NINTH INTERNATIONAL CONFERENCE OF WOMEN ENGINEERS AND SCIENTISTS

CONFERENCE REPORT

UNIVERSITY OF WARWICK UK
14 -20 JULY 1991

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York House
St.James's Palace
London S.W.1

The Engineering Council is determined to recruit more women into science and engineering. Although the number of women entering these professions is rising gradually, the total is still lamentably small: only around five per cent. For this reason I welcome the Ninth International Conference of Women Engineers and Scientists to be hosted by our Society at Warwick University in July, which should do much to raise the profile of women in these fields. By meeting together to discuss the theme 'Communication' your delegates will be demonstrating the significant contribution made by women to this important subject.

Communication implies informing people, whether of good news or bad, the mundane or the dramatic. Like it or not, much of the information we receive today concerns afflictions of one kind or another; famine, ill-health, deprivation or natural disaster. Some of these afflictions are inescapable, but many can be either prevented or ameliorated through the application of technology. This is a prospect which I believe ought to have a strong appeal to women, especially to women who are qualified as scientists or engineers.

I know that your delegates are gathering from many countries and in the hope that your discussion will highlight the contribution that women can make to solving some of these complex problems, I wish you a highly successful and fruitful conference.

H.R.H. The Duke a/Kent

FOREWORD

This Report for ICWES9, the Ninth International Conference of Women Engineers and Scientists, is not intended as a verbatim report of the Conference; that has already been provided by the two volumes of 'Proceedings'. It is intended as a memento of a fascinating meeting of women and men from 42 different countries, who got together at Warwick University in July 1991 to listen to the speakers, take part in debates, meet old friends, make new ones and forge stronger networking links with colleagues from all parts of the world. It concentrates on those parts of the Conference which are not generally reported in a formal way, the social gatherings, the technical tours and the fine Dinner that brought seven wonderful days to a conclusion.

In some cases, we have reported what was said from speakers' notes, in others that has not been possible, so we have attempted to provide a flavour of what was said, and the friendly atmosphere in which it was said. For certain occasions during the Conference, the photographs say it better than words; unfortunately there is never enough space for pictures of everybody! We have included some delegates impressions and let our own comments wander rather more freely than formal reporting would have allowed.

Thanks are due to those people who have contributed: some through notes they made at the time; some for their speech notes; some for the photographs; some for their impressions; and all of them for the time they have given either writing a piece specially for this Report or searching through their papers to find something they had written at the time.

I hope you will enjoy it, and that it will conjure up some happy memories of a wonderful conference.

Elizabeth Laverick
Organising Chairman

OVERSEAS DEVELOPMENT ADMINISTRATION
ELAND HOUSE
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MESSAGE FROM LYNDA CHALKER MP, MINISTER FOR OVERSEAS DEVELOPMENT

I was particularly interested to learn of your Conference and am strongly supportive of its aims. In Engineering, as in other sectors of the Aid Programme, we aim to promote the interests of women, both as recipients and as implementers of aid activities. For example, last year under our technical cooperation training programme , we financed one hundred and fifty-two women students from developing countries on a variety of engineering courses. Recently, we have used the services of women engineers on a water and sanitation project in Nigeria, on an irrigation management project in Sri Lanka and in running a disaster management workshop in Nairobi. We are also currently supporting the training of a young lady engineer in Water and Waste Engineering under our Associate Professional Officers' Scheme, with a view to utilising her expertise in the years to come on various development projects.

I hope the above will give you some idea of the role played by women engineers in the implementation of the Aid Programme. I wish your Conference every success.

LYNDA CHALKER

PATRONS

Sir Eric Ash KB CBE FRS FEng

Sir G William Barlow BSc Tech FEng FIMechE FlEE

Basil R R Butler OBE FEng FIMM

Baroness Gardner of Parkes JP

Robert Malpas CBE FEng FIMechE FIChemE FIMH

Baroness Platt of Writtle CBE FEng DL

Sir Dennis Rooke CBE FRS FEng

J Cicely Thompson MBE MA CEng FlEE

Dame Anne Warburton DCVO CMG

Conference Chairman, **Dr Elizabeth Laverick,** reminisces on the organisation of the Ninth International Conference of Women Engineers and Scientists:

The Proposal

At the opening of the Conference on 15 July 1991 my mind went back three and a half years to January 1988, when WES (the Women's Engineering Society) members met together in open forum to discuss the implications of hosting ICWES9.

