will be performed using Teck Cominco's Mineral Liberation Analyzer. Developed in the mineral processing field, the analyzer provides quantitative mineralogical information for factors that are also important to mineral weathering.

"This is an excellent project on many levels," says Klein, "for industry, for Canada and for me personally."

Teck is taking the lead to be an exemplar of corporate citizenship—demonstrating that the organization cares about the community in which it operates. And the project provides an opportunity for researchers and the Canadian mining industry to be more proactive in our mine waste and to be international leaders in practice."

On the personal level, the project not only allows Klein to utilize his extensive metallurgical industry experience, but it also allows him the opportunity to travel to Peru and learn about a country shaped by unique environmental, historical and cultural factors.

In developing this proactive research plan to aid industry in corporate citizenship, Klein has also learned valuable lessons in global citizenship from which we can all benefit.

"There are many factors that shape the local perception," says Klein. "It's a marvelous opportunity to become aware of these influences and therefore to be more considerate in our interactions."

New at UBC: Biomedical Engineering

Undergraduate option and graduate degree programs

Biomedical engineering—combining engineering, medicine and life sciences to improve healthcare—is a field of study now offered by Applied Science.

With over 30 faculty members involved in biomedical engineering, UBC provides a strong network for collaborative learning and research.

Four engineering departments—Chemical and Biological, Electrical and Computer, Mechanical, and Materials—offer undergraduate and graduate courses in the burgeoning field, and Applied Science collaborates extensively across campus and with industry on research projects.

For the first time this fall, the Department of Electrical and Computer Engineering will be enrolling approximately 30 undergraduate students in the Biomedical Engineering Option. In addition to gaining core competency in fundamental electrical engineering topics, the option allows students to delve into specific topics concerning biomedical engineering and explore the applications of engineering to medicine and biology.

The three-year undergraduate option begins in second year and topics of study include imaging tools for diagnostics and therapy, bio-instrumentation, micro-implantable devices, assistive device develop-

ment, as well as important issues in medical device standards and safety.

“This is a unique opportunity for undergraduates,” says Electrical Engineering Associate Professor Robert Rohling, coordinator of the option. “It allows students to gain early experience and comprehensive knowledge of biomedical engineering. They can also apply their new skills through project-based learning and cooperative education. These students will be in high-demand as B.C.’s biomedical industry flourishes.”

At the graduate level, the new Biomedical Engineering Program offers the course-based Master of Engineering (M.Eng.) and the research-based Master of Applied Science (M.A.Sc.) and Doctor of Philosophy (Ph.D.) degrees.

The graduate program emphasizes a balance of biomedical engineering and life science study with a focus on clinical and industrial application.

Designed to provide graduates with a breadth of knowledge in life science, clinical practice and biomedical engineering, all research projects focus on healthcare applications such as bioreactors for pharmaceutical products, prevention and treatment for bio-mechanical injuries, bio-compatible coatings for medical instruments and medical imaging for diagnostics.

The program will also be hosting the Grand Round Seminar Series. Open to all, it provides an opportunity to network with and learn from researchers at other universities with a broad diversity of interests.

“Our goal is to create better and novel engineering-based solutions for healthcare,” says Program Director and Chemical and Biological Engineering Associate Professor Ezra Kwok, M.D.

Kwok understands the complementary roles of engineering and healthcare. A professor in Chemical Engineering since 1995, he took a leave of absence in 2001 to study medicine at McMaster University and returned last year to help create the program.

“What became clear to me during medical school is the very different approaches physicians and engineers take towards solving similar problems,” says Kwok. “That’s why we’ve designed our program to work with physicians as well as experts in chemical, electrical, mechanical and materials engineering, so graduates will be well equipped to tackle a problem from various angles.”

The Biomedical Engineering Program recently received a generous boost from Electrical Engineering Professor Emeritus Charles Laszlo and his wife Doreen Laszlo. They donated



Trasi Jang

Ph.D. student Julian Guerrero holds a sensorized ultrasound probe used to screen for blood clots. The screening system was engineered at UBC under the supervision of Electrical and Computer Engineering Professors Tim Salcudean and Jim McEwen.

\$500,000 towards the creation of the Charles A. Laszlo Professorship in Biomedical Engineering—the first professorship for the program. The Faculty is committed to building the professorship endowment to \$1 million with the help of industry, alumni and friends. Further details of the professorship will be provided in the next issue of *Ingenuity*.

Faculty Development

Industry and individuals make a difference



Thanks to the continued generosity of industry, alumni and friends, we are celebrating many gifts in support of education and research.

