



Imperial ENGINEER

**SERIOUS ABOUT
CLIMATE CHANGE
90 YEARS YOUNG
ENGINEERING AND THE FUTURE**

ISSUE FOUR *SPRING 2006*

For members of The City & Guilds College Association and The Royal School of Mines Association

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COVER PICTURE: Steaming Mutnovsky volcano photographed on telephoto from Govely volcano in Kamchatka. Story Leah Glass, page 18.

Imperial ENGINEER

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The editorial board of *Imperial Engineer* reserves the right to edit copy for style and length.



Barry
Brooks

WITH THIS even more vibrant issue of *Imperial Engineer* – well done Bill, Lynn and the editorial team – you will receive the calling notice for CGCA’s AGM on 24 May. I hope that as many of you as possible can attend to meet my successor, John Banyard. My last two years as your president have gone quickly as we have bedded in the changes that were necessary with the formation of the Faculty of Engineering. Teresa is fully up to speed as our Chapter Manager – proving that we could not do without her.

Imperial Engineer is a good example of this collaboration, allowing us to communicate with C&GC and RSM alumni and with students and staff of today’s Faculty of Engineering which now has engineers of all specialisms.

Did you see the good news? May I take this opportunity to congratulate Past-President Sir Colin Terry on being awarded a Fellowship of Imperial College? He has been at the heart of what we have been doing to take CGCA, and the Chapter, into the 21st century.

As we continue to evolve, one change that seems sensible is to support the development of the departmental societies by nominating CGCA ‘departmental’ alumni representatives to provide advice and links between industry and those societies. For those who would like to play a role here, please contact Teresa.

Since the last edition of *Imperial Engineer*, we have provided several prestige events. Morton Neal’s reception and private viewing of the Dérain London paintings and other works of art at the Courtauld Institute of Art was enjoyed by nearly 200 of us. In March, 154 Guildsmen, Guildswomen and guests were entertained in the magnificent Ironmongers’ Hall for our Annual Dinner at which Lord David Ramsbotham spoke.

Before you turn the page, may I leave you with a question? Imperial is celebrating its centenary in 2007 (yes, I know that this is 10 years after CGCA’s) and we have been asked to generate ideas to mark the occasion. On the one hand, the College and the Faculty are looking for significant building projects, such as a modern Aero and Mech Eng building on Exhibition Road, and/or improved student common rooms, or a new Faculty students’ union office to replace the ex-store-room currently allocated to CGCU. But could we in CGCA fund something such as a CGCA scholarship, taking the work of the Old Centralian Trust one or two stages further? Such a scheme would show how our 110 year old Association can support engineering students of the 21st century in the most useful way. What do you think? Could you help – with funds and fundraising?



Roger
Clegg

PRESIDENTS REPORT

AS YOU will see from this edition of *Imperial Engineer*, it has been a busy time for both the RSM and the Association over the last few months with the Association Annual Dinner, the Christmas Ball and the Bottle Match. From my perspective, it is very encouraging to see that these events have had excellent turnout from both students and alumni reflecting the continuing strong bond between them. Part of the reason for this strength has been the efforts of the outgoing President of the RSM, Leah Glass and her team, who have been extremely diligent, professional and great fun during my first year as President. Many thanks and best of luck with your exams and careers. Saying that, I must welcome in the new President, Seb Turner – you’ve got big shoes to fill!

As I touched on in my last editorial, the membership of the RSMA is spread over 73 countries which represents some logistical challenges in keeping alumni informed and updated as well as I would like. As such, I have the pleasure to announce that the new RSMA website will be launched in early summer. I hope that it will provide a source of news and information (including *Imperial Engineer*) as well as being used by alumni to keep in contact with the RSMA and each other.

I finish with sad news of the death of Peter Harding earlier this year (see obituary page 27). A truly amazing man, he became President of Chaps in 1945, President of Mines and a member of Links a year later, a member of the 22 Club in 1946 and Imperial College President in 1947. I first met Peter in my first term of college in 1990. He was a perfect gentleman, drank me under the table, had an real zest for life, plus he knew all the words to Eskimo Nell. To me, if you had to define what it is to be an RSM Miner, I’d just mention Peter Harding.

FROM THE EDITOR

We are now well into our second year of Imperial Engineer and I am pleased to report that the feedback from our readers has been very positive. We are delighted with the number and quality of the contributions we are receiving, so please keep them coming! I have tried to thank each contributor individually but please accept my apologies if I have accidentally overlooked someone.

In addition, due to space constraints we have had to defer some material to the autumn edition so we ask for your patience.

In this edition, we have continued our energy theme with a look at the greenhouse gases issue. We will continue to examine this and other elements of the increasingly complex challenges that we face in reconciling our needs for energy with environmental sustainability.

Three requests before I conclude:

First, please keep up the contributions. This is a journal by its readers, for its readers.

Second, your Editorial Board needs new members. This great publication needs a succession plan.

Third, we need ideas as to how CGCA/RSMA can contribute to the IC Centennial to be celebrated next year.

Please send your ideas to Teresa Sergot.

It's a privilege serving as your editor and I look forward to your comments on this edition.

Bill McAuley

Alumni network to help students

ALUMNI are being called on to help current students, via email, with advice about working life.

Called the Occupational Network, it is being developed by the Careers Advisory Service and the Engineering Chapter. It will use a database to match a student's enquiry with the most relevant alumni contact. Emails will minimise the

time commitment for alumni. Current students could need information such as

- What is company X really like to work for?
 - How did you get to your position in the company?
 - What sort of job can I expect with my background?
- 'To ensure that the scheme is of most use to students we

will be asking alumni to complete a short questionnaire giving their academic, employment and contact details', says Teresa Sergot.

If you are interested in helping, contact Teresa in the Engineering Chapter office (t.sergot@imperial.ac.uk) for more about the scheme and for a copy of the questionnaire.

...and keep alumni in touch

THE NEW Interactive Alumni Services enables all alumni to quickly and conveniently update contact details and mailing preferences online.

This free facility also includes a 'Find a Classmate' service. It allows search for former classmates by name, course, years of study, department and faculty and can be used to email other Interactive Service users.

Once alumni have registered, they can also write a 'catch up' entry about themselves to let classmates and friends know what has happened since they left Imperial.

The Interactive Alumni

Services account is also being used by the Central Library to check an alumni's credentials. Having done so, up to six items can be borrowed at any one time. It gives members onsite access to the library e-resources

and reference collection.

The more alumni who register for the Interactive Alumni Services, the more valuable the services become for the entire alumni community. Sign up for your Interactive Alumni Services account today at www.imperial.ac.uk/alumni/interactive.

Cheers from Polish Club

RSMA's Annual Dinner was a great success with over 60 alumni and students gathered in the Polish Club 'We were particularly pleased to welcome Mike (Minerals) and Anne (Materials) Oxley', reports President Roger Clegg.

'John Reilly, who has had a

distinguished mining career over the last 35 years, most latterly with Rio Tinto, was guest speaker. In addition to recounting some humorous experiences, he also provided some pearls of wisdom from which I hope the attending students took some inspiration.'



You've got to hand it to them

TEN IN A ROW! Yes, RSM has brought the famous Bottle back to London for the 10th year in a row. This year's match (the 103rd) was one of the most comfortable wins for the Royal Miners in many years, with the boys dominating over Camborne for the entire match. The final score was a convincing 29:11. The whole weekend, which took place in Cornwall, was a huge success. Added to the ever-expanding Bottle Match programme this year was golf and female rugby. For full results and reports go to www.rsmonline.co.uk/bottle. The RSM would like to thank Tony Williams of the Dragon Group for his generous sponsorship.

FOLLOWING Imperial's governing council's decision to withdraw from London University, the College's negotiation are proceeding. It expects to reach a Memorandum of Agreement this summer, with the expectation of formally leaving in July 2007.

The decision was made because Imperial is an entirely self-governing institution and London plays no role in its decision-making processes. It also has a direct relationship with funding

Imperial to go it alone

councils and collaborates with other London institutions without the involvement of the central university.

Rector, Sir Richard Sykes, said: 'Imperial has an international reputation that is independent of the University of London. It is absolutely right that we should promote our own identity and award our own degrees'.

Imperial applied for and received degree-awarding powers from the Privy Council in 2003 which are as yet unused. It estimates that the first undergraduate students who would receive Imperial College degrees would be the 2008 intake. All current students would receive London University degrees or be given the choice of converting to an Imperial degree.

Online reading

DUE to high levels of contributions, some articles have had to be abbreviated. To read the complete stories, such as some of the obituaries and the Decade Reunion lunch review, try going to: www.imperial.ac.uk/engineering/about/alumni/imperialengineer

Decade memories recalled at lunch

VARIOUS bunches of 'Fivers' met in the SCR for this year's Decade Reunion Luncheon. Some had not seen their fellow students since College days which in some cases was during the war.

The current students were particularly pleased with themselves, because as well as exhibiting Bo, Spanner and Bolt, they also had Davy (the RSM Safety Lamp) and Theta (the RCSThermometer).

In keeping with tradition, representatives from each decade spoke briefly between courses about their college experiences.

First up was Colin Harris on college in war-time. He recalled a number of Fleet Air Arm officers in Aero, secret war research in the labs, nuclear work in RCS, Dr Dyson with a prototype flame-thrower and the college dinner marking the war's end.

50s' demos

We heard from Joe Modro for the 50s. One of the pioneers of the 'extended' undergraduate course, he was grateful to Prof Pippard for letting him do this. There were demos and the odd policeman's helmet as a trophy. One ended up on the head of Albert on his memorial and Joe explained how big Albert's head turned out to be, up close.

Phil Collins claimed the 60s invented sex and with Christine Keeler, Mandy Rice Davis and Philip Larkin to support him, perhaps he has a case. Phil re-



The class of 65.

membered day-release at the LSE (presumably to learn about demos and sit-ins), Sinclair Goodlad, Yogi Bishop as President (Yogi is now our contact in Oz) and Radio Tizard, whilst the rest of Southside was a building site.

Prof Peter Cheung spoke for the 70s comparing it with current Elec Eng. Prof Eric Laithwaite was mentioned, especially in connection with an incorrectly wired demonstra-

tion where a 'projectile' perforated a partition close to Prince Charles. Apparently the hole is retained.

Tiddlywinks

For Rag Week, Mike Bartlett recalled 85's tiddlywinks down Oxford Street. From a civil engineering slant, there was the Carsington Dam collapse, soil mechanics lectures from Prof Alec Skempton and mascotry involving Reggie, the concrete lion of King's College.

Paul Cooper's time in the

90s coincided with the fall of the Soviet Union and Nelson Mandela's freedom. As driver and mechanic on a 650mpg entry in the Shell mileage competition, he worked in the pits at Silverstone.

Current President Sid Singh enthused over the present healthy state of the student union which now includes RSM. He mentioned the increased number of overseas students at IC, the amount of construction work on the campus (it's Mech Eng's turn in 2007). Sid finally brought the more formal part of the luncheon to a close with a rousing Boomalaka.

Afterwards there were opportunities to tour round college (especially Elec Eng with Prof Peter Cheung), take a look at the videos and memorabilia or just mix and reminisce. Many thanks to the volunteer speakers who always add the real spice to the mix for this event.

David Law

CALLING all who left College in a year ending 6. This November's Decade Reunion Luncheon is for you!

There is a discount for groups of five or more for this enthusiastic and nostalgic afternoon so contact your contemporaries to ensure a large gathering.

As part of Imperial's growing calendar of events for alumni (driven by research undertaken with the alumni community) the Office of Alumni Development is also planning an inaugural alumni reunion for Saturday 16 September. For further information on this event, visit www.imperial.ac.uk/alumni/reunion2006.

DEVELOPMENTS AROUND THE ENGINEERING FACULTY

MULTI-DISCIPLINARY, cross-faculty research by the new Energy Futures Lab is planned to find ways of meeting fundamental energy needs, such as heating, lighting, power and transportation, without contributing to climate change. It aims to set the energy agenda over the next 20 to 50 years.

The lab, under the direction of Earth Science Engineering's Professor Nigel Brandon, will enable Imperial to bring together existing strengths in developing technologies, such as carbon capture, fossil fuel engineering, renewable energy resources and fuel cells, and its proven track record in innovation and entrepreneurship.

Energy Minister Malcolm Wicks, speaking at the launch, said: 'I'm happy that Imperial is using its considerable techno-

New Imperial lab to set energy agenda

logical expertise in these areas to address such important problems'.

Urban energy use

At the launch of the lab, Imperial and BP announced a £4.5 million project, the BP Urban Energy Systems project to research the use of energy in cities. Co-directed by Professor David Fisk, it is exploring how money and energy could be saved if cities integrated resource systems. It is the first to try to document and understand, in detail, how energy, people and materials flow through a city.