On that cold, but sunny day, sitting in Hilda Blount's (then President) lounge, we formed a committee, six strong, to research and prepare a proposal for WES Council and onward transmission to the ICWES Continuity Committee that the Women's Engineering Society should host ICWES9 in 1991.

The objectives of the Conference were defined as follows:

- to provide a technical forum demonstrating to the world the achievements of women engineers and scientists;

- to assist the extension of international co-operation by providing an assembly for the exchange of experience and ideas from all parts of the world;

- to facilitate the discussion of technical and social issues relevant to women as scientists and engineers and to encourage the proposal of solutions;

- to provide opportunities for women engineers and scientists of all cultures and backgrounds to meet socially.

The proposal defined the time, the place and the theme **Communication** , chosen for its global appeal to all cultures, scientific and engineering disciplines and its perpetual relevance to civilisation. It outlined a provisional technical and social programme, and discussed administration and finance, delegate numbers and probable cost.

I myself, was not a member of that Committee - I had just retired from work and felt very strongly that the younger generation should plan and organise this ICWES, the second to be hosted by WES. However, in the ensuing months, as the magnitude of the task became clearer, I was persuaded to chair the Organising Committee and the Conference - a good introduction to retirement, I thought and like most retired people I soon wondered how I had ever found time to go to work!

The Organisation

Our first action was to set up a Company - we called it ICWES9 -limited by guarantee, (thereby protecting the Society's own funds) to undertake what became a considerable business venture, ICWES9. Almost 100 (12%) members of the Society volunteered to be guarantors. Next we applied for the company to be registered as a charity. It took about six months to achieve charitable status, our main aim being to 'advance the education of the public in the study and practice of engineering and science for women' with powers to 'promote and organise the Conference... and to foster international co-operation to ensure the continuation of the exchange of engineering and scientific information between women scientists and engineers'.

The original Executive Committee was expanded to include representatives from the Institute of Physics and the Royal Society of Chemistry, both of which had women's groups. The Secretary of WES also joined the Committee acting as a focal point for the overseas corresponding members, and as a valuable link with the Society. Although officially, according to the ICWES guidelines, information about the Conference should be disseminated through the Continuity Committee appointed at ICWES8 and representing nine world areas, we had decided in addition to set up our own network of overseas corresponding members in those countries where we already had contacts. This proved a very sensible step to take.

Six sub-committees were set up, chaired by members of the Organising Committee (see page) and responsible to the main committee for finance, fundraising, travel and social events, conference technical programme, exhibition and public relations. Nine patrons were appointed mostly from industry and academia.

Every two months or so for three years the eleven members of the Executive Committee gave up their Saturday and travelled to London from all parts of the UK to meet and bring each other up to date on their separate activities and plan their next steps. We monitored progress and expenditure against budget. We had fun and we worked hard!

Fundraising

The most immediate problem was to raise some money to enable us to operate and to appoint professional conference organisers to carry out the administration. This we did with the help of some of our patrons and a voluntary fundraiser, Alan Gunson, whom we appointed. His first action was to prepare a fundraising leaflet which gave the background to ICWES, details of the proposed conference and its aims, and the reasons why we needed funding. Next we held a meeting followed by lunch hosted by the Rector of Imperial College, London, Sir Eric Ash, one of our patrons, at which we expanded on our needs and our fundraising strategy to a group of eminent supporters who had agreed to act as our advisers. This acted as a launch pad for our campaign which, overa period of 18 months, raised more than £ 100,000, thereby enabling us to subsidise the Conference fees, and to offer £20,000 in bursaries to assist delegates both from home and overseas who would otherwise not have been able to afford to attend. The British Council helped a large number of these overseas delegates with their travel as well. A certain number of prizes were offered, mainly by the Institutions for various categories of posters and papers. Bearing in mind that we were busy going into recession to say nothing of fighting the Gulf War, this was a very creditable achievement.

