

AUSTRALASIAN ASSOCIATION FOR ENGINEERING EDUCATION

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Jagiellonian University of Cracow, Poland, held the East-West Congress on Engineering Education between 16 and 20 September, 1991. This was the first and successful international activity sponsored and organised and by the AAEE. The Australian Ambassador to Poland, His Excellency Anthony C. Kevin was the Guest of Honour of the Congress. His Excellency addressed Congress participants at the Congress Dinner. His address is presented overleaf. Picture above shows Ambassador Kevin addressing participants at the Congress Dinner. In the background are members of the Congress Steering Committee.

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**Electrical Engineering
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Thank you Mr Chairman [A/Prof. Robin King] and thank you Dr Pudlowski, for asking me to be here tonight. It is a great pleasure to be invited here to Cracow and to be with you all this evening, for several reasons. Firstly, as our Chairman has already indicated to you, I am myself originally an engineer. Zenon [Pudlowski] did not know this when he invited me to come to this Congress. Perhaps, had he known, he might have thought better of it. Anyway, for better or for worse, I went to Sydney University from 1958-1962, and in fact did a civil engineering degree. I then became, like everybody else, an economist, and joined the foreign service in the early sixties.

I should say at the outset that there is a big difference between what is seen in the programmes on embassies, and the real life in the embassies that I worked in, that I did not spend my working day with a glass of whisky in my hand. The only thing I ever got offered was a cup of coffee, which probably makes for a less exciting but a more productive working day. The other thing about it is that it reminds me of a Polish saying: that your enemies tend to be close and your friends tend to be far away. Being ambassador to Poland I do not have any of those kinds of problems, that some of my colleagues in countries closer to home experience. In fact, I can say that Polish-Australian relations are exceptionally good and warm and friendly, one hundred per cent of the time, and we will do our best to keep them that way.

As you all know, Cracow is the city of Copernicus and you probably, or at least the accompanying persons, and, if not the Congress participants would have had the opportunity to see some of the wonderful old mementos in Jagiellonian University, of the work of Copernicus. You may have also seen the replica of his original book, on the motion of the planets which really changed the whole concept of people in Europe at the time, and the world they lived in. I feel that is an appropriate place to start because if it had not been for Copernicus, we probably would not have had Christopher Columbus, if it had not been for Christopher Columbus, we would not have had Captain James Cook, and things might have been rather different in Australia.

I thought I would spend just a few minutes at the outset tracing through some of the Australian-Polish connections; and please, those of you who are not Polish or Australian forgive me, but since we are in Cracow, and since the Institution of Engineers, Australia, has had a lot to do with the organisation of this Congress, if you would allow me, I thought I would spend a little time on that.

It is interesting that even on the first voyage of the *Endeavour* there were two Polish scientists. They went by the names of Rhinehold and George Forster, which is not a very Polish name, but they were Polish. George finished up lecturing at Vilnius University telling his students about the extraordinarily interesting things he had seen on his trip to Australia with Captain Cook. Vilnius of course was Polish at the time. So that was an interesting connection, and I think there were also some Poles amongst the early convicts, but I will not talk about that...

The next interesting connection, is probably Count, as we call him in Australia, Strylski, but as our Polish colleagues would prefer to hearStrzelecki.... and he discovered Mount Kosciuszko [Gen. T. Kosciuszko]. He is also probably the first really important Polish, I would call him, engineer in Australia, because he accomplished many things. He was a geologist, he was an explorer, a geographer, he was also a planner. He planned some of the irrigation possibilities of the inland waterways, using the Murrumbidgee and the Murray river system. He was a very visionary and romantic character. I think, probably, that it is very appropriate that he named Mount Kosciuszko, and the Snowy Mountains scheme then made possible some of the very things that he dreamed about and wrote about. In many ways Strylski - I am sorry I am stuck on that pronunciation and I will have to stick to it - represented what I think of as the characteristics of a Polish engineer, and that is not only a competent knowledge of his profession, but also a streak of romanticism and a streak of imagination. There is something about Polish engineers which is a little bit

different than other engineers. They tend to be depicted as the ones with the big schemes and with romantic vision. I think that is something to be greatly admired.

The other interesting thing is that the Poles who came to Australia in the early nineteenth century were fairly active in developing the Australian wine industry. This also surprised me, as we think of the Barossa Valley, in Australia, where some of our best wines come from, as an area of German settlement. But in fact there were three or four identifiably Polish settlements in the Barossa Valley - Polish Hill River, Tanunda and Seven Hills. They have lost that Polish character now. They have become part of the Australian general community, but for about fifty years these were the villages that spoke Polish, inter-married and accepted Polish migration, and so on.