In May, the Faculty announced an unprecedented \$7.5 million gift from Teck Cominco, the Hallbauer Family Foundation, AMEC and others to create the

Norman B. Keevil Institute of Mining Engineering.

Individual donors are also a vital part of these celebrations. The Faculty was pleased to honour the contributions from valued alumni and friends such as the \$300,000 gift from Ken Spencer and a \$100,000 gift from John DeForest.

Donating a personal gift is now easier than ever.

In the May 2, 2006 federal budget, the government announced the elimination of the capital gains tax on such donations; this means even more tax savings for donors.

On behalf of UBC, Applied Science and its Development Office, I would like to express our sincere appreciation for

the generous support from industry, alumni and friends.

If you would like to find out more about priority projects or the capital gains tax changes, please contact me at 604-822-1329 or hillary.gosselin@ubc.ca.

Hillary Gosselin
Director of Development

Shell Canada enriches student education

With back-to-school events drawing to a close, there was still plenty to celebrate on September 19 as students joined representatives from Shell Canada Limited and Dean Isaacson at the launch of the Shell Canada Student Development Fund, created from a \$400,000 gift from the industry partner.

Part of Shell's Campus Ambassador program—a significant investment of Shell people, time, energy and money in post-secondary education at select universities across Canada—the fund will benefit students through several initiatives, including guest lectures, field trips and project courses that connect them with professionals through mentoring and advising.

The Campus Ambassador program was established under the direction of Shell President and CEO Clive Mather and intends to support student-focused programs and enhance opportunities for students and faculty members to form connections with Shell professionals.

UBC is both pleased and proud to be among the first Canadian schools selected by Shell to participate in the program, which aims to develop and attract the best and brightest recruits in the years to come.

Dean Isaacson thanked Shell for its continued support of UBC and also gave a special thanks to the four Shell Campus Ambassadors—Brian Davis, Kim Code, Shelly Zwicker and Rob Dargewitz—who will be liaising with students and faculty members throughout the program.

Brian Davis (B.A.Sc. '76) noted that Shell is honoured to be associated with UBC and its strong academic programs. Mr. Davis said he is looking forward to Shell's commitment to support undergraduate student initiatives at UBC as well as mentoring and advising students as a Campus Ambassador.

Many engineering, business and science students who will benefit from the Student Development Fund over the next three years joined in the celebration. President of the Engineering Undergraduate Society Ryan Clare spoke on behalf of engineering students, thanking Shell for the invaluable relationships and opportunities that will develop through these initiatives.

"Industry interaction is so important to undergraduate students," said Mr. Clare. "The insights into professional roles and the contact with mentors and leaders in the field are extremely beneficial at this point in our careers."

The Faculty of Applied Science and UBC are thankful for the initiatives supported by the Shell Canada Student Fund and are proud to be a part of the Shell Canada Campus Ambassador program.



From left: Dean Michael Isaacson, EUS President Ryan Clare, Shell General Manager and Campus Ambassador Brian Davis and Mining Head Malcolm Scoble celebrate the Shell Campus Ambassador program.

Ken Spencer

Entrepreneurship Project Room opens

Dr. Ken Spencer (B.A.Sc. '67, Ph.D. '72), an esteemed alumnus and long-time friend of the Faculty and co-founder of Creo, was honoured on October 10, 2006, at the official opening of the Ken Spencer Entrepreneurship Project Room.

The current Chair of the Electrical and Computer Engineering Advisory Committee, Dr. Spencer donated \$300,000 to create the project room for engineering and business students.

Many friends and members of the Faculty attended the opening to celebrate the new space dedicated to collaborative engineering work and entrepreneurship, two topics dear to Dr. Spencer's heart. Dr. Spencer spoke of the importance of bridging the gap between technological innovation and the entrepreneurial expertise needed to bring new technologies to market.

UBC engineering and commerce students joined in the celebration as the Ken Spencer Entrepreneurship Project Room will house New Venture Design—a course offered jointly through the Faculty of Applied Science and the Sauder School of Business.

Dean Isaacson thanked Dr. Spencer for his generous financial support and his continued involvement in Applied Science initiatives. He spoke of the benefit of having committed and involved alumni such as Dr. Spencer whose widespread support of education is valuable to both students and faculty.

The Faculty of Applied Science thanks Dr. Spencer for his continued support and counsel as well as his donation to create the Entrepreneurship Project Room. His exceptional work, generosity and career serve as an inspiration for the Faculty and our students.