Public Relations

As with all conferences, the importance of promoting the event cannot be over estimated. Communication is an essential element in this respect, and of course doubly important to succeed as this was also the theme of the Conference! Getting our message out to women engineers and scientists worldwide presented problems, particularly as the names and addresses of delegates of previous ICWES' s were not readily available. Attempts were made to publish the dates in all relevant 'diaries' and 'event lists', and information was sent out to a large number of organisations - engineering Institutions, professional bodies and the like. Many of the overseas corresponding members played a vital role in promoting the Conference in their own countries.

A series of press releases were issued as plans developed, a News sheet, 'UPDATE' was produced at approximately six monthly intervals and used to inform the overseas corresponding members, sponsors, patrons, and all interested parties of the state of play. A special postcard, showing views of Coventry, was overprinted with an invitation to attend the Conference and this was distributed widely as was the First Announcement inviting papers. Articles were prepared for publication in relevant journals, but the uptake was disappointing.

However, by May 1990 over 400 people from 35 countries had expressed interest in attending ICWES9. We felt we were getting through!

Technical Programme

As always this was a 'chicken and egg' situation. Having chosen the theme of 'Communications' we wrote down all the topics we could think of under that heading, and sent out our First Announcement requesting offers of papers and registration of interest. So we began to draw up our own data bank. Based on the returns we received we were able to highlight six major areas: **Transport, Telecommunications and Satellites, Basic Sciences of Communication, Media, Education** and **Technology Transfer**. Next we had to locate chairmen and key speakers in each area and, with over 80 offers of papers and posters resulting from the issue of the first announcement, the long slog started - getting in titles and abstracts, vetting them, notifying those successful with a deadline for receipt of the final papers, and identifying gaps which had to be filled. We were determined to have the Proceedings available in printed form for issue at the Conference to all full time delegates.

As time went on it became clear that two additional categories of papers were emerging and we were able to offer sessions on **Human Communications** and on **Gender Issues**. It was also decided that we would ask all our overseas corresponding members for help in providing demographic papers on the present status and trends occurring in education, training and employment of women engineers and scientists in the different countries, and this information would be published separately after the Conference. The hope is that this will be a permanent feature of future ICWES' s, and that gradually a worldwide demographic picture will emerge.

Technical Visits and Social Programme

It has become a feature of ICWES's that a number of technical visits and social events are arranged for the interest and enjoyment of delegates and ICWES9 was no exception. Bearing in mind the depth of the recession at the time, local industry was surprisingly co-operative and hospitable and 23 individual technical tours were available. Each delegate was entitled to two such visits with the result that the size of visiting parties was in some cases embarrassingly small, and WES members nobly volunteered to provide transport by private car in some instances where a bus could not be justified. However, in the event an interesting time was had by all.

Socially too we were well catered for with visits to local places of interest, and the usual run of parties, receptions, etc., although at the last minute the barbecue which the Society had offered to lay on was replaced by a visit to the Coventry Marks & Spencer. There we had the opportunity to sample M&S wines and various delights from their food department. Talks about the design of their corsetry and also of the stores themselves were unfortunately cancelled. Instead, delegates were allowed to shop in comfort. This was much appreciated particularly by our overseas visitors.

Exhibition and Schools Lecture

We decided at an early stage in our planning that we would organise an exhibition in parallel with the Conference at which industry was invited to take stands demonstrating the career opportunities available to women as well as featuring their wares and illustrating the theme of the Conference. The exhibition was also open to the public and to schools who were to be invited to attend a special lecture on an engineering subject. We were fortunate too to be offered the use of a WISE bus, one of several which, as part of the Women Into Science & Engineering campaign organised jointly by The Engineering Council and the Equal Opportunities Commission, tour the country showing girls what engineering is all about.