The big Polish migration to Australia came at the end of the second world war, with about 60,000 people who had fought in the North African and Italian campaigns, under General Anders, who had formed a pre-Polish army. Many of these people had elected to come to Australia after the war, when given a choice of where they would like to settle. I think that it is very much Australia's gain, that we got these excellent people, and they had a very important role in Australia, particularly in developing the whole concept of multiculturalism. I think some of you may know the names of Professor Jerzy Smolicz and Professor George Zubrzycki. These professors are very much the architects of the whole philosophy of multiculturalism in Australia. My own theory is that it is precisely because they did come from a strong and proud Polish community that they could help Australians to understand that migrants were investments and to look after them and to help them assimilate, to help them to adapt quickly and to respect them in their own culture. I think the Poles in Australia helped us learn that very important lesson, which is why nowadays we are probably the most successful example of a multicultural community in the world.

The third wave of Polish migration to Australia is still continuing and probably started in the middle 1970s. These were a different group of people once again. They were very well educated and they spoke good English. Australia had the opportunity of selecting them and they had the opportunity of selecting Australia. Many of them were engineers, and I think Zenon is a very good example of the sort of people I am talking about: people of energy, dynamism, flexibility, adaptability, high intelligence and people who have made a good contribution to Australia. That flow of migration is still continuing, and it is interesting that many of them are engineers.

I would now like to turn for a moment and venture a few remarks on the theme of your Congress, which is the education of engineers. When I went through engineering I had the feeling that I was learning a lot about the basic engineering disciplines - hydraulics, soil mechanics, structural design and so forth, in the civil engineering field. I did not feel I was learning very much about how an engineer fits into society, how he fits into the world of economics and business, and what sort of effect he is having on the environment. All of those things were very much a closed book. That is clearly not true any longer. The engineering profession has broadened its horizon, to a very large degree. It is self critical, it is looking at the quality of the information it is offering and context it is providing for its students. Glancing through the papers of these Congress Proceedings, I think it is very encouraging to see what an enormous change there has been. As an Australian, I am also very impressed by the quality of the Australian papers in that regard. I think that if we do find a solution to the pressing problems of the environment and the green house effect, and so on, then concerning also the energy problems that confront us, certainly the engineering profession will have to be in the forefront of finding those solutions. Certainly, the quality of engineering education will determine very heavily how effective those solutions will be. Engineers are problem solvers, we have big problems as a global community and I am very heartened and encouraged to see that the engineering profession is thinking very responsibly about what is the best curriculum to follow.

My final remarks this evening, once again returning to the theme of Poland and Australia,

and talking a bit about where things are in Poland now. I did mention that the co-operation and friendship between Poland and Australia are very good. We do, of course, suffer from distance and we also suffer from problems of resources. But we have to spread our diplomatic efforts all over the world. One of our greatest assets is the Polish-Australian community, now about 150,000 strong, and also the natural affinity that Poles and Australians have for one another. We are both fairly informal, we are both fairly honest and we seem to get on fairly easily together. Our only problem is that Polish is an impossible language - which I am finding out at the moment. But Poland does stand on the threshold of an very exciting future.

In recent weeks the enormously important changes in the Soviet Union have opened up great possibilities for Poland. Poland in the nineteenth century was very much the Manchester, the industrial heartland, of the whole Eastern European area. This can happen again now, in a very different way. Poland has opportunities not to be on the eastern edge of Europe, but to be really in the heart of Europe. Poland can look westwards to the European community and eastwards to the whole new series of, hopefully, democratic nations - but certainly independent nations - that are coming into existence to the east of Poland. I think that Polish engineers, Polish business people, and Polish technologists will have a great opportunity in these new conditions.

I also very much hope that Australian engineers and Australian business will be there helping them, and at the same time helping ourselves. I have just come back from a mining and energy trade fair in Katowice, which had exhibitors from over 40 countries, and about 133 firms. We ourselves put on a small exhibit. The Australian Trade Commission invited Australian firms to participate. I was a little disappointed that only three did, but they are fairly impressive firms. One of them was the Western Mining Corporation, which is now considering a major joint venture in Poland, in the area of copper mining, with a major Polish copper miner. The second company was an interesting little one called Emergocam, which was started by a Polish migrant to Australia who, after 15 years in Australia, came back to Poland and bought three or four factories, and is now doing very well in developing them in heavy metallurgical engineering. The third company was Mineral Control Instrumentation, which is a technological leader in the area of coal scanning equipment, which of course is something that could be extremely useful in the Polish coal industry. I hope that there will be more and more Australian companies that see the potential for co-operation with Poland, and for joint ventures in this country, and I hope that Australian engineers will go back to Australia with the message from this congress, that Poland is not a basket case, that Poland is a dynamic economy, that is pulling itself up by its own boot straps and that Australian companies should be in there working with them and helping them.

