



ACSE

Encouraging academic excellence

University Student Scholarship

The Association of Consulting Structural Engineers of NSW

Who is ACSE?

ACSE (The Association of Consulting Structural Engineers of NSW) was first formed in 1933 and in 1968 merged with *The Association of Consulting Engineers Australia* to become ACEA's structural branch. *ACSE* still retains its own Board and membership.

What does ACSE do?

ACSE has a long and proud history of service to the engineering profession and has contributed to many of the positive changes that have occurred within the industry through the years.

ACSE works to improve the technical practice of Structural Engineers through continuing professional development seminars, annual seminars and through the funding of research. It seeks to strengthen ties between practice and academia through its University Lecturing Program run at the University of Sydney and the University of NSW.

It endeavours to encourage academic excellence through the ACSE University Student Scholarship scheme and the ACSE Prizes awarded annual to students.

Who qualifies for an ACSE University Student Scholarship?

ACSE actively seeks to promote excellence in structural design among Engineering students.

Each year six Universities in NSW are invited to nominate one outstanding final year undergraduate structural engineering design project for consideration, with eligible projects having been undertaken during that current year.

The nominated student must be either employed as a structural engineer already or intending to seek employment as a structural engineer after graduation.

The scholarship consists of work experience in three different overseas structural consulting firms over a six week period with airfares paid and \$6000 living expenses provided.

Upon return the selected student is required to submit a 1000 word report to ACSE describing his/ her experiences.

We believe experience speaks for itself so we have included a report by the 2003 inaugural winner and a former student of the University of Sydney, Daniel Cook, on his experiences working as a professional engineer in practices in London, Dubai and Jakarta during his ACSE Student Scholarship.

The 2004 ACSE Student Scholarship winner and former student of Newcastle University is looking forward to travelling to London, Dubai and Beijing in early 2006.

AN ENGINEERING JOURNEY-2005 A REPORT ON THE INAUGURAL ACSE STUDENT SCHOLARSHIP

By Daniel Cook

The profession of engineering is based on the immutable laws of science, laws that do not change from week to week nor from one corner of the globe to another, but while these basic principles of engineering remain constant all over the world, the way in which they applied to achieve the most beneficial results varies quite dramatically.

In the months of February and March of 2005 I was privileged to travel to three very unique environments and experience life as a professional engineer in each of these wonderful places as part of the ACSE Student Scholarship. My three destinations, London, Dubai and Jakarta, provided me with three totally diverse experiences of the engineering profession and over the six weeks of the trip I managed to gain a wealth of knowledge that I know will benefit me for the rest of my life as a professional engineer.

My first destination, London, could be said to be the heart of the modern western world, and is home to some truly astonishing structural engineering feats of the past, iconic symbols of the present and some brilliant ideas for the future. My time in London also reinforced my thinking that Australian firms are at the forefront of the engineering profession around the world, as many Australian firms are playing significant roles in some of the larger projects currently being undertaken in the UK.

Dubai is a city where the boundaries of the construction industry are being pushed to the limits. Seemingly every project being undertaken in the city is tagged as either the world's first, or the world's largest of its kind. From man made islands to the world's tallest buildings, nothing is beyond the imagination of the Dubai people, nor are any of these challenges beyond the abilities of the engineers driving them.

The city of Jakarta is a mass of people – the population of Australia in a city barely the size of Sydney. It is a place where the construction techniques and building materials used differ greatly from those here in Australia, and consequently the way in which an engineer must approach any given project requires some additional thought processes in order to ensure the job can be completed in the most efficient manner.

The six weeks of the ACSE scholarship trip were a remarkable journey, one in which I learnt a great deal and had one of the most extraordinary times of my life. It is my hope that I can convey in this report some of the many experiences I had and the knowledge that I gained in my travels.

LONDON

The first stop of the trip was London. I was privileged to be able to work in the St. James' Park office of Connell Mott MacDonald during my stay and be involved with some of the most prominent jobs in the UK. The redevelopment of Wembley Stadium, the Manchester Chief Justice Centre, Terminal 5 at Heathrow, all of these projects were in progress during my time in the London Office and I was fortunate to be able to get a greater understanding of each of them during my two weeks.

Wembley Stadium is one of the landmark stadia in the world today, and the redevelopment of the Stadium is one of the major engineering projects being undertaken in the United Kingdom at the moment. Having not been involved in stadium construction before, and being a bit of a sports nut, I was very excited to get the opportunity to travel out to the stadium and have a look around to fully understand the structure and how it all worked. I spent two days at the Wembley Site office helping check shop drawings and learning more about the construction of the new stadium and seeing how a project of this scale operates. The main arch is a very impressive piece of engineering and the chance to have one of the main design engineers' talk me through a lot of the design issues involved in developing the Stadium was an extremely educational opportunity.

Terminal 5 at Heathrow is an enormous project. Over 50 different companies are involved in the sub-contractors. The most impressive thing about the Terminal 5 project though, is not the construction itself; it is the way in which all of the consultants and builders operate. All of the consultants, builders, and even the client, work together in teams, so that a structural engineer in his or her site office will be sitting directly next to one of the architects and across from one of the builders.

The idea is that any problems can get rectified much quicker and any queries can be answered immediately. This sounds a bit awkward at first but once you see how the construction is progressing and talk to people involved in the project you soon come to realize how successfully this system is working, it seems to encourage a very pro active working environment. It does help that British Airways, one of the UK's largest companies is the driving force behind the idea.

During my time in the London office of Connell Mott MacDonald I also had a chance to undertake some design work. This was a great experience as the site I was working on had a great number of constraints on it and some thoughtful engineering solutions were required to develop some economical answers for the client. Also, designing structures in London is quite different to structural design in Sydney, different ground conditions, snow and ice considerations and temperature differentials all play a major factor in structural design in this area and its proved to be a wonderful learning period for myself. All in all the two weeks which I spent in London turned out to be a very enjoyable and educational encounter.