Keeping nuclear option open

Increasing the safety and reliability of nuclear power, as a solution for satisfying energy needs, is the challenge addressed by a new initiative. Also announced at the lab launch was the £6.1 million *Keeping the Nuclear Option Open* programme. It is funded by the *Research Council's Towards a Sustainable Energy Economy* initiative and will investigate how nuclear power can become a more appealing energy production option. It represents the largest single Research Council commitment to

fission reactor research for more than 30 years.

The researchers, led by Professor Robin Grimes, hope that the four-year project will help increase the acceptability of nuclear power as an alternative source of energy and maintain the UK's expertise in nuclear technology.

For further information on these energy announcements go to www.imperial.ac.uk/news.

The source of some of these articles and some of the words come from Reporter, newspaper of Imperial College.

Medical imaging is increasing in importance

BIOMEDICAL Systems Engineering Professor Dick Kitney's paper on the increasing importance of imaging and information systems in medicine describes how falling hardware prices, combined with an international imaging standard (DICOM), have greatly increased the availability of universal imaging and data access.

In the near future, picture archiving and communications systems (PACS) will provide broad availability of data from standard procedures (eg breast

screening), physiological waveforms (eg ECGs) and other images such as histologies and photographs. In the longer term, these will be expanded to include such areas as tissue and genetic data and will allow a patient's state to be compared to a general population or the patient's own previous data.

The growth of these immensely powerful diagnostic tools promises to be both spectacular and exciting. The full text of Prof Kitney's paper is on the Chapter website.

Engineers in top 100

FIVE Faculty of Engineering academics were included in a recent list of the UK's top 100 science entrepreneurs in *The Times* Higher Educational Supplement.

Three professors – Nigel Brandon (Shell chair in sustainable development in energy, ESE) John Kilner (professor of Materials Science) and Alan Atkinson (chair in Materials Chemistry) co-founded Ceres Power with the late Brian Steele. Raising £16m when it was floated on the London Stock Exchange allowed them to scale up their technology and move to product development.

Ceres Power develops unique fuel cell products ranging from the off-grid electricity generators, through auxiliary power units for cars and trucks, to small scale combined heat and power units for residential or light commercial use. Fuel cells produce energy by combining fuel and an oxidant and have the potential to provide an environmentally friendly power source.

The other two academics listed were Emeritus Professor Colin Besant and Dr Mihailo Ristic (Mechanical Engineering) were co-founders of Turbo Genset.

EVOLVING the way the Faculty of Engineering teaches its undergraduates and prepares them

Material post

PROFESSOR Bill Lee, formerly professor of ceramic science and engineering at Sheffield University, became head of Materials on 1 January. Bill Lee succeeds Prof John Kilner, head of department since September 2000. John is remaining on the staff.

Vision for future

for future careers is the focus of Imperial's major new initiative, the second phase of which was launched on 14 November.

EnVision 2010 aims to build on Engineering's already excellent international reputation to ensure that by 2010, Imperial will be in a sustainable and recognised position within the top five institutions for engineering education in the world.

Professor David Nethercot, chair of both the Faculty teaching committee and EnVision 2010's steering group, says: 'This project is important for the faculty, the College, and the UK as a whole. We need to keep attracting the finest and brightest students and staff and we want our students to be grabbed by the best international companies when they graduate'.

Imperial students ahead of field

TWO Imperial engineering students – Materials' Ian Pong and Computings' Paul Bilokon – have picked up prestigious Science, Engineering and Technology Student of the Year awards. A trophy and a £500 prize recognised their academic excellence.

They were judged against other leading universities for this important award for science and engineering undergraduates.

Over 70 years' service

Colleen Richardson writes about Rogers Knight whose 90th birthday was celebrated at the CGCA's December committee meeting

POSSIBLY the only surviving member of the Links Club who knew some of the founding members, Rogers Knight has done so much for the CGCA over 70 years. He joined the Old Centralians' Trust Fund at the time it was founded and was a founder member of the Wine Committee which has provided the CGCA with fine wines for the past four decades. He's still also helping to organise the annual dinner.

As a student Rogers was a

lic Steel, Bethlehem Steel and others. In 1939, he expected to return to England. However, he had to report to the British Supply Mission instead, where his knowledge of engineering and US steel companies was essential to the war effort. He joined a team of half a dozen specially selected engineers who co-ordinated the constant flow of steel – something like 500 million tonnes of war supplies – to Britain.

On demob from the Royal

veloped the Micro-Fog lubricator, which led to the greater efficiency of the art of tribology and Rogers was recognised as a worldwide authority on lubrication of steel mill bearings where constant motion, weight and immense heat can create havoc. In India, a cold mill was converted from hydrodynamically lubricated sleeve bearings to Micro-Fog. This saved 15 million mega joules in a year!

This technique benefited dentistry as well, allowing spindle speeds of 250,000rpm and making drilling almost painless.

Another application was for North Sea oil rig regulators. Sulphur mercaptans rotted their o-rings within six weeks but Norgren UK formulated a regulator out of a solid block of stainless steel with steel parts and ultra-resistant o-rings. They lasted six months!

Rogers was involved in introducing metrication, sitting on the CBI metric committee which was trying to persuade Britain 'to stop messing about'. He was President of the British Compressed Air Society (1972–1974), founder member and President of the European Oil Hydraulic & Pneumatic Association (1972–1974) and received the Joseph Bramah (1748–1814) Medal from the Institute of Mechanical Engineers in 1987.

In recognition of his amazingly diverse career, Rogers was made a Fellow of the City & Guilds Institute in 1980.

Sadly, Rogers' wife died 10 years ago but he is still consulting in the compressed air industry and sits on a number of institute committees. And he still has work support from his very loyal PA, Susan Collins, who has been with him since 1970.

'I haven't changed much over the years', Rogers says. 'Still working has probably helped.'

Whatever the formula is Rogers has cracked it. He is a very special man and is very special to the CGCA.



ROGERS (centre) is greeted by CGCA President Barry Brookes as he arrives in Bo for his celebrations.

member of the artillery battery with its horse-drawn guns and a very active member of the Rugby Club. He also organised the tug o'war battles. After two years studying electrical engineering, he switched to mechanical engineering.

Born in Hammersmith to an American father and Scottish Australian mother, Rogers' prep school was in Herne Bay because it played rugby. Later at St Paul's School, the only public school with an army and engineering side, he was encouraged to try for the City & Guilds College to study engineering. On graduation in 1938, Rogers' father sent him to the States where he worked with Repub-

lic Engineers and return to the UK with American wife Virginia, Rogers secured an import agency with CA Norgren Company (Denver). In the 50s, as Technical Director of this compressed air filters, regulators and lubricants manufacturer, he created an R&D department researching into modular valves with some very talented engineers.

In 1964, Rogers persuaded Norgren to raise funds for the British Compressed Air Society to sponsor an investigation at Imperial College. This resulted in a thesis *The elimination of lubricating oil from compressed air*. Realising the implications of this research, Rogers developed the first highly-successful filters in the compressed air industry. He was also involved in research at the Fluid Power Centre at Bath University. Norgren then de-

DIARY

Saturday 6 May

Walk with a past president – Notting Hill: murders, market and mystery. Meet Bayswater tube, 10.30am.

Wednesday 24 May

CGCA AGM and President's Evening, Read Lecture Theatre/Senior Common Room, Sherfield Building, 5.30pm. See inserted flyer.

Thursday 15 June

RSMA AGM/Final Year Dinner, Ante Room/Main Dining Hall, Sherfield Building, 6.30/7pm. See inserted flyer.

Saturday 22 July

Thames River Walk. Details to be arranged.

If you are interested in these walks, see cgca.org.uk to register interest or email David Hattersley at davidhattersley@aol.com Tel: 020 8504 8263.

Wednesday 18 October

Engineering Careers Fair and Networking Reception. Starts College entrance 11am.

Friday 17 November

RSMA Annual Dinner, The Polish Club, 55 Exhibition Road, 7 for 7.30pm.

Saturday 25 November

2006 Decade Reunion Luncheon, Senior Common Room, Sherfield Building, 12 for 12.30.

Thursday 14 December

CGCA Christmas Lunchtime Seminar, 170 Queen's Gate., 12 for 12.30pm. Contact David Hattersley at davidhattersley@aol.com

For more information and booking for any of these events,

**contact
Teresa Sergot
tsergot@imperial.ac.uk
or phone
020 7594 1184**

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Speaker questions government training policy

'THE COUNTRY should nurture the natural talents of all people and put them to the best use', Lord David Ramsbotham told alumni, partners, students and guests gathered in the glittering Ironmongers' Hall for CGCA's March annual dinner.

With a government intent on pushing 50% of people into university, instead of giving training to nurture natural talents, companies are complaining that there is going to be a shortage of skilled workers. The government should allow professionals and those concerned with training to decide what should be done.

As a recent Chief Inspector of Prisons, Sir David said that jobs are most likely to keep people from re-offending. In support of this idea, Leyland Trucks is starting to train prison-



ers in Preston prison, so that when they come out they will have worthwhile skills.

As part of the Old Centralians Trust's backing of current students, President Barry Brooks presented

two significant awards during the evening. Adam Roper received the Holbein Memorial award for sportsman of the year. Principal Bo driver David Horton received the Peter Moore memorial tankard.

CGCA photos to buy on web

NEW to CGCA's website is a picture gallery of prominent social events with the facility to buy prints. There is also a drop-down menu for buying mugs,

mouse mats and t-shirts with chosen photographs on them.

Pictures on view include the recent Decade Reunion and the Annual Dinner.



IMPERIAL Engineer's Managing Editor Bill McAuley contemplates one of the pictures on show at the Courtauld Institute's collection in Somerset House.

The elegant event was a private view organised by CGCA last November of 12 large paintings of London by the fauve artist André Derain. These had been brought together from other collections for the first time since they were painted in 1906-7. Those attending enjoyed an informative talk on Derain by the gallery's curators.

College landlord entertains

THE QUEEN'S GATE dining room was packed on 15 December with CGCA members eagerly awaiting a talk about the beginnings of their College, courtesy of the profits from the 1851 Great Exhibition. Malcolm

Shirley, Secretary to the Royal Commission for the Exhibition of 1851 and a professional engineer in the Royal Navy, did not disappoint.

For the full story, see this autumn's *Imperial Engineer*.

Memorial for Spitfire Pete

PLANS to commemorate the life of Peter Harding (see obituary p27) include the presentation of an engraved tankard. The RSMCSC will award it for the first time this May to a student who has made a long-term, outstanding contribution to the student life of the RSM.

The RSMA, in co-operation with registry, is hoping to instigate a memorial prize to revere an alumnus who gave so much to its life. To achieve a prize of £100-150 a year will take a significant amount of fundraising. A memorial lunch is also being considered.

Latest walk

FASHIONABLE Notting Hill and its not so fashionable areas will be explored on 6 May by David Hattersley who organises 'Walks with a Past President'. There will also be time to explore the vibrant Portobello Road market. New members and guests are most welcome.

See the Diary column on page seven for details on how to join David on Saturday 6 May.

RSMA updates web

FOLLOWING the lead of RSMCSC's bright website, RSMA is also having its website redesigned by RSM student Seb Turner. It is expected to go live in mid May.

SET to make a comeback

THE UK Resource Centre for Women in Science, Engineering and Technology (SET) Return campaign, is aiming to help up to 1,000 women return to careers in SET over the next three years. It is connecting them to a host of free services and support, including training, mentoring and networking schemes.

As part of Return, the Open University is offering a

free on-line course called Science, Engineering and Technology (T160). This will help women plan their return, update skills, provide opportunities to attend networking events and to meet potential employers, role models and mentors.

To register for courses in October and February 2007, phone SET on 01274 436485 or email it on setwomenresource@bill.ac.uk

'In great shape thanks to help received..'

THE CITY & Guilds College Union has gone from strength to strength this year, following a wonderful last year and some outstanding work by past President John Collins. There was a little setback when personal reasons stopped Aaisha Latif becoming President.

Deputy President for Finance & Societies Chris McIver stepped in once again to make great use of the summer sabbatical, generously funded by the CGCA, Engineering Faculty and a few Livery Companies. In the re-election in October, I took over from Chris.

In October, we saw the Annual CGCU Freshers' Dinner held in College with more than 350 students from the engineering departments in attendance. A live band, poker, dance floor and chocolate fountains made the event a tremendous success.

After the excitement of Freshers' week, there was the first ever Engineering Careers' Fair (see page 16). Most of the 30 companies brought back Imperial alumni to man their stands. Some of them stayed for the Networking Evening, - another fantastic opportunity for our students to meet and learn from experienced alumni.