Dean Isaacson (right) presents a thank-you gift to Dr. Spencer.



John DeForest — a lifelong philanthropist

When John DeForest returned from his six-year WWII stint with the Royal Canadian Air Force, he had a choice of university tuition or land as compensation for his service. A demonstrated mechanical aptitude and a wife from British Columbia led Mr. DeForest to choose the tuition benefit and UBC's Department of Mechanical Engineering.

Mr. DeForest worked hard to earn his B.A.Sc., and after graduating in 1951, returned to aviation at CP Airlines. He enjoyed his 32-year career there where

he took on many roles and retired as Manager of the Engineering Department.

Mr. DeForest credits much of his life's achievement to hard work and good choices like the one that brought him to UBC.

He has celebrated his successes with acts of generosity and kindness such as his recent choice to give back to his alma mater with a \$100,000 gift of shares. His generous gift has created the annual \$5,000 John DeForest Bursary in Mechanical Engineering, an excellent

opportunity to assist students in financial need.

Generosity is something Mr. DeForest is very familiar with. In addition to his gift to UBC, he assembles and sews handmade teddy bears for individuals and children who are in times of duress—a tradition first started by his late wife Hazel. When he's not sewing teddy bears, Mr. DeForest is an avid community volunteer who was recently honoured by the Association of Professional Engineers and Geoscientists of B.C. and the City of Burnaby.



John DeForest makes teddy bears for those in need, one of his many generous deeds.

The Faculty of Applied Science is grateful to have the generous support of alumni like Mr. DeForest and takes great pleasure in sharing their stories and profiling their contributions.

\$7.5 million gift establishes the Norman B. Keevil Institute

Teck Cominco Limited, industry and friends provide support

“If you can’t grow it, you have to mine it.”

Dr. Norman B. Keevil on the importance of mining

Thanks to a \$7.5 million gift from Teck Cominco and friends, the Norman B. Keevil Institute of Mining Engineering was officially launched on May 3, 2006.

This extraordinary gift was donated in support of UBC Mining Engineering, and the Keevil Institute was named in honour of Dr. Norman B. Keevil to recognize his many outstanding contributions to Canadian mining.

In addition to establishing a fitting legacy for Dr. Keevil’s work, the donation from Teck Cominco will

Teck Cominco President and CEO Don Lindsay proudly announces the Norman B. Keevil Institute of Mining Engineering.



Martin Dee

boost the education and research capacity of UBC Mining Engineering and leverage further funding from government and private sources.

To recognize the unprecedented investment in the future of mining engineering education and research at UBC, more than 100 members and friends of the Faculty attended the May 3 event held in the Fred Kaiser Building. The announcement was followed by a luncheon hosted by UBC President Martha Piper at her campus residence for donors, dignitaries and special guests.

In attendance at the announcement were B.C. Minister of State for Mining the Honourable Bill Bennett, President Piper, Teck Cominco President and CEO Don Lindsay and honouree Dr. Keevil; each joined Dean Isaacson in speaking about the impact of the support provided by Teck Cominco and the legacy and inspiration of the Keevil name within Canadian mining. Other supporters of the Keevil Institute joined the celebration, such as the Hallbauer Family Foundation and AMEC, as well as several individual donors and special guests.

Dr. Keevil spoke of the prestige and honour of having one of the world’s leading mining schools bear his and his family’s name. He has been a leader and advocate for Canadian mining for over 40 years, and the Faculty is mutually honoured to be represented by the Keevil name.

Optimism and confidence in the future of mining was a recurring theme of the event. “Mining is not a sunset industry; it is absolutely essential to everything we do,” stated Minister Bennett.

Like her fellow speakers, President Piper spoke of the important role mining will play in the future. She acknowledged its influence on the new economy and how the Keevil Institute will prepare the global citizens of tomorrow and meet the increasing demand for skilled professionals in the industry. In closing, she thanked Teck Cominco for its inspired commitment to the University of British Columbia; Dr. Keevil for the prestige and honour his name brings to UBC; Mr. Lindsay for his leadership and confidence in UBC; and the government for its ongoing commitment to education and the citizens of British Columbia.

On behalf of Teck Cominco, Mr. Lindsay was proud to announce the Norman B. Keevil Institute for Mining Engineering in honour of Dr. Keevil’s unprecedented contributions to the Canadian mining industry. He also acknowledged the prestige the Keevil name carries.