I think that is probably just enough, Mr Chairman and ladies and gentlemen. In closing, I would like to say that I hope you all have found your time in Cracow as enjoyable and exciting as I always find my time in Cracow. It is a wonderful city, with a great sense of pride in its culture and really the best of Poland, and I think that in these last days you have seen the best of Poland. I hope that you will all go back to your own countries, wherever they may be, as ambassadors of Poland. This country, in the last fifty years, has gone through some very hard times. Its people are now trying to make up the damage, they are showing great courage and great spirit, and they need all the help and friendship they can get. I hope that you will all, as you all go home, give them that help and friendship.

I wish you all well for the rest of the congress. Thank you for inviting me, it has been a great pleasure to be here this evening.

*Anthony C. Kevin
Ambassador of Australia*

FROM THE PRESIDENT

I have just returned from a six week period in Europe. The highlight of that period was the magnificently successful East-West Congress on Engineering Education held in the historic city of Cracow, Poland. With AAEE as the leading co-sponsor, the conference attracted much attention to the AAEE and its role as a growing player in the international scene of engineering education. A more detailed report appears elsewhere but I wish to place on record the thanks of AAEE to the Congress Chairman, Zenon Pudlowski, and all those who assisted in its success.

To those who went, the opportunity to meet with international colleagues in such conducive surroundings added much depth to our appreciation of the current challenges and opportunities in engineering education.

Most of the rest of my trip was spent in the UK looking in detail at various aspects of university research, innovation and industry interaction. As I think we all realise, there is much in common between Australia and the UK in underlying structures and in the changes which are sweeping over all our higher education institutions. We have a lot to learn from each other.

Therefore it was no real surprise to return to the statement by Minister Baldwin on quality in higher education. This has been on the UK agenda for some time now and there are many good reasons why it should be there and why it will become increasingly important. As engineers, concerned with quality as part of our professional practice, we should be at the forefront of those advocating a quality programme.

The form such a quality programme should take deserves extensive discussion. I was very intrigued and impressed by the fact that a number of higher education establishments in the UK have actually achieved accreditation for their degree programmes under the UK equivalent of the ISO9000 series (or Australian AS3900 series) of quality standards usually associated with manufacturing industry.

Such standards stress practices, procedures and documentation rather than specific content of a teaching programme. They are structured so that procedures are in place to ensure all necessary steps are taken to provide the best quality of education experience and to identify and trace the cause of any possible failing. Compulsory student surveys and external examiners are just the start of the sort of procedures we all should have in place to monitor and improve.

It is to our credit and to the nation's advantage if we can graduate our students in minimum time and with minimum wastage and with an education/training most cost-effectively achieved.

If we are pragmatic, we realise that the days of high levels of government resource (if ever they existed!) are past and so cost-effectiveness becomes the catchcry of those still motivated to produce the engineering graduates the nation needs.

There is also another reason - the offer of extra funds from the Minister, to those committed to quality. The Minister is to be applauded, and we need to use our conference and other venues to build a common commitment to quality.

*Professor Trevor W. Cole
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President of the AAEE*

PUBLIC EVALUATION OF AUSTRALIAN UNIVERSITIES

In July this year, a financial newspaper, *The Independent Monthly* published a review of Australian universities. The review is entitled *The Good Universities Guide* and was prepared primarily for high school students considering their choice of university. It is an extract from a book *The Independent Monthly Good Universities Guide to Universities and Other Higher Education Institutions* by Dean Ashenden and Sandra Milligan.

The review answers many of the questions that prospective students are likely to ask (or perhaps should ask) when selecting a university and a course of study, providing comparisons on a course level. The following lists are included in the review:—

- * Entrance requirements.
- * Staff/student ratios.
- * Relative starting salaries after graduation.
- * Comparison of libraries.
- * Gender bias in salaries.

The authors give information on how these lists were compiled and how they should be interpreted. Comparisons between institutions from different states sometimes requires conversions to be performed (eg. for entrance scores) and these conversions are also explained.

The reported low gender bias in salaries for graduate engineers is very reassuring. Female engineering graduates are almost on a par with their male counterparts. Only art and design has a smaller bias (law has a negative bias). Let us hope that this equality in the workforce will lead to an erosion of the perception of engineering as a male domain. The review also contains a *Top 12* of institutions around Australia with each entry containing the outstanding qualities of the institution concerned. The book gives greater details on a faculty/school level.