Bo did make it to Brighton...before the end of the race with driver Dave Horton and a series of co-drivers bringing Prof David Limbeer (Head of Electrical & Electronic Engineering)

to a wet and windy finishing line.

We also took part in the annual testament to Guilds' engineering - the Lord Mayor's Show (below). This year the team headed by John James (Civils) built a 16 metre bridge - a scaled down version of the Medway Bridge as designed by our sponsors, Atkins. Dean

by Siddharth (Sid) Singh,
President CGCU

of Engineering, Prof Dick Kitney again walked the route with student participants.

We've recently welcomed the Imperial College Railway Society as a new CGCU club and our departmental societies are now bigger than ever,

constantly working with us to keep students entertained and make their time at Imperial College worthwhile.

The CGCU is also working closely with the Faculty on its EnVision 2010 project which is redefining and developing Engineering teaching for the future. We are also organising an open day for young women from the various girls' schools around London, to give them a preview of what Engineering at Imperial College is like. The CGCU is in great shape thanks to the help and support it receives from its alumni, and with next year being Imperial College's Centenary Year, we hope to continue benefiting from a generous and supportive alumni body.



'WHAT on earth am I going to write?' I could compose the classic president's article, outlining my goals for the year and boast about how I am successfully achieving them. Nahh, boring.

My goals are pretty much the same as previous presidents'. They stem from extreme pride at being part of such a great institution as the RSM and a strong will to see it return to its former glory.

After several dark years, I am exceedingly pleased to announce that the RSMCSC is now thriving.

The underlying force of the RSM is its spirit; a spirit that comes from the life and soul of the RSM - its staff and students. The following comments demonstrate how much they love being a part of it. The RSM doesn't just live on - it's back with a vengeance!

I like the inclusive ethos of the RSM

Back with a vengeance!

by Leah Glass, La Presidente, RSMCSC

which embraces all its students and staff - even students who are only here for a one-year MSc course leave with a lifelong attachment to their host department and the RSM. Much of this stems from the students themselves, who create such a supportive atmosphere. It looks like it will continue to do so for many years' - Dr Gary Hampson, Sedimentary Geology Lecturer.

'The community spirit within the RSM is still going strong, with the new freshers getting involved in all the social events and joining the various sporting teams' - Suzie Ogilvie, 2nd Year Geology.

From the first year I joined the RSM I have been encouraged to enjoy my degree rather than lock myself away in study. From the Bottle Match to bar nights, everyone is welcome. The RSM continues to strive in teaching/research but also in keeping alive the traditions that Imperial was founded on' - Elizabeth Stock, 3rd Year Geology.

'I love being part of the RSM. It has played a part in most of my happiest times at Imperial. But probably the most enjoyable thing has been seeing it become so much stronger, especially during the last year' - Sam Phillips, 3rd Year Materials.



WHEN RSM's De La Beche society was organising a field trip to Azerbaijan, to be honest, I'd only vaguely heard of the country, and certainly knew virtually nothing about its history or culture.

Nevertheless, I jumped at the chance to go along with the six other students being promised a month of fascinating geology plus a brilliant insight into the Azeri culture, not to mention 80 hours of Russian language tuition.

Did it deliver? It most certainly did! On landing in the early hours of the morning, we were welcomed into our host family's homes with incredible hospitality. The guidebook warned us that Azeris will look after their guests to the point of extreme and suggests they would be willing to take a bullet for us.

Every dinner was like a banquet and our families were more than willing to help us do anything we wanted. I found the Azeri culture to be fascinating. The complicated history since the fall-out from Soviet times means the capital city, Baku, is now intermixed with Soviet heritage and renaissance of the Azeri culture.

Baku itself holds on to a proud historical culture with many museums focused on arts, literature, puppets, carpets and various other cultural artefacts. Everywhere you go, there's a statue of a popular poet or literary person. On the weekends we went on tours around the city and visited these museums, further enriching the whole experience.

The Russian lessons were incredibly intense, but also good humoured

and fun. The seven of us split into two groups and had four or five hours of lessons a day, switching between two teachers. We then combined for a 'language practice' session.

Although this teaching was gruelling at times, I was surprised how quickly I picked up the basic concepts. I found when wandering around the shops and restaurants that I was able to buy or order something and more often than not ended up with the right thing – a sure sign of improvement!

*Second year geology
student Suzie Ogilvie
looks back
on an experience of a
lifetime*

In the afternoons we went on the geology fieldtrips which were my favourite parts of the trip. There were four main areas of study – oil, mud volcanoes, structural geology (including landslips, exposed bedding, gauges and visible folding) and ancient history (cave-paintings and fossils).

We were taught by a Russian professor from the Oil Academy in Baku, in Russian, but with an Azeri translator from the university with whom we built up a good friendship and still email occasionally. We could even communicate with the professor by remembering our school French. Also good practice for the future, I guess! Our Russian wasn't quite up to scratch, unfortunately.

I couldn't believe what a fantastic variety of geological features was right on the doorstep. The vast fields of nodding donkeys scar much of the Absheron Peninsula, but produce a good percentage of the world's oil and are the key factor in the continued growth of Azerbaijan.

We were lucky enough on our visit to make some contacts at BP during our weekly evening conversation class. They invited us on a tour of their oil terminal in Sangachal, which we gratefully accepted.

The whole experience was incredible and better than I ever could have imagined. I learnt so much in that month about Russian, geology and Azerbaijani culture and had so much fun in the process. I'll always look back on it as an experience of a lifetime, one which is unlikely to be repeated, unfortunately.

The other students on the trip also made it one to remember, with great fun being had playing with the mud-volcanoes and building mammoth sandcastles on the beach, with oil rigs in the distance off-shore.

Azerbaijan opened my eyes to a completely different way of life and a culture so unlike our own – in some ways better, and in others worse.

I was pleasantly surprised that western culture has only just moved in, so the city still retains its own unique identity. McDonald's however was present. Give the country 10 years and I'm sure things will have changed. So I am so glad to have had the chance to go there now, before it loses its charm.

FEATURES

WHEN I graduated in 1974, social responsibility and environment were the last thing on anyone's mind. My first 'project' at RSM involved looking at the feasibility of using a string of small nuclear charges to excavate a canal from the Mediterranean Sea to the Qattara Depression. Ironically, the key spin-offs from this idea would have been almost limitless green hydro-electricity from the water as it dropped the 100 or so metres.

Later there was a move to that other industry not known for its green credentials - oil. Time in Africa, however, had fed my passion for wildlife and conservation, so on the way I rather secretly joined Greenpeace - at the time probably a dismissable offence.

Some years later, having started a computer and then a medical business, I decided to indulge my passion for nature and went to Oxford to study for an MSc in Environmental Change and

Solutions for sustainability

Mike Mason talks about emission management and renewable energy technologies offered by his company

edly the single biggest challenge facing mankind and possibly the biggest we will ever face. It requires us to re-evaluate our fundamental relationship with energy, the key driver of our wealth creation system. Therefore if I was actually to do anything worthwhile it had to be on climate and energy.

The first product of this realisation was a venture called Climate Care. This

generally energy efficiency and renewable energy projects in the developing world which would not have happened unless Climate Care provided either money or technical expertise, or both.

Invariably these projects also bring economic and/or health benefits to the communities where the projects are, as well as the greenhouse gas reductions. For example, we have projects installing energy-efficient lighting in South Africa, Kazakhstan and the Marshall Islands. They will result in the beneficiaries having lower energy bills as well as the countries' generators using less fuel.

Off-sets doubling

Climate Care was a slow starter, but over the last six years we have doubled every year. In 2006, we will probably offset some 150,000 tonnes of CO₂ emissions.

Clients now include not only thousands of individuals who want to live without damaging the climate, but also companies including BA, British Gas and the Co-operative Bank. Dozens of smaller travel companies also offer Climate Care as an adjunct to their holidays, so there is no need to travel any more whilst damaging the climate.

The cost is surprisingly low. For an average individual in the UK, their entire emissions, excluding flights, can be offset for around £10 a month. Flying adds another £1.20 for an hour of flight. Solving the world's biggest problem is really not that expensive.

Climate Care is, however, really only a starter. If we are going to solve the problem we have to do two things -

■ **MEASURE AND MANAGE OUR EMISSIONS.** Then, to achieve the really serious reductions we need to achieve in order to live sustainably, in due course we will probably need to give everyone a personal emissions quota. Climate Care is a starter along this road.



Making chapattis in an Indian school on a renewable energy stove financed by Climate Care.

Management. Sadly, that really marked the end of the dream. Until then I had always had visions of saving nature by driving around the bush in old Land Rovers chasing poachers. What I learnt on the MSc frightened me. There was no way there would be anything left to save if we didn't first look after the climate. The Land Rover and bush life would have to wait.

Dealing with the climate is undoubt-

is a business that allows individuals and companies to repair the damage they do to the climate. The concept is simple.

You go to our web site

(www.climatecare.org) and tell us how much petrol, oil or gas you use, or how far you fly, and we calculate how much greenhouse gas emissions you create.

You are then asked to pay us a sum of money, (about £7.50 per tonne of CO₂ emitted). We invest this in projects which reduce emissions by the same amount that you created. The result is that you don't add to global warming.

The projects we invest in are



Harvesting willow, one of the most common sources for woody biomass.

■ **EMPLOY RENEWABLE ENERGY TECHNOLOGIES** to make the most of the resources we do have and can use sustainably.

This leads to the next venture. Biojoule is a new energy business focused on turning biomass such as wood, energy crops, and agricultural waste into useable and economic fuels. Biojoule is an engineering business at heart and takes me back to my roots at the RSM as a generalist engineer.

Biomass is the Cinderella of renewable fuels. Although it is probably the most widely used fuel source in the world (think of all those billions who still cook on wood) it has, until very recently, largely been overlooked by the major renewable energy players and government policy-makers. They have focused on higher technology items such as solar power, wind, hydrogen or fuel cells.

Woody biomass

Biojoule's current focus is on woody biomass and energy crops such as willow and miscanthus – a form of pampas grass. As chips, or pellets, woody biomass can substitute for coal in power stations, district heating plants, and even domestic boilers. Large numbers of homes in northern Europe are wood heated but one of the biggest surprises is the number of homes in North America that use wood heating.

Energy crops are surprisingly cheap fuels to grow. At the point that they are harvested in the field, energy crops can

just about compete with coal. Wood, if it comes from forest management operations, or sawmill waste, is a similar price or cheaper, especially in the big timber producing areas such as Russia and Scandinavia.

The big problem with using woody biomass is that it is expensive to handle and move. Wood from trees is 50% water for a start. Not only does this increase the cost of moving it, but it dramatically reduces the calorific value of the the wood.

The next problem is air. Most of the volume in a lorry load of wood chips is air. Then there is the problem of consistency. Chips from different sources or even different machines at the same source are often different in size and shape. Moisture contents can also vary both from site to site and across seasons quite significantly.

Finally, there is the problem of handling. Wood chips tend to hang up in storage bins, jam feed augers, rot when stored and generally play havoc

FROM mining in Zambia and Angola, work in the oil business and an MBA, Mike Mason (Mining 74) studied for an MSc to gain his green credentials. Mike is based in Oxford. For more information, visit www.climatecare.co.uk, ring +44 (0)1865 207000 or email mail@climatecare.org



with the nice simple systems used to handle coal.

The classic solution to these problems is to turn the wood into pellets. This involves drying the wood, cleaning it to remove stones, tramp metal *etc* and grinding it to a fine powder. Then it is pressed through dies to make small pellets 6-8mm in diameter and up to 20mm long. In bulk these are around four times as dense as dry wood chips; they include almost no water; they are clean and easy to handle, and flow well in materials handling systems. Pellets are to wood chips what diesel is to crude oil.

Making pellets, however, adds cost. Traditionally, pellet mills have been large, fixed facilities attached to massive sawmills. However there are vast reserves of wood in small patches of woodland that aren't close to a megamill. Getting the chips from these to a pellet mill tends not to be economic.

Pioneer pelleting

Biojoule is pioneering a new approach to pelletising. We are developing a new, small scale plant that produces only 1.25 tonnes per hour. However the plant is fully automated and can operate 24-hours a day seven days a week provided it is filled once a day with wood chips. This gives us a 10,000 tonne a year capacity, well matched to smaller sawmills or forestry operation.

Another key feature of the plant is that it is built into a series of containers that can simply be dropped on a flat level site. Not only does this mean no construction work is needed, but also the plant can move from one patch of resources to another as each is harvested. For energy crops, and seasonal resources, this is a major benefit. The plant can move to a harvest area, process the biomass that is available, and then move on.