The Keevil family name has long been associated with the academic world and Norman B. Keevil comes by his academic strengths honestly. His father (Dr. Norman



Martin Dee

Speakers and honoured guests unveil the building plaque. From left: UBC President Piper, Teck President and CEO Mr. Lindsay, Dean Issacson, Dr. Keevil, Mrs. Keevil and Minister Bennett.

of Mining Engineering

Keevil Sr.), through airborne surveys, made some stunning discoveries and went on to become the cornerstone of the Teck Corporation.

Minister Bennett concluded his speech with an assurance of government support for this initiative and stated, “given the shortage of skilled people, it is incredibly important to the future of the province to encourage young people to take over from pioneers like Dr. Keevil.”

Dean Isaacson extended his personal thanks to all the donors that contributed to the \$7.5 million, including Teck Cominco Limited, Hallbauer Family Foundation, AMEC, David Thompson, Silver Standard Resources Inc., Robert Quartermain, Steven G. Dean and Dr. Klaus M. Zeitler.

In addition to recognizing the outstanding industry and donor support, he gratefully acknowledged the many people who worked hard to realize the naming of the Keevil Institute and the gift that made it possible.

Hallbauer

In recognition of Robert E. Hallbauer’s (B.A.Sc. ’54) lifetime achievements and contributions to the Canadian mining industry, the Hallbauer Family Foundation has created the Robert E. Hallbauer Chair in Mining and Sustainability within the Keevil Institute. The late Hallbauer’s immediate family—wife Joan Hallbauer, son Russell Hallbauer and daughter Cathy Barron—initiated the generous support through a \$625,000 donation from the foundation.

Mr. Hallbauer has been recognized for his integrity, leadership and technical accomplishments in the mining industry for over 30 years.

His career has been highlighted by many accolades and awards. He developed several mines and has successfully led some of the world’s largest mining companies.

UBC is honoured by the support of the Hallbauer Family Foundation and the level of recognition this initiative brings to a UBC alumnus who is a symbol of success in Canadian mining.

Mr. Robert E. Hallbauer.



Martin Dee



Dean Isaacson thanks Dr. Keevil for his support of UBC mining research and education and his dedication to the mining industry.

The Faculty is pleased to have the support and resources needed to advance the capacity of Mining Engineering at UBC and is proud to be associated with the achievements and distinction of Dr. Keevil.

AMEC

AMEC, B.C.’s largest project management and engineering services company, created the AMEC Classroom in the new Norman B. Keevil Institute of Mining Engineering with a \$250,000 donation.

Vice President and General Manager Bob Stanlake (B.A.Sc. ’71) represented AMEC at the event as one of several UBC alumni who are committed to ensuring UBC has the capacity to equip the mining industry with the skilled engineers that are in demand.

The new AMEC Classroom is on the fifth floor of the Frank Forward Building and will officially open in October 2006. The AMEC Classroom will offer modern teaching and learning resources to students and faculty to support the growth and advancement of Mining Engineering at UBC.

AMEC Vice President and General Manager Bob Stanlake (left) congratulates Dr. Keevil and thanks him for his contributions to mining.

Martin Dee



Alumni update

2006 has certainly been an exciting year with all kinds of changes and developments both at UBC and within the Faculty by way of new academic buildings, student and residential housing, innovative research and new programs.

We encourage you to visit to find out more about what has been happening at your alma mater since your graduation.

In July of this year we were happy to welcome our new President Stephen Toope and look forward to even more exciting developments and changes.

UBC Alumni Affairs has been tirelessly planning, redesigning and implementing ways to better deliver services—not just to clusters or groups of alumni, but to each and every one. I am sure you will hear of these changes in the near future.

As always, I continue to seek ways to engage you in the enhancement of Applied Science and ways to better serve you. I would love to hear any suggestions you might have.

If you would like to organize a class reunion, mentor a student or otherwise connect with our students and faculty members, please do not hesitate to contact me by phone at 604-822-9454 or by e-mail at mcordeiro@apsc.ubc.ca.



May Cordeiro

Alumni Relations Officer

2005—2006 Event Highlights

CHML '75—30th Reunion— December 2005

The Chemical Engineering Class of 1975 had its 30th-reunion dinner in December. Classmates attended from as far away as Hinton, Alberta, Wales and Kazakhstan!



CHML '75, back row from left: Paul Johansen, Ben Lee, Ed Wong, Dennis Johnson, Tito Chiang, Ken Karlstedt. Front row from left: Bruce Der, Rick Smith, Glenn Chiga, Ron Rosmer (photo and caption provided by Bruce Der).