This was indeed an ambitious undertaking, requiring its own budget and administration. Thanks to the extremely hard-working sub-committee, supported by the Conference administrators, who also had expertise in this area, and in the teeth of recession, this activity added an extra flavour to the week, and put a few pounds in the bank.

Registrations

No matter how excellent the programme or how much work WES members put in voluntarily, the financial outcome of the Conference depended on the number of registrations. Looking on it as a business with a turnover of the order of half a million pounds, you can imagine we were sitting on tenterhooks, waiting for the registrations to come in. In spite of the generosity of our donors and sponsors, a week's conference does not come cheap. In addition delegates were not

necessarily given time off from work to attend and indeed could not, in some cases, afford the time away from their jobs. Everyone in industry was under pressure and redundancies were the order of the day. Delegates from overseas, of course, had the additional problem of heavy travel costs.

We had decided to offer a generous reduction in fees to those who registered three months in advance. However, only 200 out of the 400 required (if we were to break even) took advantage of this offer. My hair started to go grey with worry as the numbers crept up very slowly. I went out and bought a wig! Were we going to have to go back to our guarantors with begging bowls in hand? We cut our budget as far as we dared. We agreed to dispense with the translation facilities which would have cost the earth and for which only one request had been made in answer to our specific question - a mistake as it turned out, as in practice it became very clear that this was a very necessary facility albeit for a small group of delegates.

In fact, it was not until the second day of the Conference that we realised that we would break even as a large number of delegates just turned up and registered on the spot, even from countries as far away as Nigeria and the Ivory Coast. Future ICWES organisers take note! Mind you, over those last three months everyone involved made strenuous efforts to contact all possible sources of delegates, particularly those overseas.

Final Thoughts

So, we did not go bankrupt! There were no obvious hitches apart from the lack of translation facilities, and everyone seemed to enjoy themselves. But how successful was it and what can we learn for the future? We, the Executive Committee, examined our own navels and came up with quite a few thoughts which we have passed on to Nigeria, the potential hosts for ICWES 10. We also circulated a questionnaire to delegates with a view to learning from them, the receptors. 173 delegates responded out of a total of some 400. I leave you to judge the results for yourselves.

Elizabeth Laverick

QUESTIONNAIRE

A questionnaire was circulated to delegates to determine the success of the Conference and to learn for the future. It was divided into nine areas, covering the physical aspects, such as the accommodation and the general organisation, registration, and the content of the programme, including the social events.

Delegates wanted more time for discussion. It was felt that the technical programme was too rushed and should been under tighter time control, with better presented talks and time for questions and discussion at the end of each presentation. Some delegates suggested that there should have been at least one open session where small groups could have discussed the issues that the speakers were putting forward.

The social events were very popular and many also felt that the dinner evening should have been extended.

A very specific criticism, and an area that annoyed a number of delegates, was the overlap between the technical programme and the tours on the Thursday afternoon. The comments suggest that there should perhaps have only been tours on one afternoon.

In all areas, many of the points were made by several respondents. There were also a number of key ideas or criticisms, which, although they may only have been made by a few people,are nevertheless noteworthy.

The recommendations received were:

- the need for translation, particularly French;

- more structure required for the demographic session;

- the programme should have been sent out much earlier with final registration details, especially to overseas delegates who may be combining a conference with other travel;

- a newsletter to keep delegates in touch between conferences;

- better timekeeping, especially if running concurrent sessions;

- more male delegates;

- copies of the Proceedings to be available for all delegates;

- more emphasis on other sciences (not just engineering)

- a fuller introduction to the 'ICWES Phenomenon' for new delegates.

In conclusion, there were a lot of positive comments about the Conference in general and the atmosphere of the occasion. It was seen as an excellent opportunity for networking as well as hearing talks on a number of interesting topics.