Interest in Biojoule's new plant has been dramatic, in spite of the fact that the first unit is not scheduled to operate until late summer 2006. Expressions of interest have come in from as far afield as Australia and South Africa, as well as from the USA and EU. The challenge now is to build the first plant and prove it can deliver what it promises.

FEATURES

CAPTURING the carbon dioxide produced when fossil fuels are used and placing it securely back in the earth's crust offers a unique approach to the problem of human-induced climate change. Carbon capture and storage (CCS) technologies are probably the key to unlocking climate change negotiations and making a successful transition to a low-carbon global energy economy. Currently CCS is being picked up by the oil industry as a way to get extra oil as well as to reduce CO₂ emissions. But when the urgency of tackling climate change is outstripping the ability of governments alone to respond it is important to use every opportunity at hand to get this game-changing technology deployed at a global scale as soon as possible.

Global need

Fossil fuels, although a dwindling resource, are not dwindling fast enough for the climate. The Intergovernmental Panel for Carbon Change (IPCC) estimates that up to 5000 Gt of fossil fuel carbon could still be emitted, 10 times the amount since the start of the Industrial Revolution and much more than is currently expected to lead to irreversible 'tipping point' events.

While there are still many uncertainties, it is clear either that significant amounts of fossil fuels will have to be left unused, essentially for ever, or that they will have to be used in such a way that the resulting carbon dioxide doesn't do any harm - with carbon dioxide capture and storage.

Carbon dioxide can be captured from conventional power plants by washing the flue gases with CO₂-specific solvents before they are vented to the atmosphere.

Alternatively, the fuel can first be gasified and reformed to produce hydrogen and carbon dioxide. The CO₂ is then removed and the hydrogen burned in a conventional gas turbine power plant (instead of natural gas) to generate 'decarbonised' electricity. The hydrogen may also be used directly, for example in future hydrogen vehicles.



Jon Gibbins discusses CCS with Prof Di Zhou during a recent UK-China workshop. Prof Di Zhou, of the South China Sea Institute of Oceanology, Chinese Academy of Sciences, is a lead author on geological storage in the IPCC report.

Initial designs for capture plants, based on conventional power and chemical plant technologies, are expected to add an extra 1-3p/kWh to the cost of electricity with CCS. Practical experience might lead to this cost penalty being halved through innovation and development.

For geological storage, the captured CO₂ is compressed to around 100 atmospheres, forming a liquid with about the same density as water. The liquid CO₂ is then injected into porous rock layers a kilometer or more underground with impermeable rock sealing layers on top of them.

Depleted oil (and gas) reservoirs are good places to store CO₂, provided old wells are plugged properly. The rock seals have already held gases for millions of years and it is easy to calculate how much dense phase CO₂ they can hold.

Ideal storage

But there are also many saline aquifers with suitable seals on top. Preliminary estimates are that these could store much more CO₂, probably enough to hold the emissions from all or most of the world's fossil fuels.

Injecting CO₂ into ageing oil fields can also wash out extra oil, a process known as enhanced oil recovery (EOR). Especially with higher oil prices, revenue from EOR can cover at least some of the costs of capturing, transporting and injecting the CO₂.

These CCS+EOR projects are important to get CCS deployed as quickly and widely as possible during an interim period while carbon prices are still too low to make most storage-only schemes viable. Also EOR is probably the only legal offshore CO₂ storage option, until the OSPAR and London Conventions' rulings on placing substances under the seabed can be brought up to date.

If the additional oil from EOR displaces other oil production then the net increase in emission rates is likely to

Getting serious about climate

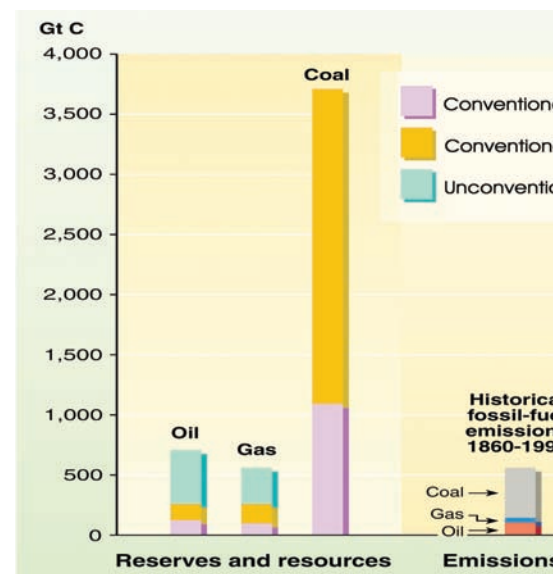
Dr Jon Gibbins, Principal Investigator for the UK CCS Consortium, suggests a fundamental change in energy policy can help save the planet.

be small. With suitable incentives, projects can usually be planned to give long term CO₂ storage significantly in excess of CO₂ from incremental oil.

Many new CCS+EOR projects are now at the planning stage - in the USA, Canada, China, Norway and the Middle East as well as in the UK. In one of the first such projects, BP and Scottish and Southern Energy announced plans a year ago to generate low-CO₂ electricity at Peterhead Power Station in Scotland and send the captured CO₂ through an existing pipeline to the offshore Miller oilfield.

A smaller number of 'pure' CCS schemes with CO₂ injection into aquifers or depleted natural gas wells are also being considered, using either low-cost CO₂ sources or direct government subsidies to get satisfactory project economics.

For the next 15-20 years large numbers of fossil fuel plants will, however, continue to be built without CCS, especially in rapidly-developing economies such as China and India and for urgent replacement of worn-out 60s' and 70s' infrastructure in Europe and the USA.



Carbon in remaining fossil fuel reserves and resources available to the atmosphere up to the year 2100. 'Unconventional oil' includes oil shale and tar sands. 'Unconventional gas' includes coal seam gas and shale gas. Source: IPCC Working Group III Contribution to the Fourth Assessment Report, Working Group III Contribution to the Fourth Assessment Report, www.ipcc.ch/publ/

Worried about change

the UK Carbon Capture and Storage
change in the way we use fossil fuels that
before it is too late

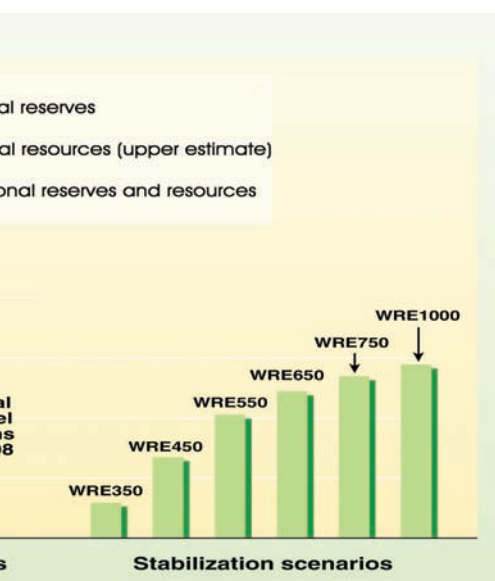
It is important that these are at least made
'capture ready', so that capture equipment can
be retrofitted later without extensive down-
time and unnecessary expenditure. Only
minor up-front costs are involved, for addi-
tional space on site and some small design
modifications.

Key contributors

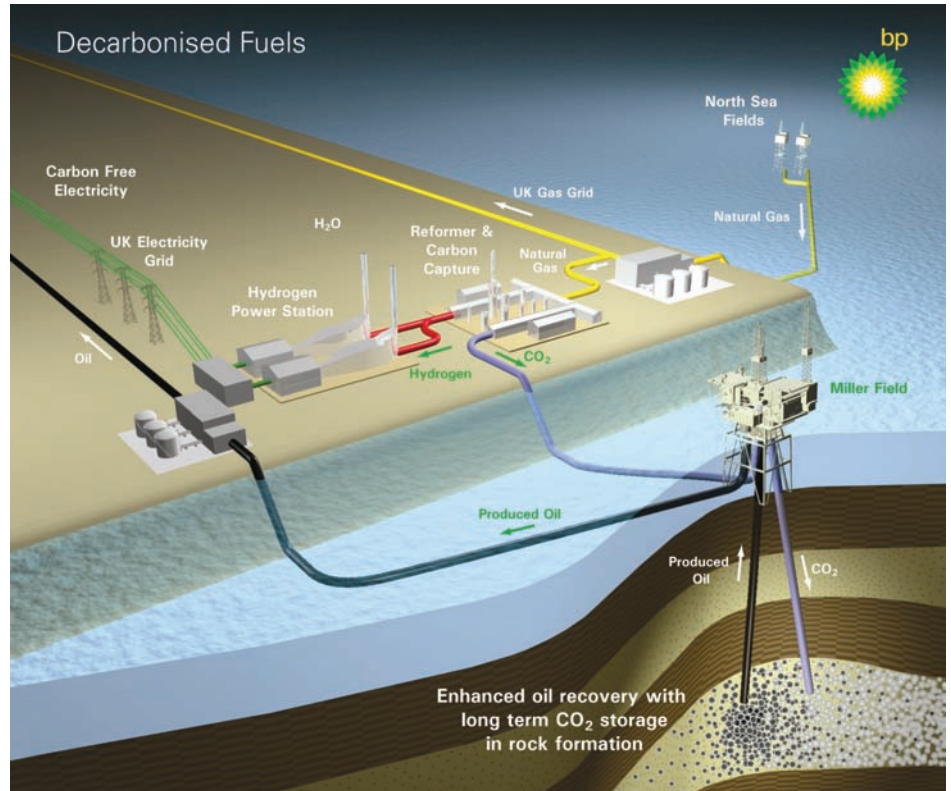
Imperial College and 13 other universities and
research institutes are participating in the UK
Carbon Capture and Storage Consortium
(UKCCSC), funded by the Research Councils'
'Towards a Sustainable Energy Economy'
(TSEC) programme.

Work so far has included a paper at the
Exeter G8 Climate Change conference,
showing how CCS could be used to address
the UK's 2020 generation and emission gaps.
UKCCSC members have also contributed to
the Science and Technology Select Commit-
tee's recent inquiry on CCS.

If the ongoing energy review supports



reserves is much larger than 'safe' emissions to
'oil' includes oil sands and oil shales but not coal-
bed methane, deep geopressed gas etc. but
as hydrates. (Based on IPCC CCS, Climate
un/syrenq/l1to9.pdf)



BP's design for DF1, an industrial scale decarbonised energy system. Injecting the CO₂ into the Miller Field reservoir more than three kilometers under the seabed could extend the life of the field by about 20 years and enable additional production of about 40 million barrels of oil. DF1 would also have an output of 350 megawatts of carbon-free electricity, enough to power a quarter of a million homes in the UK. It would permanently store 1.3 million tonnes of carbon dioxide – the equivalent of removing 300,000 cars from the roads.

current proposals from BP, E.ON and others
for CCS projects in the UK, an outcome that
seems likely, given the critical importance of
CCS for global climate change mitigation
efforts, then UKCCSC will have a major role
to play in developing the necessary knowl-
edge and skills, and also in helping to
transfer these to key overseas users such as
China.

Useful web addresses for more on CCS
and climate change:

- www.ukccsc.co.uk - UKCCSC web site (academic, despite the name!)
- www.publications.parliament.uk/pa/cm/cmsctech.htm - Download for the Science and Technology Select Committee inquiry report and evidence - a very up-to-date summary of CCS activity in the UK.
- www.defra.gov.uk/environment/climatechange/internat/dangerous-cc.htm - Download for the Avoiding Dangerous Climate Change book: full proceedings from the Exeter G8 conference.
- www.ieagreen.org.uk - The IEA Greenhouse Gas R&D Programme website
- www.ipcc.ch - The IPCC special report

on Carbon Dioxide Capture and
Storage is on the front page

- www.bp.com/genericarticle.do?categoryId=97&contentId=7006978 - BP press release on DFI

JON GIBBINS is a Senior Lecturer in the Energy Technology for Sustainable Development Group within Mechanical Engineering. He is raising awareness of CCS's possible role as part of a more sustainable UK and global energy supply, with participation in a number of industrial projects on new CCS developments, several invited presentations to parliamentary groups and inputs to academic and professional meetings and the media in the UK and abroad. He has recently given oral evidence to the Science and Technology Committee inquiry on CCS (as part of a UKCCSC group) and to the UK Energy Review. Jon is especially interested in integrating power cycles with post combustion and oxyfuel CO₂ capture equipment, in order to improve overall performance, and in 'capture ready' concepts for all types of plant.