I believe that this review is an indication of a greater consumer awareness that is growing in the student population. With the concept of 'user pays', which has become so popular of late, also comes the concept of customer satisfaction. Higher education institutions will need to achieve and maintain excellence in teaching, as well as research, if they are to survive in the education marketplace of today and tomorrow.

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EXPERIMENTAL STRESS ANALYSIS AND ENGINEERING EDUCATION



Mr Bob Ziv

As mechanical engineering students at the University of Minnesota we were eagerly awaiting the entrance of our new mechanics of materials professor. The year was 1957, and some 50 of us, Mechanical Engineering students, were ready to be launched into real engineering. Although the bell sounded several minutes earlier, there was no sign of the professor. Then the door flung open, and in came a bespectacled, white-haired man in his 50's. In each hand he carried a tray of eggs. He walked onto the podium, faced the class and said: *Each of these trays contains a dozen eggs. The difference between the trays is in their construction. One is made of pressed cardboard, and the other is made of folded cardboard. In a moment I will drop both trays on the hard floor. Before doing so you have to choose the tray that will better protect the eggs. Simply stated, you have to select the better design.*

Inexperienced as we were, and complying with the laws of statistics, about half the class chose the folded tray, and the other half the pressed tray. Professor Ryan carefully positioned himself at the edge of the podium, and holding the trays from above he released his grip. The trays came down crashing on the floor. Careful inspection revealed 7 broken eggs in the pressed tray, and only 2 broken eggs in the folded one. The experiment was repeated twice more with similar results.

In the ensuing two weeks (6 lectures) we did nothing but analyse the construction of the egg trays. No mathematical manipulations, no complex equations. Just good brain work with a lot of common sense. It was an invigorating experience, one that eventually led us to questions that could be answered only by reverting to mathematical analysis. It was years later, during a class reunion, that it dawned on us how clever was J.J. Ryan in his plot to unconsciously glide us into a complex subject.

Throughout that course, and those that followed, J.J. (As he was nicknamed) insisted on accompanying all analytical work with practical experiments. We designed a hydraulic car bumper, built a prototype, tested it, and learned where we made wrong assumptions in our theoretical analysis. We used a similar process with a collapsible steering wheel, and several other automotive components. We had no computers, not even hand held calculators. Just the good common sense of J.J., his practical engineering, and his love of teaching.

Unfortunately this trend is disappearing from the new academic world. Sound engineering practices are being replaced by sophisticated CPU's and super VGA monitors. FEA (Finite Element Analysis) is a powerful engineering design tool. It enables the designer to view his creation before it takes a real shape, and achieve an initial best strength/weight ratio. However, we should always keep in mind that as long as we deal with a drawing on paper or an image on a monitor we are dealing with an imaginary world. Only when the flat image becomes a real 3-D shape that we can touch, we enter the real world. Henry Ford, Graham Bell, and Edison never had the fortune of using computers. Their skeleton innovations put on flesh and skin only in the LAB. About 400 years back it was Francis Bacon who said: *Experimental science does not receive truth from superior sciences. She is the mistress and the other sciences are her slaves.*

Were it not for experimental techniques, today we would not enjoy the luxury of flying in high speed jet airplanes, have efficient comfortable and reliable cars, or reach the moon. Experimental Stress Analysis (ESA) is an accepted fact in most industries. Unfortunately not so in engineering schools. Some schools practise ESA just to enrich their printed curriculum, some have no ESA labs. Several months ago, I visited an engineers' school in Sydney and heard the following statement from a key staff member in the Mechanical Engineering Department: *We use a few strain gauges, no photoelasticity or any other ESA technique. Our main tool is FEA. Our students achieve their final design using the latest FEA software. We believe this is the trend of the future.* It is sad to say that this view is shared by several other teaching institutes and research organisations in Australia.

Some of us forgot, and some of us never knew that teaching ESA may be a rewarding experience. One picture of a photoelastic pattern depicting the stress distribution in a complex structure may open up a new world to an engineering student. Properly done it may be the turning point for this young man. The key words are PROPERLY DONE. As Hardy Cross said in his book *Engineers and Ivory Towers* (McGraw-Hill, 1952): *There is no field of study that requires more careful training or a keener intellect than the devising and interpretation of experiments.*

Too often I hear the excuse that funds are not available for lab equipment. Then, the same person, in the same breath boasts of a recent acquisition of the most sophisticated computers and the latest software. It is time we realise that computers, even with the most super VGA, do not design an engineering structure. It is THE ENGINEER, the human being that innovates, and dreams up the shape that eventually becomes an engineered

product. It is people like J.J. Ryan that make good engineers out of raw young minds.

Mr Bob Ziv

Note: Mr Bob Ziv is a graduate of the University of Minnesota in Mechanical Engineering. He spent fourteen years of design and testing in the aircraft industry and nineteen years with the Measurements Group (USA), doing customer support, technical training, and lecturing worldwide.