C J Thompson

Delegates Responding

Area	UK	USA	Africa	ROW*	Total
No. of responses	99	19	20	35	173
Technical Discipline					
Engineering	59	9	16	15	99
Physics	8	3	1	6	18
Chemistry	10	3	-	3	16
Other	22	4	3	11	40
Professional Association					
WES	14	-	1	-	15
SWE**	-	12	-	-	12
lOP	8	-	1	-	9
RSC	10	-	-	-	10
IEE	11	1	2	-	14
IMechE	10	-	-	-	10
National Society	-	-	13	16	29
Other	16	-	-	-	16
How did you hear about the Conference?					
WES	39	9	3	3	54
Institute	16	-	11	7	34
Mailshot	11	2	-	6	19
Employer	17	-	-	-	17
Personal contact	7	7	4	16	34
Did you receive support for your Registration?					
No	19	18	2	8	47
Bursary	21	-	6	13	40
Other	56	1	11	12	80
General organisation					
Good	54	14	17	24	109
Average	40	5	3	9	57
Poor	3	-	-	2	5
No response	2	-	-	-	2
Registration					
Good	66	13	16	29	124
Average	28	3	2	5	38
Poor	2	3	-	1	6
No response	3	-	2	-	5

** Rest of the World* *** Society of Women Engineers (USA)*

	UK	USA	Africa	ROW	Total
Quality of:					
Accommodation					
Good	64	10	14	29	117
Average	18	8	5	5	36
Poor	3	1	-	-	4
No response	14	-	1	1	16
Food					
Good	60	13	10	24	107
Average	35	5	10	9	59
Poor	4	1	-	1	6
No response	-	-	-	1	1
Technical programme					
Good	58	17	16	26	117
Average	29	2	4	9	44
Poor	6	-	-	-	6
No response	6	-	-	-	6
Technical tours					
Good	50	10	8	22	90
Average	26	5	7	12	50
Poor	3	-	-	-	3
No response	20	4	5	1	30
Exhibition					
Good	47	11	9	19	86
Average	35	6	8	14	63
Poor	8	-	-	-	8
No response	9	2	3	2	16
Social events					
Good	73	18	9	30	130
Average	10	1	7	5	23
Poor	2	-	1	-	3
No response	4	-	3	-	7
Sightseeing tours					
Good	21	14	7	23	65
Average	9	3	3	5	20
Poor	-	1	1	-	2
No response	69	1	9	7	86

ICWES9 COMMITEES

Organising Committee

Dr Elizabeth Laverick PhD CEng CPhys Hon F UMIST FIEEE
Melanie Armstrong BSc CEng MIM MIMfgE
Nigel Armstrong BSc ACMA
Mary Ayre BSc
Jacqui Brookes BSc
Dr Margaret Farago PhD CChem
Dorothy Hatfield BSc CEng MRAeS
Gwen Maxwell BA
Dr Elizabeth Rhodes PhD DIC
Dr Beverley Stanford PhD CEng MInstMC
Cathy Thompson MSc

Sub committees

Fundraising
Dr Elizabeth Laverick
Jacqui Brookes
Sue Bird
Dr Beverley Stanford
Nigel Armstrong
Melanie Armstrong
Alan Gunson

Travel & Social Eents
Mary A yre
Dorothy Hearnden
Sara Johnston

Conference- Technical Programme
Dr Elizabeth Rhodes
Dr Margaret Farago
Daphne Jackson
Dr Karen Burt

Public Relations
Jacqui Brookes
Hilary Foster
Christina Skull
Dorothy Hatfield
Alison Clark

Exhibition
Dr Beverley Stanford
Julie Stornton
Dianne Winfield
Fiona Scott
Kath Ditchfield
Maria Stammes
Anne Tweddle

Finance
Nigel Armstrong
Betty McCarthy
Dr Elizabeth Laverick*
*(*ex officio)*

OVERSEAS CORRESPONDING MEMBERS

Argentina	Professor Y Rivara de Ronchi
Australia	0 Wellesley-Cole
Belgium	Ir P Talpaert
Bolivia	Ing H Moscoso
Burkino Faso	D Yogo
Canada	Professor DEllis
China	Professor S-W Yang
Cote d'Ivoire	I Y Gueye
Denmark	A Kolmas
France	E Thouret-LeMaitre
India	Dr S V Bhide
Iran	Professor M Rahmani
Italy	D A Amour
Japan	Dr I M Ikusi
Kenya	Dr J O'Leary
Mali	G S Fofona
Mexico	A Perez Lopez
Netherlands	J Zwartz
Nigeria	Y Soyinka
Pakistan	D Habib
Portugal	Dr B Ruivo
South Africa	B Sudano
Spain	A Mercade i Ferrando
Sri Lanka	S Devarajan
Switzerland	J Juillard
Uganda	C Kolya
Uruguay	L Chebataroff
USA	E Murray
Zimbabwe	S Mabaso- Kwalo