Ecton to revive courses to attract school leavers to minerals' industry

THE MINERAL Industry Manpower and Careers Unit in the Peak District, which was run from RSM by the late Geoff Cox (Min53), closed in 1990. However, courses at the 18th century Ecton copper mines continued due to mine-owner Geoff's involvement and the work of the Ecton Hill Field Studies Association (EHFSA). Eventually foot-and-mouth and other factors, including Geoff Cox's illness and death, ended the courses. Their resumption has been impossible until now.

Happily, EHFSA's small band of enthusiastic volunteers, who ran these courses, kept up their hopes of resuming the work. Happily, too, Geoff's widow, Elizabeth and the executors of his estate have transferred the mineral rights and study centre to newly-formed charitable trust company, the Ecton Mines Educational Trust. It will make the centre available for educational activities, with the revival of EHFSA courses as the likely starting point.

Activities at Ecton were mainly intensive one-day courses based on the chemistry of mineral extraction –

especially, but not solely, for A-level chemistry students. More than 500 students came each year. Other users included primary school groups, GNVQ students, undergraduate geologists, PGCE science groups, local church groups, professional experts and researchers. Past Ecton supporters

Ecton Mine Educational Trust is looking for further industry backing. John Bramley outlines why it is worth supporting

include the Royal Society of Chemistry, the local group of the Geologists' Association and the RSM.

As demand grew, the courses were refined into a one-day, intensive sequential programme tailored to a maximum of 30 students.

The background to mining at Ecton was introduced before setting off up Ecton Hill, past the old 'powder hut' (black powder chemistry), to the building that once housed the original Boulton and Watt winding engine.

Nearby the party inspected the hole where the main Ecton ore-body originally outcropped at surface, before walking over the hill to Waterbank Mine. Here the old mine dumps offered a rewarding opportunity to collect mineral specimens. These were taken back to an outdoor laboratory for wet chemical qualitative analysis. A further practical session followed on mineral separation techniques and their science. Finally, as a climax to the day, there was an underground tour into Salt's Level in Ecton Mine.

It will take at least a year before Ecton is fully operational again. Improvements have to be made to the study centre and to the security of shafts and adits. Further support from industry is also needed now it is recognised that recruitment is once again becoming a problem.

CONTACT John Bramley (MinTech 59) if you would like to help: johnbramley@onetel.com
Material for this report was supplied by Alastair Fleming, Chairman, EHFSA.

Taking a glimpse of an exciting future

THE COLLEGE entrance and MechEng foyer were bustling with engineering students last October for the first-ever Engineering Careers Fair. Organised jointly by the Engineering Student Union's Internship Centre (www.cgc.u.net/internships) and the Careers Advisory Service (www.imperial.ac.uk/careers), it aimed at giving students a greater exposure to engineering companies and giving them the opportunity to discuss possible career options.

Arup, Network Rail, Procter & Gamble, Rolls Royce, Shell and BP were among 30 companies who attended and many stands were staffed by alumni. Over 1,500 students who visited the event agreed it was fantastic to have an 'engineering-only' fair.



Engineering Faculty Principal Professor Julia King commented: 'We're really pleased to see some of our alumni on the stands. It gives the current students a glimpse of the exciting future ahead of them'.

If your company is interested in attending the next fair (expected date 18 October) then please contact Elspeth Farrar, Director for the Careers Advisory Service to express your interest – E.farrar@imperial.ac.uk

Last October Nick Rushbrooke and Paul Worrall from Rainhill Rotary, Merseyside, took themselves off to rural Tanzania. This is the background to why they went and how the charity WaterAid is transforming the lives of thousands each year with its programme of safe, sustainable water and sanitation projects.

ELIXIR OF LIFE

AFTER Nick Rushbrooke retired in 2001, after a third of a century in the UK water industry, he worked as a consultant. However, in 2003 his wife Jenny died from cancer and he gave a small legacy to Rainhill Rotary in her memory to use for charitable purposes.

The Club decided to give much of it to WaterAid. It used the money to part-fund the development of new water supply and sanitation provision in villages in the Mpwapwa rural area, near Dodoma, in central Tanzania.

In 2005, WaterAid reported that the schemes were nearing completion so before the November rains set in Nick and Paul made a week-long visit. They visited a total of six WaterAid schemes, five in the rural Dodoma region and one in Dar es Salaam. The Rainhill Club had helped to fund projects in three villages, 100 km from the Tanzania's capital, Dodoma, itself some 500 km from the main city of Dar es Salaam.

Village involvement

Their most memorable trip was on the third day when they travelled 100km on dirt roads by Land Rover to visit the villages of Kitati and Mafene. The local WaterAid representative, Musa, who has worked for them for many years, explained the need for sustainable projects which, though primarily funded by them, relied on the full participation of the villagers.

WaterAid trained the local people in the value of hygiene and good sanitation, and the importance of keeping the two aspects of clean and dirty water far apart. The villagers helped sink the wells and, where necessary, laid the supply pipes to central taps and built the storage tanks.

On their visits to Kitati and Mafene they were met by the village councils, who proudly showed off their five new wells. They are hand-pumped, drawing the water from shallow underground aquifers, replenished in the rainy season. All-in-all, the project supported seven wells, supplying clean water to over 7,000 people at about £1 a head!

It's an old saying, but a true one "You never miss the well



till it runs dry". 'Fortunately most of us will never have to find that out - we just have to turn on the tap to receive a clean, safe, unrestricted supply of fresh water', says Nick. Not so in much of the developing world, where over a billion people do not have access to it, and over two billion lack basic sanitation. As a result, a child dies every 15 seconds from water-related diseases.

The changes that reliable and clean water provision can make to a community are remarkable. It is usually the duty of the women to fetch and carry water for their families. The daily journey used to take several hours and resulted in dirty stagnant water, infested with diseases such as cholera and river blindness.

Once the new wells were working the women could spend more time with the children and help in the fields. The children become better nourished, don't die in infancy and have time to go to school. The health of the community improves overall. The used water helps irrigate the land, and cash crops, such as onions and tomatoes, can be grown - even though the markets are far away.

Life-changing

The villagers can now also water their cattle, saving long journeys by the herds. Finally, they can use the water to make mud bricks, replacing the timber and mudpack huts with substantial single-storey houses that survive the rainy seasons. In so many ways, the provision of safe, reliable water changes their lives. 'It really is the elixir of life', says Nick.

'We really enjoyed our visit to Tanzania, finding it both humbling and uplifting. The people had such a wonderful nature, they always seemed to smile. As one village elder said "We don't have very much, but we are grateful for what we have...and we are happy". We could learn much from their philosophy of life.'



Nick Rushbrooke JP BSc C Eng MICE FCIWEM ACGI (Civils 68) worked in the water industry for over 33 years, retiring from Untied Utilities as Commercial Director in 2001. He remains very busy with many charity and service activities and is past President of Rainhill Rotary. Email NickRushbrooke@aol.com

See the world AND get a degree!

Fourth year geology and geophysics student and RSMCSC's President Leah Glass
enthusiasms about the advantages of taking an earth sciences degree

ONE OF the main reasons I chose to study geophysics at Imperial, apart from the world class reputation of the department, was the fact that it offered me the chance to spend the third year of my degree abroad.

The department has formal exchange agreements with the University of California, Berkeley and the Colorado School of Mines in the USA and Melbourne University, Australia. These agreements enable you to attend these institutions and only pay Imperial College fees.

Free choice

This is a fantastic deal considering that international fees at Berkeley are well over £15,000 per year. However, the department also gives you the freedom to initiate your own exchange with a university of your choice, on the condition that this university is of a suitable calibre and that you organise the funding issues, whether that be through sponsorship or personal funds.

For as long as I can remember, volcanoes have been my passion and I have climbed too many and got too close to really still be alive today! None of the above universities offer any specialised courses in vulcanology so I decided to seek an alternative. This alternative came in the form of the University of Alaska, Fairbanks (UAF), and what a fantastic choice it turned out to be. To solve the funding issue, the Alaska Volcano Observatory very kindly paid my tuition fees and in exchange I agreed to volunteer to help monitor the ~30 active volcanoes in Alaska and on the Kamchatka Peninsula, Far NE Russia. The monitoring I did was via satellite images, due to the extreme remoteness of the volcanoes being studied. This also opened up a whole new avenue of research for me and I did my third year project on the thermal modelling of active lava domes, as seen in satellite images.

During my year in the Great North I learnt an incredible amount, not just about volcanic processes but also about living. The way of life in interior Alaska is

very different from most places in the world today. Not only are the temperatures extreme (I experienced -55F to +90F in the space of 10 months!) but every day life is pretty off-the-wall as well. I lived in a 16x20ft cabin with no running water and it was absolutely

Alaska is an incredible place with very few equivalents left in today's world.

As with most off-the-wall places, Alaskans are a truly individual set of people coming from all walks of life, from mushers to gold panners. Alaska isn't one of those places you just 'end



DESCENT from Mutnovsky volcano.

brilliant. It forced me to appreciate what is truly important in life and made me even less materialistic than before. Although the darkness in the winter can be hard, the abundant Northern Lights displays and the 24 hour daylight in the summer more than make up for it.

I am an avid outdoor person and Alaska is an adventurer's playground. Driving along, if you see a mountain or a hill you want to climb, get out of the truck, don your boots and get going – just be aware of the grizzly bears! No fences and very few rules. Cross-country skiing out of your back door to remote cabins and natural hot springs with friends, kayaking next to glaciers and amongst whales and being able to go camping and not see another person for months; whatever tickles your fancy.

up', so the people that inhabit this great land truly want to be there. Materialism is virtually non-existent with most people living a similar standard of life, especially away from Anchorage, the only real city. You really have to go there to appreciate the astonishing generosity and affable nature of the Alaskan people.

Unbelievable

However, probably the greatest opportunity that came my way during my year abroad was the chance to do some volcano related fieldwork on the remote Kamchatka Peninsula, just across the Bering Strait from Alaska. A month of extreme wilderness, incredible people, delicious vodka and more active volcanoes in one region than I will probably ever see again – unbelievable. Words can't do justice to this experience, but my photographs will help...

Science teaching – cut the politics

THROUGHOUT my years as a head teacher we were continually seeking teachers of chemistry, maths and physics. Rarely could we choose and often the person appointed was of comparatively poor quality. Thank goodness there were also some remarkably dedicated and wonderfully professional colleagues.

Governments of all persuasions have identified the need for an appropriately educated workforce, but have failed to ensure a supply of adequately qualified and trained teachers.

Politicised

Unfortunately education became politicised and subject to the thought that business models could be applied to service industries.

State secondary schools were set on a path of competition based on external measures of success. The error was that those things that could be measured acquired overwhelming importance and the regime of testing fell upon us. Schools found themselves competing with each other on the basis of league tables of externally measured outcomes.

Many school leaders responded with displays of great competitive and entrepreneurial skills. If the grade counters were now to be king, the

schools would produce the grades; especially as all subjects were to acquire the same value.

We still have an inadequate supply of science and maths teachers and it is probable that the quality of any such teacher is, on average, poorer than in other subjects. Added to this over the years, scientific discovery and development have greatly extended the curriculum. Pupils, given choices, will opt for easier and better taught subjects. They also want to select their university and they perceive that best grades accord them best choices. This trend will be supported by schools looking for better government reviews.

There are currently 2,502 designated specialist secondary schools. Without debating here what a 'technology' college is, there are more sports colleges than science and engineering ones combined.

If we believe that a secure supply of science-educated young people is

needed to sustain our economic future, there is a need for a new and powerful influence capable of having an impact on the government. I believe that the universities, in cooperation with wealth creators of the business world, are best placed to achieve this.

Term change?

If universities are having difficulty selecting their undergraduates through the current system of admissions procedures, they should change the start of their academic year to January. The autumn term could become a time for interviews, fine-tuning, orientation programmes, preliminary study and other preparation activities.

PAUL BUET (Geology 61) spent 21 years managing two large state co-educational comprehensive schools before becoming a consultant in education and management training. paulbuet@bywater82.freeserve.co.uk

Organising student tours – it's easy and rewarding

WHEN considered from an undergraduate perspective, I'm sure many mid-career alumni appear to hold exalted jobs in some extremely interesting places. But recall for a moment how you yourself regarded industry before you graduated, and what you would have given for a peek behind the scenes of some of our best known companies and institutions.

Certainly, as Jon Crocker – a student involved in the CGCU's Internship Centre – will readily confirm, students have valued the three visits I've arranged since February 2005 around the BBC's TV Centre in West London.

I'm reliably informed that queues for tickets have stretched out of the union office door and down the corridor with as many as a 100 hoping for one of 16 places. With such a demand, it's only fair to consider those on more relevant courses. With the BBC these have been Electrical Engineering, Computing and Information Systems.