DUBAI

The construction industry in Dubai is simply unbelievable. I cannot imagine any other place in the world that could possibly sustain the development that Dubai is undergoing, and is expected to experience in the coming years. As Dubai tries to establish itself as a tourist Mecca every new construction seems to boast about being either the world's first or the world's largest of its kind. Whilst I was in Dubai I visited the site of what will be the world's largest shopping mall, the Mall of the Emirates, and then days later I visited the Burj Dubai site, where it is planned not only to build the world's tallest building but also a shopping mall larger than at the Mall of the Emirates, this sort of thing typifies Dubai-there is always something much grander on the horizon.

My time in Dubai was spent with Hyder Consulting who are involved in some of the more interesting jobs currently going on in the city. Fortunately I was able to get involved in some of these projects whilst I was in the UAE. The Jumeirah Beach Residence, the Mall of the Emirates Snow Centre and the Burj Dubai were all projects that I was able to experience first hand; I even was able to undertake a design review of an irrigation tank on the Palm Islands.

The Mall of the Emirates is an incredible project, the largest shopping mall in the world – with its own in-door snow centre. Hyder Consulting were the design engineers behind the snow centre, or snow dome, project. Even just considering a project like this is fascinating – inside the snow dome it will be -1.6° C, while outside in the summer months the temperature will rise to around 50° C, creating an enormous temperature differential in the structure that had to be overcome. Seeing a structure of this scale, and being such a mind-blowing concept, was a very special experience.

The Jumeirah Beach Residential is an enormous development containing 36 residential towers, each around 40 stories high, and all being constructed simultaneously, I've never seen so many cranes. This is the sort of project where you can really get a feel for the construction industry in Dubai, the construction work at the Jumeirah Beach residence is constant – 24 hours a day for 6 ½ days of the week (Friday is only a ½ day so that the workers can practice their religious faith). Seeing this scale of construction all being undertaken at once is totally bewildering when you see it for the first time.

One aspect that you come to appreciate from working in a place such as Dubai is how the different environment affects the engineering process. Many of the buildings being constructed in Dubai are being designed by foreign companies, in some cases in design offices overseas – in Australia for example.

The problem with this is that Australian designers in most cases are used to working with Australian builders, and a skilled workforce, whereas the construction workforce in Dubai, whilst enormous in numbers, is not a highly skilled workforce and consequently several issues arise during the construction phase. On site engineers have to be able to spot these complications, sort them out, and then convey the solutions to the contractor.

Dubai is one destination that I now believe every engineer would enjoy immensely and should visit in the next decade. The construction there is non-stop and absolutely staggering. It will be interesting to see just how many changes this unique city goes through in the next decade or two – I'm sure it will be quite astonishing.

JAKARTA

After seeing the incredible construction being undertaken in Dubai and being involved with some extremely large scale and world-renowned jobs in London, Jakarta provided another completely unique engineering experience that again broadened my professional perspective. The construction industry in Jakarta was vastly different to those I had encountered in London and Dubai, different construction methods, a different type of workforce, but the same engineering principles that remain unaltered the world over. Whilst in Jakarta I had the opportunity to work as part of the design team on several different jobs which enabled me to gain a unique perspective into life as a structural engineer in Jakarta.

Due to recent unrest in some of the Indonesian cities several international companies and embassies are upgrading the security measures to protect against any future acts of terrorism. The bombing of the Australian Embassy highlighted the fact that better security measures were required to ensure that people employed by these embassies and companies deemed to be open to such an attack could enjoy a safe working environment. Part of my work in Jakarta was at the Dutch Embassy where I was able to become involved with some expansion and renovation of the embassy, as well as seeing the retro fitting of security measures that would serve to protect the embassy staff and visitors and would also deter any would-be-attackers.

Another project that I was fortunate to be able to be involved with was the design of a blast wall and vehicle entry houses at the offices of HSBC in Medan. Before my time in Jakarta I had not done any significant work in the design of structures to resist a blast loading, so the work I was undertaking in Jakarta was both fascinating and highly beneficial.

Since returning back to work in Australia I have become involved with the design structures required to resist blast loading – and the fact that I was able to gain some exposure to the types of forces involved, and strategies that are being used to deal with these blast forces has been, and continue to be, highly beneficial.

The six weeks I spent travelling around the world was a fascinating journey, not only an engineering experience, but a true life experience. To have the opportunity to travel to the three different destinations that I did and live as a consulting engineer, if only for a couple of weeks, was truly the opportunity of a lifetime and an experience that I will never forget.

Most engineers have to wait several years before they get the opportunity to travel abroad and practice their trade. To work in three totally diverse environments over the globe is usually a feather in the cap of a long serving, and rather fortunate senior engineer. To be given such a chance at the beginning of my engineering career is an opportunity that I will always appreciate and certainly never forget. Engineering is a profession in which you gain knowledge through exposure to different designs, models, conditions and environments, and it is because of this I feel that I have learnt such a great deal by being given this privilege.

In bringing this report to an end I would like to thank many people who helped me throughout my journey, firstly to all the members of the ACSE, who made this wonderful journey possible. To Simon Baker, Peter Merenu and the staff at Connell Mott MacDonald in London, Ian Burns and the team at Hyder Consulting in Dubai, and Marten Eddy at TTW Indonesia, who not only showed me around the engineering side of Jakarta, but also acted as my personal tour guide and host. The biggest thanks must go to the two people who were instrumental in the organisation of the trip, David Carolan and Rhyl Martin, without their organisation the trip would literally not have gotten off the ground.

So to all involved... Thank you