Dorothy Hatfield
President of The Women's Engineering Society

INTRODUCTION

ICWES9 was, without doubt, the most significant and impressive experience of my Presidency of The Women's Engineering Society. It was certainly a week to remember and the presence of over 400 delegates from 42 countries must make it the most cosmopolitan event I can ever hope to attend.

Although I didn't get to as many of the working sessions as I would have liked, I did see a few excellent snippets and thoroughly enjoyed the social events. But for me, and I suspect for many others, the best thing about the week was just having the opportunity to meet and talk with so many women who shared a common interest in science and engineering which bridged the differences between our various and differing cultural backgrounds.

The conference certainly came as a wonderful ray of light in the middle of a year which was not a happy one for many people throughout the world. Many countries were in the depth of recession and many places were torn by political troubles and by disaster both natural and man made.

Of course, all this fantastic happening only came about because a lot of people put in a very great deal of hard work over along period. All gratitude and credit is due to Elizabeth Laverick and the members of the organising committee, and also to numerous others, both in the UK and from other countries, who gave time and effort to make it all such a success. Three years ago we knew it would be a tremendous undertaking - we were certainly proved right when the recession and the Gulf war mitigated so strongly against us.

It is ever more apparent that the only way for a voluntary organisation to make things happen in this day and age is to maximise the use of all the will, skills and experience available to the project in hand. This certainly proved true for ICWES9 and must increasingly be used as the means of making the world an acceptable place to live.

In these days when there is almost universal concern for our environment, it sometimes seems that many people do not realise that we cannot hope to achieve the goals and improvements we seek without scientists and engineers. It is only they who can develop the facilities and systems which will give us the essentials of food, comfortable shelter and the ability to keep ourselves healthy and active in ways that will be sustainable and acceptable in the future. Of course, they must also be the source of providing the means of our enjoying the non-essentials the world of the 21st century will except, entertainment and relaxation as well as the means of survival.

To do this we must learn how to make the best possible use of all the resources available to us, food, fuels and above all our most precious resource - people. This means that the half of humanity who are female, must be encouraged to make a full contribution in all areas and at all levels. Their talents cannot be allowed to be channelled into relatively few specialised areas; they are needed everywhere.

The breadth and depth of the papers presented at ICWES9 certainly demonstrated the capabilities of women who are already involved in scientific and engineering pursuits. The continuing need is to extend that involvement to many other women and to show the world at large that these disciplines are not only essential but exciting and interesting as well.

So, COMMUNICATION proved an excellent choice for the theme of the conference and must continue as a core objective for us all. We must communicate with each other and not lose the valuable links forged at ICWES9. We must communicate with the rest of the world to show how we, as women, scientists and engineers, can help towards a secure and comfortable future.

Dorothy Hatfield
President
The Women's Engineering Society

SOCIAL PROGRAMME

Sunday 14 July
WELCOME PARTY - Bringing of Greetings and Old English Fayre
Panorama Room, Rootes Hall, University of Warwick (See page 20)

Monday 15 July
CIVIC RECEPTION
Museum of British Road Transport, Coventry

Hosted by **The Right Worshipful The Lord Mayor of Coventry, Councillor David H Edwards.** (See Page 27)

Tuesday 16 July
UNIVERSITY RECEPTION
Arts Centre Gallery, University of Warwick

Hosted by **Professor J 0 Flower, Chairman of Engineering**, who described the initiatives taken by the University to encourage women to study engineering and consider it for their future career. **Mary Ayre**, Chair of the Travel & Social Committee ofICWES9, gave the Vote of Thanks.