CIVL '86—20th Reunion— April 7–8, 2006

The Civil Class of 1986's 20-year reunion was a great success with almost 50 grads (60% of the class!) attending the various weekend events. These included a pub night at Steamworks in Gastown, golf and dinner at Grouse Mountain.

Classmates came from as far as Jakarta, Indonesia to make the special event. Class reunion volunteer Allan Russell sent a special thank-you message to all that attended. "It was wonderful to get together with everyone again and reminisce, talk about our families, and compare waist and hairlines.

Thanks again to our corporate sponsors without whom we could not have hosted such a successful event. And a big thanks to our reunion committee (list of sponsors and committee members available on the website below)."

For a full photographic review of events, please visit <http://construction.civil.ubc.ca/civil86/>

Calgary engineering alumni and friends reception—June 15, 2006

Dean Isaacson hosted the annual reception for Calgary engineering alumni and friends at the Sheraton Suites Calgary Eau Claire. Attendees learned about UBC and Applied Science developments in the areas of research, students and infrastructure.

A few students currently in Calgary on Engineering Co-op work terms shared their experiences. Interesting discussions ensued between the dean, guests and students.

CIVL '66—40th Reunion—June 16, 2006

Alumni met with current Civil Engineering Head Eric Hall and other faculty members for an informal lunch followed by a department tour.

A thank-you message to Hall and faculty members from Jim Mutrie noted that all in attendance enjoyed seeing the current state of civil engineering education and research. “We all value the education we received at UBC and, as expressed by one class member who has worked around the world, feel it was as good as you could get anywhere.”

EECE '60-'00—August 10, 2006

EECE alumni from the classes of 1960–2000 living in and around the Lower Mainland gathered for another successful reunion—the seventh one this year! Besides a lot of chatter and sharing of memories, guests received an update of activities by Department Head Vijay Bhargava. One of the department’s successful alumni, Ken Spencer (founder of Creo) shared memories of his days on campus and his career.

EECE Department Head Vijay Bhargava chats with guests.



Calgary alumni join together for festivities and Faculty update.



CIVL '66 alumni enjoyed their reunion and wear their Reds with pride.

EECE alumni enjoy a scrumptious buffet.



**CHML '66—40th Reunion—
September 9–10, 2006**

Among those in attendance, consensus was that the 40th reunion was as good as, if not better, than those held before. Activities included a tour of the new Chemical and Biological Engineering Building, a dinner cruise to Bowen Island, Sunday brunch at the Watermark on Kits Beach and a Thai dinner overlooking False Creek. At the end of the weekend the class granted Peter Hemmes, the event organizer, tenure for the A.I.Ch.E. Social Coordinator position he held in 1966! Photos of events can be viewed at: www.apsc.ubc.ca/alumni/engg_reunions.

**BASc '56—50th Reunion—
September 29–30, 2006**

2006 is a very special year for the graduating class of 1955. In the annual tradition, the Dean of Applied Science hosted this 50th-reunion group to a two-day celebration. The reunion included a private lunch at the UBC Botanical Gardens where Civil Engineering Head Eric Hall provided interesting trivia from 1956, updates on UBC and Applied Science developments and led a lively question-and-answer session.

A vast majority of attending alumni had neither seen each other nor been back to campus since graduating. This provided a perfect opportunity to reconnect, share career and life stories, and meet faculty members.



Above: BASc Class of '56 and guests lunch at the UBC Botanical Gardens' Reception Centre.



**BASc '66 and '76—40th and 30th Reunions—
September 30, 2006**

BASc Classes of '66 and '76 (left) along with their guests enjoyed a reception in the Faculty Lounge of the Civil and Mechanical Engineering Building. EECE Head Vijay Bhargava provided the guests with UBC and Applied Science updates.

Upcoming Events

Below is a list of upcoming 2006–07 functions. The BASc '47 (a survey has been mailed; if you have not received one, please contact me at the number below), MECH '57 and MECH '87 reunions are currently in the planning stage. Details will be posted at www.apsc.ubc.ca/alumni/engg_reunions.htm.

Class	Date	Events
CIVL '71	Saturday, November 4, 2006	Meet at Koerner Pub for a drink followed by campus tour. Dinner to follow in the Penthouse of the Graduate Student Centre
Old Red New Red	Wednesday, February 7, 2007	Wine and cheese reception, network with students and view ball models display

If you have questions or would like to be involved in organizing your reunion, please call 604-822-9454 or e-mail mcordeiro@apsc.ubc.ca.