It's great how supportive my colleagues have been. I thought by the third tour they might get fed up with

my demands. However, we involved a number for a short time each. We started with a quick bit about graduate recruitment. Here I asked our existing graduate trainees and recruitment manager to show their faces. A graduate is someone students can easily relate to which helps put them at ease and makes the tour seem relevant.

Released

I then took them through a bit of theory – talking about what we call the 'broadcast chain' (content acquisition to final broadcast) – before they got to wander around. For this I've been grateful for the help of one of our consultants who a) knows the technology better than I do! and b) shows that we tick that all-important 'do you do consultancy?' box. So many undergrads seem to ask that these days.

We then split the group in two for two tours, one to the news centre and the other to the satellite teleport and central communications area. Siemens staff from these areas spent about an hour before swapping groups and doing

it all again. So although this is quite intensive, it is just a couple of hours.

And, it must be said, organising the tour to start mid afternoon and ending with a few beers at 6pm has also been an added incentive to all involved!

I feel that even if this helps one student realise broadcasting technology is for them (or equally to realise it isn't!) then it has provided something very valuable. It also showed Siemens and the BBC in a good light and helped our graduate recruitment effort.

Simply contact Jon Crocker (jmc103@doc.ic.ac.uk) to discuss what you might do. Bottom line is that this has been easy to do and very rewarding for all concerned. It's our Association and we as alumni should do more of it. So if you think you can do something, don't just sit there: take action!

PETER CHASE (Computing 85), CGCA's Treasurer, organised these courses in his roles with the BBC and then its technology partner Siemens Business Services. peter@chasequovadis.com

Engineering the profession's future

THREE categories of registrant on the EC^{UK} roll are chartered engineer (CEng), incorporated engineer (IEng) and engineering technician (EngTech), titles that are protected by Royal Charter. They all play a vital role within industry.

Over the years registration requirements have become more demanding, with applicants now undergoing a rigorous professional review interview and a detailed assessment of technical and personal competences. A masters degree is also now the norm for CEng candidates graduating since 1997.

Coupled with the relatively high average age of registrants, this resulted in a slight decline in recent numbers. However, latest figures show a surge in new registrants. In 2005, there were 8,018 people who achieved CEng, IEng or EngTech status – an increase of 39% on 2004.

Career boost

This influx of a largely younger breed of registrant shows that the benefits of registration appear to be getting through to the latest generation. They are aware that by gaining the titles CEng, IEng or EngTech, they can expect to boost their career prospects – along with potential earnings – and enjoy enhanced professional status and greater influence within their industry.

Importantly, there are advantages too for employers. By taking on registered engineers or technicians they have the assurance of knowing that their key personnel hold an internationally

recognised mark of competence, which can help them to retain business and win new clients.

To become registered a person must join one of the 36 engineering institutions and societies licensed by EC^{UK} who assess applicants. Qualifications, training and experience are then assessed against the UK Standard for Professional Engineering Competence (UK-SPEC), published by EC^{UK} in 2004. It

The Engineering Council UK's Register of Professional Engineers and Technicians lists some 250,000 men and women. Chief Executive of EC^{UK}, Andrew Ramsay explains how and why individuals register and outlines its role in improving standards in the profession and representing UK engineers' abroad.

imposes no new registration requirements, but does explain them more succinctly. This has helped the licensed institutions.

One of EC^{UK}'s more important duties is to help its member institutions develop good practice in processing registration applications. It does this through training, workshops and open days, and by providing smaller institutions with the secretariat for their joint meetings.

More than half the institutions are licensed to assess academic programmes for inclusion on EC^{UK}'s database of accredited engineering courses/qualifications that meet the educational requirements for CEng or IEng registration.

A growing number of accreditation visits made to higher educational institutions are carried out jointly by several institutions.

Last year saw the creation of the

Engineering Accreditation Board, one of whose functions is to organise joint visits. EC^{UK} is providing its secretariat.

All courses are now evaluated against UK-SPEC's output standards. Significantly, the latter have been incorporated in the Quality Assurance Agency's new subject benchmark statement for engineering degrees meaning that universities no longer have to work with two different standards.

New data

Universities also now have the facility to indicate on the UCAS course database whether their engineering degree programmes are EC^{UK} accredited, a key piece of information that hitherto could not be included.

Extending overseas recognition of UK engineers is another important EC^{UK} role. It was heavily involved in the negotiations that led to the adoption of the European Directive on Recognition of Professional Qualifications, the text of which is compatible with UK requirements.

Another notable achievement has been the adoption of UK-SPEC compatible standards by the Washington Accord, a mutual recognition agreement relating to accredited engineering degrees. Nine countries are signed up to the accord, including the UK, USA, Canada, Australia, South Africa, Hong Kong and Japan. Other nations are expected to join soon.

Some concern

There is still much work to be done internationally. Of late there has been some concern about the implications, for integrated master's degrees, of the European Higher Education Qualifications Framework, which is the latest step in the 'Bologna Process' (under which the signatory nations have agreed to align their HE systems).

EC^{UK} has been pressing government to protect these programmes, the majority of which are MEng. It has also had a major influence on a guidance note from the Europe Unit of Universities UK on the issues now confronting HEIs running such courses.

With almost 40,000 registrants now living overseas, EC^{UK} will be continuing its efforts to enhance the status of UK academic and professional qualifications.

BEFORE 2002, Andrew Ramsay held senior posts in the ECUK's predecessor, the Engineering Council. He joined it in 1997



from the Chartered Institution of Building Services Engineers (CIBSE) where he was Chief Executive. Before that he was Secretary of the Construction Industry Council, a pan-profession body for the construction industry in 1990.

Educated at Cambridge and as an AEI Rugby indentured apprentice, Andrew also worked for GEC and the CEBG. He is a chartered engineer and a chartered secretary.

CHEMICAL
ENGINEERING 1960

Where are the slide rules?

LAST September's invite from Prof Steven Richardson to 11 1960 Chem Eng graduates (The Noughties) to visit their old department brought back memories of their first day 48 years previously.

Many other old memories were reawakened, tales told and it was soon realised that although chemical engineering has remained fundamentally the same, there have been many

changes. Where are the slide rules, we asked some undergraduates who had come up early? They thought they were something prehistoric and only found in museums – a shock for the old boys. It was, however, comforting to note that the old boys had kept up with things like PCs, internet and e-mail.

After lunch in the Senior Common Room in the Sherfield Building (fondly remembered by

the visitors as the site of the Imperial Institute), the group had a conducted tour of the department. Much was new but a lot was still the same, under the veneer of modernity.

Present were Brian Stevens, Alan Nethercott, Jim Friend, Michael Heath, David Martin, Prof. Stephen Richardson, Barry Daniels, Roger Hedge, Malcolm Cross, Tony Davis, Don Latimer and Dave Wilbraham.

ALUMNI NEWS

Four pages of who's doing what and where

Curry celebration returns

Triodes to roots

THIS YEAR the Triodes 'just wanta be young' so in January they returned to their roots, the Indian restaurant on the second floor of the Strand International Hotel.

'It was just the same as when we were students – school dinner tables, beer from the off-licence next door (although they get it for you now!), but great great food', reports arch Triode Martyn Hart.

Next year's reunion, celebrating 34 years away from Guilds, will start at the George at the top of Fleet Street on Friday 5 January 2007.

martyn.hart@blueyonder.co.uk

WITH partners and offspring the total party came to 70 when the Elec Eng class of 1967–70 held a reunion last May. Of the original 100 who started the course, 40 made it from far and wide, including the US, Canada and Europe.

Specially designed-posters provided directions for those who couldn't remember where the Union was! To save embarrassment for those who had changed out of all recognition – fatter, balder, wrinkly, short-sighted and no longer wearing the obligatory 60s' jeans – they were issued with badges incorporating the original final year departmental mugshot. A photographer generated a new set of portraits, rounding it off with a group shot in the Union quad.

Everyone was asked to bring any memorabilia they had so original dog-eared group shots were on show with IC scarves,

Work wanted after 35 years

ELECTRICAL
ENGINEERING 1970

C&G sweatshirts and lab notebooks and reports

We were joined by a couple of original staff – Colin Vickery and Bob Spence – as well as the current EE Deputy Head Peter Cheung. Colin was

keen to chase up a few tutorial sheets not yet handed in – yes, he still remembers the culprits!

After a rendition of the class's final year song 'Bless them All', Prof Cheung bravely escorted the increasingly jovial crowd around the department, after which we decamped to the Queens Arms, followed by

a visit to Khan's in Bayswater.

It was all part of careful planning, with a dedicated team meeting in the Union bar once or twice a year and finishing with a curry. The last one attracted 30 and they've become mini reunions in their own right!

Simon Maddison

simon.maddison@btinternet.com



Distant call for Civils 1972 graduates

WHEN I joined Civil Engineering in October 1969, in a class of about 60 there were only three girls (Anita Robinson, Janet Hartley and Vera Novakova).

There were perhaps half a dozen of us who were obviously foreigners: myself from Pakistan, Sergio Grillo from Brazil, Ed Mardiross from Iran, Carlos

Marques from Macau, Francis Tong and KL Lau from Hong Kong, Victor Lou from Malaysia, and Vera from Czechoslovakia (in a double minority).

Unfortunately, I'm not in touch with any of my classmates, but now we're in the email era it should be easier to reconnect, perhaps through some sort of

bulletin board or mailing list. The 'Find a Classmate' service is a start, though I haven't been able to find anyone on it yet.

Looking back I was clearly a fish out of water, even if I didn't realise it at the time. I had been shortlisted for an exhibition scholarship, but it seemed that almost everyone in my class was

brighter than me! It took quite a while to realise that most were simply more articulate, partly because of their different cultural backgrounds. All the same, I learned a lot in my years there and I'm proud to be an Imperial graduate.

Khalid Hasan

hamzahas@cyber.net.pk

ALUMNI NEWS

Glittering launch?

LESTER KEMP (MSc Min Exploration 90) and co-director Rupert Baring (son of Oliver, head of Warburg's City mining team) have formed Mantle Diamonds Limited.

They hope to launch this private UK-registered company, focused on kimberlite exploration, on the London Stock Exchange in the next 12 months.

Lester recently embarked on a road show to raise US\$1 million (£600,000) financing. Anchor investor is JP Morgan.

The company will concentrate on diamond opportunities in Finland, Canada, Mali and Algeria.

lester.kemp@ntlworld.com

Hoping for C&G

FRANK BROWN (Chem Eng 62) just returned from OZ and NZ having retired as Group Manager of the development and technology practice at Jacobs ConsultancyUKLtd. He will continue as a consultant with the responsibility to mentor new graduates, many of whom he hopes will continue to come from C & G.

frank@reapdesigns.co.uk

Patently OK

LAURENCE PRETTY, patent attorney and partner in Los Angeles for international law firm Hogan & Hartson, has lately been involved when Japanese companies protect their US patents in the US courts against Chinese businesses accused of shipping infringing products into the US. He'd like to make contact with John Cooke (EE '58) or Alan Goodliffe (Ae 58).

LHPretty@HHLAW.com

WOMEN, GET YOUR OWN BACK AND HELP CHARITY!

LAST issue we published an amusing (to most) definition of woman in terms of hazardous materials.

Now the Editorial Board is giving women readers of *Imperial Engineer* the chance to get their own back and at the same time win a donation to their favourite charity.

Jack Sandy (Min 50) has generously offered a £100 first prize and £50 for a runner-up. He says his hand is hovering over his cheque book. So get those thinking caps on, get out the technical dictionaries to help and pen a humorous

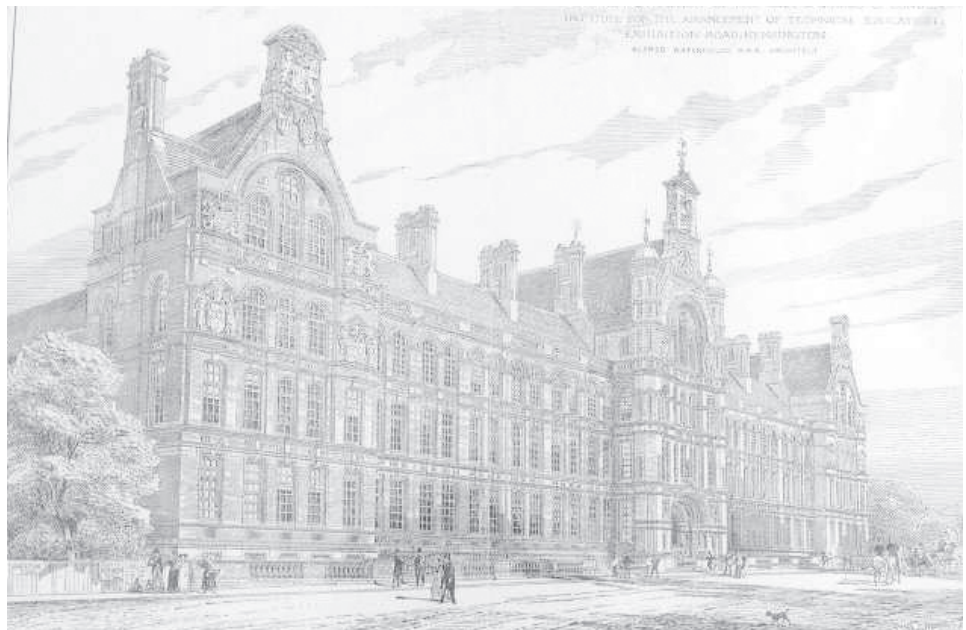
definition of man. It can be in prose or poetry but in no more than 100 words.