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DEVELOPMENT OF SOLAR THERMAL TEST CENTRE IN NEW DELHI - INDIA

Since March 1988, the Indian Government, through the Department of Non-Conventional Energy Sources, has been working with the United Nations (UNTCDC & UNDP), to establish a world class solar test centre, at Gurgayaon, Haryana Province near New Delhi. This centre, located on several hundred acres of land, is designed to act as a focal point for the large Indian renewable energy programme, carried out by the Ministry of Energy

and Civil Aviation. The project expenditure, which will be well in excess of (US) \$5 million dollars in total, includes funding from the local government, United Nations and bilateral aid programmes.

During the term of the three years contract with the United Nations, the test laboratories, workshop administrative offices and guest house will be built; and sixteen local staff will be trained locally and overseas, in Australia and North Africa.

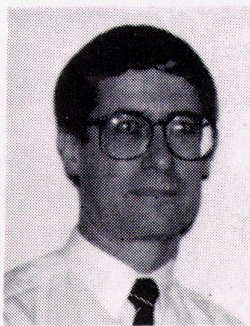
Close liason is envisaged with the local renewable energy companies, in an effort to ensure effective R&D, development of new commercial products, and effective industry and government interaction on the important aspects of product quality control and standards. This will cover a wide range of solar cookers and ovens, solar water and air heating equipment, solar refrigeration and solar thermal power devices.

It is envisaged that the existence of this first class solar facility will aid in technology transfer, and information dissemination on renewable energy technologies in the Indian sub-continent and in other Asian and African nations interested in solar energy development. The centre will be well equipped and staffed to provide a range of short courses on solar thermal technology for Indian and foreign participants. Completion of the United Nations contract is envisaged in 1991, the final contract date - depending on the delivery of test equipment and the status of the staff training programme.

There is little doubt that this far sighted initiative of the United Nations and the Indian Government will lead to greater penetration of solar technologies into the local energy economy. Because of the vast number of villages in India, which are not connected to the national grid, this programme can lead to major improvements in the living standards of millions of people in remote areas of the country.

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TRAINING FOR THE CLEVER COUNTRY



Prof. T.W. Cole

Two hundred years of truncated development and reliance on primary and secondary resources have left Australia poorly prepared to create the skills, attitudes and sense of urgency needed to ever be the clever country.

Australia has already missed out on the energy-based industries of the industrial revolution. The clever country requires us to be leaders in the second industrial revolution, a revolution based on information: its creation, dissemination, application and sale in the form of advanced goods and services wanted by the world markets because of their quality, value, design and innovative use of technology to solve clearly identified needs. The pace of change in the world, and the increasing demands we all place on it, means little time is available to address the needed changes. But the

cultural and structural changes which are needed sit uncomfortably with much of what makes up the Australia of the 1990s.

It is time that Australia took cognizance of the observation of Confucius that there are three methods by which we may learn wisdom; by reflection which is the noblest, by imitation which is the easiest, or by experience which is the bitterest. The bitterness of declining living standards is a reflection of the propensity of the Australians to trust

experience. It is time to reflect and to gain through imitation.

Elements in our great universities fight hard to retain an outmoded (and perhaps never actually true) view of themselves as places of intellectual elitism, of scholarship and research, a place above the needs and material concerns of the society and nation.

Ignoring the community-responsiveness which marked the early Bologna University, our nineteenth century fathers chose instead the monastic model of Oxford and Cambridge. Australia has remained locked into these attitudes of the 1850's and impervious to the developments in the systems used as models.

If one is honest, one admits that Australia is yet to create a university in the top league of international universities.

Led by Vice-Chancellors mainly from the arts, with some from the sciences, but with very few indeed from the professions, they publicly reject the real role a university might make to improving the quality of life and wealth of the country. As a consequence, research is predominantly in pure science with Australia having almost as many research scientists per head as USA and Japan but more than one and a half times as many as France and Germany.

A recent editorial in the *Times Higher Education Supplement* referred to the complication of the relationship between academic and industrial worlds. To industry, *Higher education is seen as unenterprising, (or, worse still, anti-enterprise). The values it instills in its students are regarded as an unwholesome mish-mash of Matthew Arnold and Karl Marx. Universities, in particular, are accused insinuatingly of being more interested in producing graduates keener to criticise rather than contribute to society, to redistribute (if not appropriate!) rather than generate wealth.*

Engineering departments in these major universities developed a defensive position in which emphasis is on technology rather than engineering - on research in abstraction from the commercial implications of the results, in abstraction from the identified needs and opportunities of the marketplace.