Concrete research

Fixing the cracks in our infrastructure

Concrete, the ubiquitous building material, needs diligent maintenance to ensure its structural stability. The dependability of our infrastructure has become a critical issue in Canada due to severe steel corrosion in concrete, changes in code provisions, increases in design loads and poor maintenance.

As Canada Research Chair in Infrastructure Rehabilitation and Sustainability, Civil Engineering Professor Nemkumar Banthia is developing innovative and cost-effective rehabilitation techniques for concrete maintenance and strengthening.

His research revolutionizes Canada's infrastructure regeneration by using

environmentally friendly materials and processes to substantially reduce the cost of repair.

Because cement production significantly impacts the environment—the production of one ton of cement releases nearly a ton of carbon dioxide and greenhouse gases—there is an urgent need for a green solution. Current repair materials use large amounts of cement, and Banthia is developing durable repair materials that consume less cement and instead use large amounts of industrial by-products.

Another of his repair materials involves the novel use of recycled aggregate in shotcrete—a popular, cost-effective technique in

which concrete is sprayed.

These innovations provide two environmental benefits; they reduce greenhouse gas emissions caused by cement production and reduce waste concrete in landfills.

The second element of Banthia's research focuses on a highly innovative technique of structural strengthening using sprayed, fibre-reinforced polymer, a cost-effective method that he pioneered at UBC.

While Banthia's research helps guarantee a functional and safe infrastructure for the future, his work has many additional benefits. These innovations not only save resources domestically, but provide a competitive edge in the emerging global



Nemkumar Banthia studies concrete repair materials at the microscopic level.

market of concrete infrastructure regeneration—valued at more than \$1 trillion.

The federally funded Canada Research Chair program aims to advance research domestically. Since the program's inception in 1997, UBC has been allocated 165 chairs. Banthia is Applied Science's most recent CRC appointment.

Engineering esprit de corps

Team spirit underlying an academic program?—sounds like an unlikely combination, but not at UBC Engineering.

Many UBC Engineering students share in experiences often reserved for elite collegiate athletes. Training, practicing, traveling, cheering, fundraising—not to mention long hours in preparation for the 'big event'—all enhance our students' experience and help define their collective spirit.

"Participating in extracurricular activities is an extraordinary opportunity to complement academic work," says Associate Dean Bruce Dunwoody. "The skills, attributes and network students gain by preparing for and participating in engineering competitions is invaluable for career and life success."

With more than two dozen active teams, extensive opportunities exist for students to join a competitive group that piques their interests.

Within the last year, many engineering teams have had phenomenal success and two have enjoyed international media coverage.

In the first-ever NASA Space Elevator/Beam Power Competition, UBC's Team SnowStar was voted most likely to succeed in 2006 and has been covered in *Maclean's*, the *New York Times* and many other outlets.

UBC's Supermileage Team placed first for the fourth year in a row in the SAE Supermileage Competition in Michigan. The team's record 3,145 miles per gallon along with its tips for achieving high-fuel efficiency have been featured world-wide. The team recently traveled to Japan to compete in Hiroshima Supermileage; the experience provided students with a rare opportunity to exchange ideas with others from across the globe.

To help ensure future success and collaboration among teams, the Faculty has established the Engineering Student Team Council (ESTC), which serves as a liaison between teams and administration, coordinating and promoting shared activities and interests.

"Students come and go, so this provides infrastructure that will be sustainable from year to year," says ESTC Chair and SnowStar Leader Steve Jones.

Go team; go UBC Engineering!

In memoriam

Michael Beddoes (1924–2006)



Professor Emeritus Michael Beddoes passed away peacefully July 5, 2006. A faculty member in the Department of Electrical and Computer Engineering since 1956, a pioneer in signal processing and communications, and a talented musician, he will be greatly missed.

Although officially retired since 1989, Professor Beddoes continued his research through the spring of this year.

In Canada, holding a Natural Sciences and Engineering Research Council of Canada (NSERC) grant is the mark of an active and successful researcher, and Professor Beddoes held one until his death. In fact, at the age of 82, he was the most senior researcher in Canada holding an NSERC grant.

His expertise encompassed many aspects of electrical and computer engineering, including electronics, circuits and system theory, speech and signal processing. He was an outstanding scholar who contributed to both theory and hands-on applications.

In the early sixties, when small, relatively low-cost computers became available, Professor Beddoes was among the first to recognize that the technology had enormous potential for assisting those with

speech or hearing difficulty in communicating. His research led to the development of devices to convert written text into comprehensible sound, an innovation that for the first time allowed those unable to read text to have access to written material. At the forefront of signal processing and communications, his research consistently had important human applications.