Please let us know what charity you would like to benefit if you win one of the prizes.

The decision of the Editorial Board will be final.

We need your entries by 1 August so that the Editorial Board can select the two prize winners for publication in the autumn *Imperial Engineer*. Send them to Dr Teresa Sergot at the address inside this front cover.

Jack's email is jack.sandy@tiscali.co.uk



KEN STRACHAN (Mech Eng 81) is looking to sell a nice lithographic print of City and Guilds College in 1881, first published in the Building News when it was known as The Central Institution. It is by architect Alfred Waterhouse.

'As this building was rather before my time, I wonder if any Old Centralian would like to offer me £15 for it. It's mounted in a snap frame measuring 400mm by 300mm and it could either be collected from my house in Nuneaton or posted at cost.' Ring 02476 353617 or kenstrachan@lineone.net.

Alumnus on quest for the real Gulliver

WHO WAS Gulliver, the man who voyaged to mythical places in Gulliver's Travels by Jonathan Swift? Was he real? And was the book written by Swift?

Graham Harris (*Civils 61 & 63*) has been on his trail for several years. In the next issue of the *Imperial Engineer*, he will share some of the results of his detective work.

Gulliver's Travels was first published anonymously and

though written in the first person, a good deal of biographical information is included. It's as if Gulliver is not only anxious to cloak his identity but teasing us to determine who he was, says Graham. The book has been attributed to Swift because he annotated an early copy.

Newspapers today would pay handsomely for Gulliver's story and writers of lurid fiction turn green with envy!

WE NEED YOUR NEWS

Let us know your news and stories.

Or have you an idea for a feature?

Editorial assistance is available!

Contact is Teresa Sergot
(address on page two).

**COPY DEADLINE FOR NEXT ISSUE IS
TUESDAY 1 AUGUST**

CGCA MELBOURNE

AT LAST November's dinner (right) in Melbourne, 30 alumni and partners heard a fascinating list of facts from Chairman David 'Yogi' Bishop. This included news of members not able to be present and information about illustrious alumni.



IC in Vic reunite

CHEMICAL
ENGINEERING 1975Ready again
in five years

ALTHOUGH not as successful as they would like to have been in contacting people, organiser Dave Barnes reports that 12 of the year (and two partners) attended Chem Eng 75's 30 year reunion in the Hoop and Toy in Thurloe Place.

'It goes without saying that we had a great time last September. As all those who came had been to the previous one, we didn't have problems recognising each other. We had 12 out of the year who managed to come, plus 2 partners. We hope to do a similar thing again in five years' time.

Attendees from the year were Chris Alderton, Dave Barnes, Deryck Cebula, Shirley and Nigel Fletcher, Bernard Hagger, Chris and Priya Murray, Steve Robinson, David Rumsey, Nick Takel and Mike Tuck. **Dave Barnes (Chem Eng 75)** david.barnes@rhul.ac.uk

Big turnout for great event!

HELD FOR the first time in Canada, the 31st Annual ICENAE (Imperial College Exiles North America East) Reunion last autumn was a resounding success.

The sun shone on the 61 people for the entire weekend and the facilities and activities provided by Fairmont Chateau, Montebello and nearby locales in La Belle Province (Quebec) met with the approval of all.

Continuing the traditions established in prior gatherings

in the Adirondacks, mountains were climbed, trails hiked, golf and tennis played, horses and bikes ridden, pools swum, canoes paddled and historical landmarks and artisan shops visited.

The wining and dining that interspersed these physical feats were excellent and the noise level of the group attested to the enjoyment of connecting/reconnecting with others who share the IC experience.

Ros Corr (RCS 66)
rosamundr@aol.com

Alan stands in at
plumbing institute

ALAN WOOLASTON (Aero 55), a Past Master of the Worshipful Company of Plumbers, has been appointed Acting Chairman of the Board of Trustees of the Institute of Plumbing and Heating Engineering (IPHE). Currently he is also Chairman of the IPHE Annual Conference. He will retire from that position at the IPHE Centenary Conference in Torquay. Email: akw3@tutor.open.ac.uk

In Brief

Developing success

ANDY CULMER (EE Eng 98), with a fellow director and his brother as an employee, is running a small hardware and software development consultancy I.T. Dev Ltd. In a few months work has grown enough to employ double the people.
andy.colmer@itdev.co.uk

Water world

RUPERT KRUGER (MSc Environmental 92) is in California as Vice President of Water and Environment (USA) for Atkins. It follows other work in the UK water industry, including for Water UK. He'd like to contact alumni in the vicinity.
Rupert.kruger@atkinsamericas.com
See article next issue.

Award well spent

GIL RABBIE (Chem Eng 04) used his Rosen Award to support a volunteer programme in Argentina. See his article in the next issue. He's now a process engineer for Procter & Gamble.
gil.rabbie@gmail.com

Racing hope

PHIL SHARP (Mech Eng 2003) has come fourth in a race from France to Brazil which he hopes will launch his solo yacht racing career. See more by visiting www.philsharp.com

Nickel refinery planned to help world demand

Gavin Becker (Met 74) writes about the study phase of the project he is managing

GLADSTONE Pacific Nickel Limited, which was listed on the London Stock Exchange in March 2005, is raising monies to complete studies on the viability of a large nickel refinery to be built in the port city of Gladstone, central Queensland.

This substantial project is designed to mine and beneficiate nickel and cobalt laterite ores from Marlborough (70km NW of Rockhampton) and pump beneficiated ore in a slurry pipe-

line 175km to the processing plant in Gladstone. Recovered high purity nickel and cobalt from a high-pressure acid leach plant and metals refinery is intended for sale into the world's stainless steel and alloy markets.

Additional ore supplies will be brought into the coastal refinery from various locations in the south west Pacific, where the bulk of the world's quality nickel laterite ores are situated.

The port of Gladstone is

about to expand to be the world's largest coal export facility. This infrastructure will also be available to facilitate ore importation for treatment at the processing plant.

The Gladstone Nickel Project can be expanded in stages, and the plant has the capability of ultimately producing ~130,000 tonnes per annum of nickel (~10% of world demand), and some 11,000 tonnes a year of cobalt by-product.

Stainless steel growth since the 1960s has seen nickel demand increase by 3-4% a year. Recently this has been exacerbated by demand in China.

New nickel projects are few and far between, with projected nickel demand much greater than projected supply. In turn this means that there is a need for several projects of Gladstone's scale (or equivalent) from 2010 onwards.
GSB@gladstonepacific.com.au

A surreal weekend in the Lakes

'WE HAD a great weekend although a bit surreal with people who you had not seen for 40 years arriving Friday evening and disappearing Sunday morning. On Monday it was hard to believe it had happened' writes. Alan Harle about the reunion of 17 Metallurgy students and partners last October. It was held at the famous Wild Boar Hotel near Kendal.

'On Saturday the party split into two. The energetic group sailed half way down Ullswater and then walked back to the ferry, whilst the more sedentary group went toured the lakes. After a pleasant day out a celebratory dinner featured a display of photographs of student days. But the photographic highlight of the weekend was Barry Keyworth producing an official Imperial College sheet of mugshots taken in 1962.

'Dean Brendon Parker came from Sydney, but the traveller of the weekend had to be Raffi Armenian. With his wife he arrived in London on Friday morning from Toronto and returned on the Sunday afternoon. Luckiest person present was Professor Peter

Draper who had survived the Pakistan earthquake the previous Saturday.

'It's interesting to note that whilst we all graduated with an engineering degree, 15 made careers in other areas, ranging from merchant banking to patent law.

'We've failed to locate three of our original group – Martin J Adams, John M Evans and Charles WE Johnson. Can you help please? **Alan Harle** alan.harle@btopenworld.com



ABOVE:The Geology Field trip, Easter 1963, including three professors and the three missing people sought by metallurgy colleagues. **BELOW:** Colleagues 40 years on.



Consulting news from India

NOW 93 years young and retired Maneklal Bilaney has written about the consulting engineering company he started in 1939 in Bombay. He won a scholarship to England where he gained his MSc in 1936.

He became the driving force behind MM Bilaney & Co, one of the largest engineering companies in India. and, in the 60s, started what was probably the first Indian consulting engineers' office in Germany.

The company has been responsible for thousands of projects and worked with many overseas companies setting up plant in India.

A keen Rotarian, Maneklal Bilaney has received an number of awards for services to consulting engineering.

E-newsletter in Singapore

IT'S BEEN a busy time for the Imperial College Alumni Association of Singapore (ICAAS), according to information received through an emailed newsletter.

The first two issues mention visitors, including Sir Richard Sykes, Sir Eric Ash and Prof David Ewins.

Mention was also made of

a crowded programme of talks, visits and nights out. and that Imperial College is top choice for Singaporeans. In 2003-04 it more than doubled those at Oxford and was well above Cambridge.

The Dragon Boat team is also looking for recruits!

To go on the mailing list, email ICAAS President Hing Yan Lee on hingyan@ngp.org.sg

Peruvian award for miner

IAN DUN (MinTech 71) was awarded the Peruvian National Mining Award 2005 for his joint paper with Peruvian fellow worker Jorge Diaz on the recovery of fine cassiterite from old tailings.

Ian is Metallurgical Manager for MINSUR SA (Peru). igordon@minsur.com.pe.

Centenary suggestions from Malaysia

ITTEE CHEAH (Mech Eng 76), CGCA's representative in Malaysia reports meeting the Imperial College team at February's Education Exhibition in Singapore. Assistant Registrar Sue Stone introduced Imperial College to a full house while Dr Stepan Lucysyn, Senior Lecturer and Undergraduate Ad-

mission Tutor, (Electrical and Electronic Engineering), attended to a steady stream of applicants.

'With the centenary year round the corner, I suggest we should organise some events in this part of the world like a graduation ceremony in Penang, similar to those held in Singapore and Kuala Lumpur. We could also

organise an Imperial College forum the same weekend.

'I would enlist alumni I recently met such as S K Ong (Mech71), SH Wong (Mgmt Sc 75), GY Leong (Civil 80s), Hing-Yan Lee (Mgmt 80s), E J n (Mech 90s) and P J Toh (also 90s)', he concludes. icheah@yahoo.com

Early influences defined MC's core values

DAVID TRAIN (Chem Eng 49&55) counted himself lucky that at crucial points in his education he was supported by teachers like those at Lady Hawkin's School, Kingston, who gave him encouragement and guided him with both vision and direction.

David was the son of a wounded Great War soldier, a king scout and a Herefordshire hedger and it was these as much as his subsequent degrees and careers in pharmacy and engineering that moulded and defined him. He developed core values that guided him throughout his life.

During his war career in the Royal Army Medical Corps, his Military Cross was

awarded 'for valour in saving lives. While in support of the Regimental Aid Post, 4th Battalion the Welsh Regiment during an attack in hilly and densely wooded country in January 1945, in deep snow, he established and ran a Jeep Post over 2,000 yards in advance of the Regimental Aid Post and personally evacuated casualties under continuous shell and mortar fire.

'After dark, when the unit on his right had made an attack and achieved its objective, news came in that casualties were lying in a forward company as the stretcher bearers had been killed and the stretchers broken by shell fire. Without hesitation he led two field

ambulance stretcher squads forward to the company and conducted the evacuation by hand carriage over 600 yards of incredibly difficult ground through heavily wooded slopes with many obstacles caused by fallen trees.'

DAVID TRAIN

Lucky to be demobbed in the summer of 1945, David took up a lecturing post at the School of Pharmacy, London University, helping to allow all who were eligible to study a degree at university.

He had married Jeanne Edmunds in 1943 and after the war they settled down in London and had two sons.

David had the opportu-

nity to read a second degree in chemical engineering after which he gained his doctorate in pharmaceutical production.