Australia's research engineers per head of population number just one third that of France and Japan, one fifth of the USA and just one eighth of that in Germany.

We need to recognise that the best brains are diverted away from the true needs of a clever country within the elite institutions of our nation.

The institutions which do address wealth creation through manufacture and commerce are only now being pulled in from the second tier of higher education. But the reality still holds that they attract the less able students, have less than adequate resources, and have almost no tradition in the applied research and development which underpins the industries of tomorrow.

Even when one looks to postgraduate education, the situation remains bleak. A subset of the universities attracts a disproportionate share of research council grants and plays an over-mighty role in the reproduction of the academic profession. This feedback process dampens greatly the potential for change just at that time when major moves towards wider access compromise much of postgraduate education.

As the *Times Higher Education Supplement* (29 March 1991) reports, *First, as British education moves towards wider access, as much attention needs to be given to the organisation of elite institutions within this mass system as to those which recruit the bulk of the students. ... In recent years there has been much talk of teaching-only universities which many regard as a contradiction in terms; almost no thought has been given to their corollary, research-only universities.*

It goes on to quote Dr George Holmes from the *Oxford Magazine: Britain lacks Institutes of Advanced Study and Ecoles des Hautes Etudes. This lack is itself suggestive; it indicates our attachment to an anachronistic definition of academic excellence. Our instinct is to trust to 'first-class minds', rather than scientific and professional expertise.*

In mainstream academia, the Research Schools of the Australian National University project themselves as the elite, funded directly from Canberra, situated in the nation's capital, remote from the real world of commerce and industry - a dream world in which a fellowship in one of the Australian Academies represents the pinnacle of contribution to the nation.

Just this year ANU added the words *and Engineering* to its Research School of Physical Sciences. Its internal magazine *Advance* proclaims the ANU, and especially the Institute, as representing *the best scholarship in the country* and that the addition of engineering to the ANU, *at the very least has, symbolic value.*

The article points out the wonder of Swiss visitors to the ANU who have difficulty concealing their astonishment at engineering at ANU given that most Swiss engineers graduate from *flagship* federally-funded engineering institutions - the Swiss Federal Institute of Technology at Zurich, and Lausanne. These have the range and excellence in engineering to contribute to the national industrial needs through the best students and to proclaim through their names the unashamed focus on this goal.

Reflection tells us that simply renaming an Institute at ANU will do little, and has potential to do much worse. As *Advance* is prepared to admit, ... *there are the ill-informed [in ANU] who consider that because engineering serves practical ends, it lacks intellectual rigour; ... or that the cultural tone of the university is necessarily lowered by engineering. But leaving them aside, there are a large number of perceptive people who believe that over an extended period, the division of the university's budget is primarily a zero-sum game. If engineering expands, someone else must contract.*

It is not among entrenched values and sacred cows that one will develop the attitudinal change and skills required. It is not in the country's interest if, as the article states, the value of engineering at ANU adds no more than *the very positive contribution to the image of the university among key opinion and decision makers.*

How dangerous any shallowness would be in the context of our national need - a need to attain the long-term standard of wealth for us to afford a quality environment in which the cultural pursuit of pure research can find its place.

To be utterly cynical, one sees that Australia's higher education has for too long exuded elements of the parasite - drawing, without repayment, its succour from the agricultural and mineral resources of the soil, and from the labours of a diminishing industry. Like the bower bird, the established university draws into its nest the bright products of the schools, suppressing even further their sense of urgency and sense of creativity, while destroying forever that recognition of the true role of wealth creation in a sustainable, long-term quality future for our country.

How much true also of Australia it is to quote Janet Daley from *The Independent*, when she says: *I would suggest, there is no shame attached in British society to knowing nothing about science ... Science ... is for schoolchildren, something one grows out of with maturity and the coming of civilised tastes. C.P. Snow had it wrong. It is not so much that the arts and sciences are two cultures as that science is not part of culture at all, and so this country remains chronically at odds with the twentieth century.*

How much truer to recognise that the culture of Australia rejects out of hand the true worth and challenge of wealth creation and so remains hopelessly at odds with the reality

of the information revolution passing us by.

What then, have others done to avoid this position? In the United States of America, the creation of institutions like MIT and RPP in the 1860s, and universities such as Stanford and Berkeley was in the context of a strong and growing corporate industrial sector. These institutions had little difficulty achieving the stature and respect still eluding our own institutes of technology. They had little difficulty in attracting the best students and significant funding. They form a key part of the wealth creation process of the USA.

In Continental Europe, the elite institutions fulfil a similar role. Grand Ecoles in France have equal prestige across all fields with the Ecole Normale providing to technology and engineering that prestige and recognition which assures the flow of funds and students and assists the country to develop and survive.