Professor Beddoes' career was a happy alignment of his two great passions—engineering and music. He had a remarkable ability to share these passions with others through his research, teaching and piano playing. Throughout the years, many colleagues, students and friends enjoyed the music he played at department parties. It was music as it is meant to be—enjoyed by the participants and players—not as an exhibition to be listened to passively.

As a way of honouring Professor Beddoes, the Department of Electrical and Computer Engineering has established a memorial fund in his name. If you would like to contribute to the Michael Beddoes Memorial Fund, tax receipts are available for donations sent to:

MICHELLE ORR

UBC Development Office
500-5950 University Blvd.
Vancouver, BC V6T 1Z3

Phone: 604-822-8904
E-mail: michelle.orr@ubc.ca

Engineering Students

It is with great sadness that the Faculty announces the recent loss of three engineering students. Each third-year student died unexpectedly in separate vehicular accidents during August and September 2006.

Kyle Donohoe (December 1, 1986–August 7, 2006)

Kyle enjoyed UBC's Integrated Engineering Program and worked countless hours with his project team on a robotic bartender.

He looked forward to beginning his first co-op work term this fall and planned to become an architect.

Kyle will be remembered for his lighthearted disposition and laughter, his intelligence, his creative and artistic talents and his passion for motorcycle riding, snowboarding, beach volleyball, hockey and camping.

Nathan Hughes (March 18, 1984–September 3, 2006)

A Chemical Engineering student, Nathan had recently completed a co-op work term with Cominco Engineering Services Ltd.

Nathan will be remembered for his intelligence, consideration and kindness, as well as his sharp wit and sense of humour.

In his two years at UBC, his easygoing manner and quiet confidence earned him the respect and friendship of many.

A scholarship in Nathan's name will be arranged at a future date, and the Chemical Engineering Undergraduate Club is raising funds in his honour.

Garreth Thomas (March 26, 1985–September 14, 2006)

A Mechanical Engineering student, Garreth was active in the Mech 2 community and spent this summer sharing engineering with children through his co-op work term with *GEERing Up!*

Garreth's ready willingness to help others, sense of humour and positive attitude will be remembered.

An accomplished musician and composer, Garreth was active in his church, helping to lead the children's worship.

A memorial award is being created in Garreth's name. Donations can be directed to UBC Development Office c/o Michelle Orr (see above article for contact details).

Appointments

Applied Science

Ruth Derksen was appointed Instructor in the Centre for Professional Skills Development on July 1. She brings with her a background in rhetoric and linguistics. She conducts professional skills workshops and assists students with communication skills in various engineering courses.

Electrical and Computer Engineering

Alireza Nojeh was appointed Assistant Professor on August 1. His research interests span the areas of controlled fabrication, physics and applications of nanostructures, electron emission phenomena, electron microscopy and modeling of nanoscale systems.

Meeko Oishi was appointed Assistant Professor on July 1. Her research expertise is in hybrid and nonlinear control theory, human interaction with control systems, hybrid reachability, and modeling and control of biological systems.

Peyman Servati was appointed Assistant Professor on September 1. His expertise is in nano-structured semiconductors, nanocomposites and nanowires for electronic devices on rigid and flexible substrates.

Kenichi Takahata was appointed Assistant Professor on August 1. His research is in the area of micro/nano-machined devices and MEMS, with a focus on biomedical applications and their manufacturing technologies, including micro-electro discharge machining.

Mechanical Engineering

Nima Atabaki was appointed Instructor on May 1. His expertise is in heat and mass transfer, with applications to the conversion, storage and use of energy resources.

Jen-San Chen was appointed Associate Professor on August 1. His research expertise is in the area of dynamics and vibration, with focus on the vibration of rotating disks, structures under moving loads and modal testing techniques for miniature structures.

Ryozo Nagamune was appointed Assistant Professor on July 1. He is an expert in advanced control engineering theory, in particular robust control algorithms for servo control in hard disk drives.

School of Engineering (UBC Okanagan)

Julian Cheng was appointed Assistant Professor on July 1. His research focus is on communication theory in the fields of wireless digital communications, particularly related to fading and interference.

Jonathan Holzman was appointed Assistant Professor on July 1. His research expertise is on the integration of ultrafast photonics and nano-optics toward applications in optical switching and photonic logic devices.

Mina Hoorfar was appointed Assistant Professor on September 1. Her expertise is in the area of thermofluids, in particular surface thermodynamics and its application in biotechnology, surface engineering and fuel cell technology.