He was a reader in pharmacy at London University and a visiting professor at University of Wisconsin, USA, before becoming a partner in Cremer and Warner, consulting chemical engineers, in 1960. It was a position that he held until his retirement in 1983.

He received the Institution of Chemical Engineers Arnold Green Medal for services to the Institution in 1977 and he was elected a fellow of the City and Guilds of London Institute and the Royal Academy of Engineering.

Peter Train

JOHN BRAY

WILLIAM (John) Bray CBE (Elec Eng 33&3), who died in September 2004 just before he was 93, had a career with Post Office Engineering spanning TV

licence-dodger detection vans and Goonhilly.

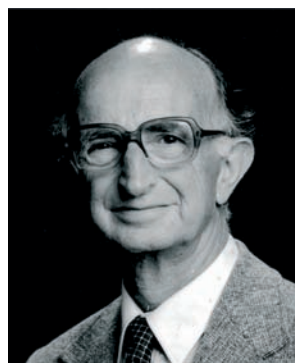
He held the commanding heights of the world of radio communications for decades and led the research labs of the PO when they were at the peak of their great achievements.

Sound basis in electronics

JOHN SPARKES (right), who died last 10 November aged 80, was a lecturer at Imperial for only five years but in this time he redesigned the whole of the second year electronics laboratory so that each activity was a mini-solving project. Head of the department – Willis Jackson, (later Lord Jackson) – was highly delighted and proposed him for promotion.

John was friendly with Prof Colin Cherry, famous for his book *On Human Communication* and used to help him with his research students. Later on John shared a common first year course on electricity and electronics with Prof Eric Laithwaite.

John Sparkes worked on radar during the war and then went into the electronics industry, where he made



JOHN SPARKES

significant advances in the understanding of transistors.

After his years at Imperial College he became Dean of Students at Essex University. His final post was at the Open University where he was Professor of Electronics and pro Vice-Chancellor.

Colleen Richardson

Mainstay of sailing club and Horners' Company

LEONARD SMITH (Chem Eng 47&52) who has died at 78, was one of the wartime student generation. After graduating from RCS in 1944 with a chemistry degree, he moved to chemical engineering where he completed his PhD in 1949 after service in the Royal Navy.

His early career involved the engineering of cooling systems but he soon found his interest in writing as joint editor of *Rubber (and Plastics) Age*. He spent most of his life as a consulting engineer in the field and was a significant contributor to the Plastics Historical Society.

He was a keen sportsman, being a most competent sailor and a mainstay of the Thames Club in Teddington. This lifetime interest did not prevent him from an active tennis and squash career.

Len was a lifelong supporter of the Worshipful Company of Horners, being admitted to the Livery in 1960. He served as Assistant Clerk during the late 80s and

LEONARD SMITH

was Master in 1999. Recently he reproduced and corrected the ordinances, acted as archivist and was drafting an updated Horners' history at the time of his death.

He was a kind, considerate and loyal man who gave freely of his technical and historical knowledge to his friends and colleagues.

WE REGRET that it has become necessary to abbreviate obituaries published in these pages. In particular, notices of alumni deaths which are more than a year old will be very brief. Some will be available to read in full at www.imperial.ac.uk/engineering/about/alumni/ imperialengineer

CATON CROZIER

ANTONY (CATON) CROZIER (Civils 58), who died in hospital on 15 March, aged 76, was latterly Membership Secretary of the Conseil National des Ingénieurs et des Scientifiques de France (British Section). He served on its Council for many years and was President in 1998.

JOHN ROBERTSON

JOHN ROBERTSON (Civils 56) died suddenly on 8 Feb 2004 at his home in Falmouth having just returned from a holiday in China. He had moved to Cornwall in the 60s and was a keen sailor.

JOHN TAIT

JOHN TAIT (Ae 58) was a long-time employee of Boeing Airplane in sales support for its civil aircraft sales to the Middle East and, before that, of Grumman Aircraft in Long Island, NY. He died last August in his home in Seattle.

A bridge between theory and practice

WHEN Raymond Sugg died on 27 November aged 81, many in the world of medical anaesthetics mourned the passing of an engineer who inspired both admiration and affection, a man with a mind that could bridge the gap between theory and practice. It was his gift for innovation and invention that had singled him out for a scholarship at 16 to Imperial during World War II.

After war work at Westinghouse, Ray returned to his family business William Sugg and Company, famous for its gaslights, cookers and heating, but in the late 50s moved to the more rarefied world of anaesthetic gases.

Within five or six years of his arrival in the world of medical equipment, he had overseen the building of a new factory with the trade name of Penlon developing a whole range of innovative ideas in the field of vaporisers and ventilators. Used throughout the world, they were

particularly suitable for field hospitals.

It was Ray's genius to link the skills involved in producing delivery systems of gases upon which anaesthetists and patients would rely and he worked with the great medical minds of the day.

RAYMOND SUGG

Ray, in many ways a modest man, was a natural team worker, giving young designers their head and using consultants to scrutinise every detail of a product.

He was proud for his team when his Oxford Ventilator won the first-ever Design Award for Medical Equipment in 1976. Useable on patients of all ages, regardless of poor operating conditions, simple robust and sensitive, the machine was the epitome of Ray's philosophy of engineering. It was followed by a whole range of similar developments. The Society of British Anaesthetists recog-

nised his achievement with a Pask Award.

Whether it was decorating his homes with Betty, cooking, or designing medical equipment with a worldwide status, the secret of Ray's success was utter concentration and ability to develop and codify his ideas. He helped to establish standards for the industry, working long into retirement on committees and sharing his enormous experience. Indeed, retirement never meant disengagement for Ray. **Philip Sugg**

AS WE go to press we have also heard of the deaths of
Alfred Grondijs –
(Min Eng 39&48)
Russell Harris
(Earth Resources 96)
Donald Miller –
(Mech Eng 45&48)
Leslie Moore –
(Mech Eng 52)
Marten Meyers –
(Earth Resources 97)
Peter Spear (Civils 57&62)

'Motor racing's most outstanding engineer..'

FELLOW motorcycle enthusiast and mech eng student Sir Noel Davies recalls that Keith Duckworth's skill and flair as an engineer were apparent to classmates, tutors and lecturers alike. He died on 18 December aged 72.

'He always tackled every problem from first principles, eliminating as far as possible, 'factors of ignorance' as he called them. This and his meticulous attention to detail account for the remarkable reliability displayed by the products of Cosworth Engineering.

'Keith was an enthusiastic member of the college motor club and followed me as club captain in 1956, thereby being responsible for the driving and maintenance of Bo.

'Keith's enthusiasm for two-wheeled motoring soon extended to the four-wheeled

variety with the acquisition of an Austin 7. This was suitably breathed on with Keith's ideas on cylinder head and carburettor design. A unique feature was its spare steering wheel, which when waved vigorously out of the driver's window, caused consternation to other road users!

KEITH DUCKWORTH

He then had a Lotus 7. Lady passengers had to remove their high-heeled shoes so no damage was done to the stressed skin floor.

'I have observed and appreciated his success both as an engineer and a businessman, from Cosworth's early beginnings in North London to the impressive facilities in Northampton.

He had strong views about everything and loved a debate. A conversation with

Keith, whether over a pint of beer or across the office desk, would often turn into a marathon which could only be brought to a conclusion by you capitulating. His strong sense of humour added to the proceedings and enabled relationships to be maintained!

'The British motor racing industry has lost its most outstanding engineer of the last 50 years, and those who knew him well have lost a loyal and trusted friend.'

The name Cosworth was derived from a combination of Duckworth and Costin. Mike Costin and Keith met at Lotus and forged a lifelong friendship, setting up Cosworth Engineering in 1958.

It became famous for its high-performance engineering, especially for the Ford-Cosworth DFV V8 Formula

One engine – a legend in Grand Prix racing circles.

In the early 60s, Keith concentrated on designing a series of racing car engines including the SCA F2 power unit. In 1965 he linked up with Ford and produced the FVA F2 and the three-litre DFV V8 engines. He had perfected the narrow angle/four-valves-per-cylinder/twin-overhead camshaft cylinder head layout, which the rest of the motor industry began to copy. In the 80s, at the age of 55, he passed over the chairmanship of Cosworth to Mike Costin. The business had grown too large for him to control it as closely as he would have liked.

A website has been instigated in his memory – keithduckworth.co.uk and has been filled with memories of people who revered and loved him.

Colleen Richardson

Pete, a perfect RSM miner

Taken from the obituary written by Barry Harding, eldest son of Peter Harding who died on 24 January aged 86

AFTER an early childhood based around south east London and Kent, Peter Harding was schooled at Dulwich College where he gained an entry to Imperial College to study metallurgy.

When war broke out in 1939 he was evacuated to Swansea with the Metallurgy department. However, the stay was short-lived and he went off to war as a pilot officer affiliated to Air Reconnaissance. In August 1941 while on a mission to Kiel, his Spitfire engine failed over Germany. He parachuted to safety and was captured by the Luftwaffe.

Great Escape

During his time as a POW he was involved with the Great Escape and numerous others and exercised over the wooden horse. Due to asthma he wasn't allowed into the tunnels which probably saved his life. His role was to obtain whatever tools and materials to be used in the escape efforts. This was very evident with his passion not to throw things away.

After the Germans deserted the camp, he was captured by the Russians before repatriation to England. While dad did not talk too much about the war years he would relate some of the more interesting times.

Dad was demobbed in August 1945, having spent the best part of four years in the POW camp, and returned to Imperial to complete his degree in metallurgy.

He became heavily involved in the college activities joining the various clubs and completing his degree. He became President of the Imperial College Student Union and also joined the Masonic Lodge becoming Master in 1970-71. Imperial became his love and his support of the RSM, Chaps, 22,

PETER HARDING

and Links clubs became legendary.

He started working for Bermondsey lead smelter Enthoven and Sons and stayed with them for 33 years, retiring at 63 as Technical Director. As he started his career he was introduced to

solid marble swimming pool appeared. This provided a perfect place for us kids to learn to swim, swing from the trapeze and ropes suspended from the ceiling and have tons of fun. In the bitterly cold winter of 63-64 Dad took a pair of skates down to the pool and swung down from the trapeze onto the frozen pool and skated to the end. We all thought he was a bit crazy but that was Dad. The



BACK IN THE COCKPIT: Peter during his 75th birthday flight in Carolyn Grace's two-seater Spitfire. It was the 22 Club's gift to him.

Sheila, his first love, and married her in January 1952. Dad's love for Mum was very evident when she suffered a very severe stroke some 11 years ago. He still believed a cure could be found.

As we were growing up Dad slowly cleared the land and stable he had purchased in Chislehurst. He was always on the go, building something and making additions to the house. I'm not even sure if he's finished yet. All our neighbours have said they are going to miss his ability to fix things. This, from a son's perspective, was the perfect place to grow up. The pool, which during the war had been used to grow mushrooms, was cleared and a

large grounds also lent themselves to large parties some formal, some not so formal.

Holiday time was spent at Dad's other love, Salcombe. Most years Dad taught us rowing, sailing, boating in general, water skiing (which Dad was still doing into his 70s), fishing and a general love for the sea. Needless to say great fun and lots of fond memories came from Devon.

Raconteur

As we kids grew up and as soon as I could drive, my first role was to act as driver collecting Dad from his many activities at Imperial College. On numerous occasions I would walk into either the Union or South Side bars to

find him surrounded by contemporaries, students, and recent graduates hanging on his every word or listening to a good joke. Occasionally I would join him at the dinners and suffer the consequences the following morning.

Dad was certainly an influence in my choice of career as I have spent the last 30 years in metallurgical roles in South Africa and now Australia. He has also encouraged my daughter who has just completed her studies in extractive metallurgy at West Australian School of Mines.

Community work

During his time with Enthoven he became very involved with the local Bermondsey Sea Cadets especially assisting with the mammoth task of looking after the Brixham trawler Kenya Jacaranda. He continued to consult on lead metallurgical issues and several jobs in South Africa allowed him to visit me and my family.

Finally his last love – Spitfires. I'm not sure what triggered him to recount his war interests. Part of the reason was the realisation that many of those involved in the war were dying without imparting their knowledge and experiences of what really transpired.

Dad became involved with the Spitfire Society, Air Crew Association, POW and other related bodies. The highlight for him was digging up his Spitfire aided by the local Germans, some of whom witnessed the plane's final dive, and visiting the Jever Air Base where he was first taken prisoner. Thus the nickname 'Spitfire Pete'. His talks and enthusiasm to impart his experiences and knowledge can only be a shining light for those of us who follow.

As we say farewell to 'Spitfire Pete' I would like to remember what so many fought and died for so that we may be free.

Dad, you've crossed Salcombe bar.