Australia needs such a focal point, a place of prestige and achievement, a beacon to the good students, a pointer and encouragement for the changes which we must bring about.

There must be created - outside of any existing higher education institution - at least one new national facility. It must be a prestigious centre for advanced learning, research and development in the key elements of the innovation process on which future wealth creation will depend. It must have the focus, resources and charter to attract the very best of Australian talent. Without it, the bitterness of experience will become unbearable.

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Congress Proceedings

The East-West Congress on Engineering Education, under the theme *Improving Training Methodologies*, sponsored by the Australasian Association for Engineering Education was held at Jagiellonian University, Cracow, Poland, between September 16 and 20, 1991.

The Congress papers cover almost every aspect of engineering education, addressing several important issues related to the topics originally suggested for the Congress papers. The papers present important concepts, ideas and achievements of engineering educators and industry leaders, who are involved in engineering education and industrial training with particular emphasis on the role of computer technology in the contemporary teaching-learning process.

Close to 150 academic, industry and public service representatives from over 30 countries registered, presenting over 100 papers. The Congress Proceedings consists of a total of 470 pages. A few extra copies are available for those association members and interested parties who were unable to attend this Congress.

Copies of the Proceedings may be purchased for \$A130 or \$US100 for overseas buyers, postage free, from:

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ENGINEERING EDUCATION CONFERENCES HELD IN EUROPE THIS SUMMER

Conferences on engineering education were held in Prague, Dresden, and Cracow, during September, 1991.

The Prague conference related to *Computer-aided Engineering Education*. The venue was the Czech Technical University and was under the sponsorship of UNESCO in co-operation with World and European engineering education societies. The aim of the conference was to:—

- * Create an opportunity for idea exchange between top specialists dealing with the conceptual and methodological problems concerning the development and trends in engineering education based on the CAE tools.
- * Give an opportunity to present and discuss their experiences in the use of CAE.
- * Recommend a methodological key for demanded engineering education orientation, in respects to industry's actual and future demands, at the edge of the twentyfirst century.

Some thirty five papers were presented from a range of countries, including Australia, France, Romania, United Kingdom, Sweden, USSR, Czecho-Slovakia, Poland, Belgium, Israel, USA and China. Australia was under-represented at this Conference. Dr Zenon Pudlowski, presented a keynote address: *An overview of Computer-aided Education for Electrical Engineering, at The University of Sydney*. Others in attendance included: Dr Michael Moore (RMIT), Dr William N. Roebuck (The University of Sydney) and Dr Roger Hadgraft (Monash University). It was unanimously agreed that there must be further co-operation/interchange, and understanding on the use and management of computers in engineering education. It was proposed that there should be a further international conference, in 1993, with a venue to be determined.

A copy of the proceedings is held by the Electrical Engineering Education Research Group (EEERG) at The University of Sydney. Details of papers can be obtained by contacting Dr William Roebuck on (02) 692 2951.

The Dresden Technical University was the host to the International Society for Engineering Education (IGIP) sponsored Twentieth International Symposium entitled: *Engineering Education, 1991*. People from some twenty countries participated in this conference which was held over a four day period. The main theme of this symposium was *Modern Training and In-Service Training of Engineers - Results and Prospects*. This was reflected with emphasis being made to the following six themes:—

- * Preparation of study programs for the training of engineers.
- * Educational co-operation between university and industry/agriculture.
- * Encouragement of talented students in engineering.
- * Integration of training and in-service training of engineers.
- * Use of computers in the training of engineers.
- * Environmental education for engineers.

Through these themes it was anticipated that advice would be given on:—

- * People and Technology.
- * Curriculum development in engineering sciences.
- * Working with projects.
- * Engineering education in and for developed countries.
- * Women in engineering jobs.

Some two hundred papers were listed for presentation; however, while each paper is listed in the proceedings, only some eightyfive per cent of papers were presented by the authors. A further disadvantage to non-German speaking participants was that only a few were presented in English.



East-West Congress on Engineering Education in Cracow. Picture above shows some of the Congress guests and organisers at the Congress Dinner. Seated are: (l-r) Mrs Marek, Australian Ambassador, Mr A.C Kevin, Z. Pudlowski, Mrs Pudlowski, standing are (l-r): Mrs Sissom, R. King, K. Kveton, T. Marek, L. Sissom, B. Vucetic and T.V. Duggan.

Some very good papers were presented (in English), including; K. Williams, The Open University, UK (*Use of Computing in Distance Teaching of Engineers*), M. Fernandez, University of Madrid, Spain (*A Revolutionary Computerised On-line Search for the Evaluation of Students - Its Use for Tutorial Teaching*), and R. Kenarangui, University of Tabriz, Iran (*Interactive Computer Simulation Packages for Power Engineering Education*).