Homayoun Najjaran was appointed Assistant Professor on May 1. His research is focused on broad areas of mechatronics, specializing in robotics, sensor technologies and soft computing.

Deborah Roberts was appointed Associate Professor on July 1. She is an expert in the application of biological systems for aerobic and anaerobic degradation of contaminants from water, sediments and soil.

Rudolf Seethaler was appointed Assistant Professor on July 1. His research focuses on controlling the combustion process of internal combustion engines with very accurate and high acceleration electro-mechanical valves.

Spiro Yannacopoulos was appointed Professor and Director of the School on July 1. His areas of expertise are materials science and metallurgy, including the weldability, creep behavior and erosion-corrosion characteristics of steel, as well as structure-property relationships of aluminum alloys.

2006–07 UBC Okanagan School of Engineering faculty and staff.



Achievements

Chemical and Biological Engineering Professor **Kevin Smith** has been awarded the 2006 Medal for Distinction in Engineering Education from the Canadian Council of Professional Engineers.

Civil Engineering Professor **Nemkumar Banthia** has been appointed a Tier 1 Canada Research Chair in Infrastructure Rehabilitation and Sustainability.

Civil Engineering Professor **Jonathan Fannin** has been appointed a Visiting Erskine Fellow of the University of Canterbury.

Civil Engineering Professor and Dean of Applied Science **Michael Isaacson** has received (along with D. Fletcher, B. McBride, and M. Wedepohl) the 2006 Science and Technology Community Leadership Award from the Okanagan Science and Technology Council for establishing an engineering school in the Okanagan.

Civil Engineering Associate Professor **Loretta Li** has been appointed a Visiting Fellow of the Japan Society for the Promotion of Science.

Civil Engineering Assistant Professor **Sheryl Staub-French** has been appointed the Faculty's inaugural Bauder Professor in Engineering and Economics.

Civil Engineering Professor **Carlos Ventura** has received the 2006 Meritorious Achievement Award from the Association of Professional Engineers and Geoscientists of B.C.

Electrical and Computer Engineering Assistant Professor **Edmond Cretu** has been awarded (along with co-authors R. Woffenbuttle and L. Rocha) the Tudor Tanasescu Prize from the Romanian Academy for a group of papers in the field of microsystems.

Electrical and Computer Engineering Professor **André Ivanov** has been elected Fellow of the IEEE.

Electrical and Computer Engineering Professor **Resve Saleh** has been elected Fellow of the IEEE.

Electrical and Computer Engineering Professor and Director of ICICS **Rabab Ward** has received the 2006 R.A. McLachlan Memorial Award from the Association of Professional Engineers and Geoscientists of B.C.

Mechanical Engineering Assistant Professor **Mu Chiao** has received the 2006 Young Innovator Award from the B.C. Innovation Council.

Mechanical Engineering Associate Professor **Elizabeth Croft** has received the 2006 Award for the Support of Women in the Engineering Profession from the Canadian Council of Professional Engineers.

Mechanical Engineering Professor **Clarence de Silva** has received the Henry M. Paynter Outstanding Investigator Award from the Dynamic Systems and Control Division of the American Society of Mechanical Engineers.

Mechanical Engineering Associate Professor and Associate Dean Engineering Programs **Bruce Dunwoody** has received a 2006 Just Desserts Award from the UBC Alma Mater Society for his exceptional service to engineering students.

Mechanical Engineering Professor **Sheldon Green** has received the 2006 Award for Teaching Excellence from the Association of Professional Engineers and Geoscientists of B.C.

Mining Engineering Professor **G. Ward Wilson** has been appointed a 2006 Distinguished Lecturer by the Canadian Institute of Mining, Metallurgy and Petroleum.

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Departments, Schools and Programs

- Chemical and Biological Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Engineering Physics
- Environmental Engineering
- Geological Engineering
- Integrated Engineering
- Materials Engineering
- Mechanical Engineering
- Mining Engineering
- UBC Okanagan School of Engineering

Office of the Dean

- Business & Development Office
- Centre for Instructional Support
- Centre for Professional Skills Development
- Engineering Co-op Office
- Engineering Student Services

The Faculty participates in several research centres and laboratories including:

- Advanced Materials and Process Engineering Laboratory (AMPEL)
- Clean Energy Research Centre (CERC)
- Institute for Computing, Information and Cognitive Systems (ICICS)
- Michael Smith Laboratories
- NUS-UBC Applied Science Research Centre
- Pulp and Paper Centre

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