The symposium was attended by Emeritus Professor Hugo K. Messerle, who presented the paper *Centre for Corporate Engineering*, and by Dr William Roebuck. A copy of the proceedings is held by the Electrical Engineering Education Research Group (EEERG), at The University of Sydney. Should further details be needed, please phone Dr William Roebuck.

The third event was the *East-West Congress on Engineering Education* under the theme *Improving Training Methodologies*. The Congress, held at the Jagiellonian University, Cracow, Poland, was sponsored by AAEE, with co-sponsors including The University of Sydney, The Institution of Engineers, Australia, Jagiellonian University, The International Liason Group on Engineering Education and The Academy of Mining and Metallurgy, Cracow, Poland.

This was a highly successful Congress, with participants from over thirty Western and Eastern countries, including such countries as the Ukraine and Lithuania. The Congress had over one hundred papers, which covered almost every aspect of engineering education relating to *Improving Training Methodologies*.

The essential purpose of this most successful Congress was to bring together engineering educators, from East and West, to discuss common problems and findings relating to engineering education. A further aim was to establish closer co-operation between engineering educators, in a profession sharply effected by changing technology, practices, and processes and these objectives were fully achieved.

Certainly, the papers presented generated discussion, some naturally more than others. Many created considerable discussion. However, this was within the aims and objectives of the congress, namely, to provide an international forum for discussion and to develop an opportunity to exchange information, including the need for systematic and comprehensive research on methodology and curriculum development.

Topics addressed included - social and philosophic aspects, including their impact on modern society, cognitive processes, curriculum design and evaluation, new problems and teaching systems, community attitudes, participation and equity in engineering education, effective training methods, the role, nature and importance of research, including information transfer in engineering education, design methodologies of computer-aided instruction, the impact of new technology on effective training, and the needs of engineers for further and continuing education.

Naturally, the topics related particularly to the needs of industry, specifically, as they concern methods and effectiveness of training in further and continuing education.

Australia's contribution included over twenty papers on a range of topics. Over twenty Australians attended, some of whom were accompanied by their partners. However, all this was preceded by the warm welcome given to participants by the AAEE Executive Director, Dr Zenon J. Pudlowski, and the Chairman of the Organising Committee, Professor Tadeusz Marek of Jagiellonian University. All participants were officially welcomed by Professor Andrzej Pelczar, Rector of Jagiellonian University, Cracow.

A feature of the Congress was the excellent social program. This proved to be highly successful as a means of Congress participants getting to know each other. A particular feature of this was the spirited discussions that took place over coffee and buns during morning and afternoon tea breaks. These periods were used most effectively where various groups and clusters of participants could be seen (and heard) discussing (and at times hotly debating) issues emanating from the various conference papers and ensuring discussion. This was also the case during the most appetising lunches at the Cracovia Hotel.

Many friendships were renewed and others forged, during these periods, as was the case at the Congress Dinner. It was here that the Australian Ambassador to the Republic of Poland, His Excellency, Anthony C. Kevin, during his talk revealed that he was on common ground, being a graduate in civil engineering from The University of Sydney. Zenon's wife, Dorota, did a marvelous job in organising and conducting the accompanying persons program.

Those who were unable to attend this Congress, missed an excellent opportunity to learn more about, and exchange views on, this important aspect of engineering, namely, engineering education which has been confirmed as an engineering discipline in its own right.

You would have been proud of your colleagues all of whom, without exception, distinguished themselves admirably in an international forum. Particular thanks, however, must go to our AAEE Executive Director, Dr Zenon J. Pudlowski, who as Program Chairman, did an excellent job in bringing together a program contributed to, by many and varied people and nationalities. This was evidenced by the overall tone of the Congress, including the rapport developed between individuals and group participants.

The success of this Congress has led to a decision that a second congress will be held in 1993, at a venue yet to be decided (perhaps Prague in Czecho-Slovakia). It is suggested that you do not miss that one because, after the experience of the first, it will be a sell-out.

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Portsmouth Polytechnic will host the 3rd World Conference on Engineering Education in September 1992, under the leadership of the Dean of Engineering, Professor Terry V. Duggan. Picture above shows the Portsmouth delegation to the East-West Congress on Engineering Education at the Marketplace in Cracow. Standing are (l-r): Dr Michael Bement (Conference Convener), Prof. Terry V. Duggan and Mr Graham White (Conference Secretary).

For details of the Association and membership applications write to the Editor:

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Association members and tertiary institutions are invited to contribute to the Newsletter on matters relating to membership and engineering education.

Send contributions to the Editor at the address above.