Tuesday 16 July - Thursday 18 July
EXIDBITION
Arts Centre Gallery, University of Warwick

The Exhibition was open to both delegates and visitors. Details of the companies who participated are given on Page 73

Wednesday 17 July
MARKS AND SPENCER RECEPTION
Marks and Spencer, Coventry

An evening Reception, which included a finger buffet, allowed delegates a brief glimpse into what has become a very British institution!

Thursday 18 July
CONFERENCE DINNER
National Motorcycle Museum, Solihull (See Page 28)

BRINGING OF GREETINGS AND WELCOME PARTY

What better way to meet up during the evening before the Conference officially opened than at an 'Old English Fayre'? So, Sunday evening found us arrayed in our national costumes or 'partyfrocks' , (the latterfor those unfortunates like we English who cannot boast a national costume), wandering around the Fayre to the accompaniment of a Jazz band.

The Jazz Band

It was a glorious evening - the fancy umbrellas so thoughtfully presented to overseas delegates by the Organising Committee were not in evidence, although, predictably, they did come into use briefly, later in the week.

The Panorama Room at Warwick University was transformed with a variety of decorative booths and sideshows, attended by 'wenches' in mediaeval dress and serving mostly Old English Fayre of the comestible and quaffable variety - pork pies, game pie, roast beef, sausages, syllabub and so on. We were joined by Lady Godiva of Coventry fame - albeit **not** naked and **not** riding a horse, but she was very charming with a mass of long fair hair!

Wandering outside we were treated to a **fine display of Morris dancing, including Jennifer Nyambala from Kenya with Lady Godiva the man on the Hobbyhorse - one of our few remaining traditions.**

Another, much younger tradition of ICWES is the **Bringing of Greetings** at this first informal gathering of Conference delegates and guests, and true to form, we were first welcomed by the Conference Chairman, Elizabeth Laverick, and then by WES President, Dorothy Hatfield. They were followed by a succession of delegates, each bringing greetings from their country often accompanied by gifts. The USA delegation

Elizabeth Laverick being presented with a gavel by the American delegation –
Alexis Swoboda (Left) aryl Lydia Pickup

caused quite a stir,presenting the chairman with a gavel and block to keep order, and a box of Sanity pills to see her through the week ahead. Other gifts demonstrated the particular skills and craftsmanship of the different countries - books, paintings, engraved dishes, etc. On display too were the various messages and good wishes received from those unable to attend - many of them old friends and acquaintances.

I

la Ghose of India

w

ith Elizabeth Laverick

Did we end up singing Auld Lang Syne? If not, we should have!

Elizabeth Laverick
Organising Chairman ICWES9

DR ELIZABETH LAVERICK
CHAIRMAN

Lady Platt, Sir Denis Rooke, Madam President, Ladies and Gentlemen, I am delighted to welcome you all to the official opening of the Ninth International Conference of Women Engineers and Scientists.

Since the first Conference, which was held in the United States in 1963, the aims of ICWES have remained unchanged:

- that women active in science and engineering will know each other worldwide;

- that the use of technology for the betterment of life shall be encouraged;

- and that the participation of women in engineering and science shall be increased.

To this we have added for ICWES9:

- the provision of a technical forum demonstrating to the world the achievements of women engineers and scientists;

- the discussion of technical and social issues relevant to women as scientists and engineers.

The theme for ICWES9 is **Communication** , chosen for its global appeal to all cultures, and all scientific and engineering disciplines, and for its perpetual relevance to civilisation. We shall be considering six main topics: **Transport, Satellites and Communications, Education, Information Transfer, Basic Sciences** and **Technology Transfer**. In addition, we have included sessions on **Career Development / Gender Issues** and **Human Communications**. On the final day we have a plenary session on the Demographics of engineering education, training and work experience in different countries. I would like to draw your attention also to the workshop session, **Signpost your Horizons**, which is being provided on Wednesday, aimed at helping the younger delegates to develop their careers.

We are very pleased to have with us at this opening session, several of our patrons, and in particular Baroness Platt of Writtle and Sir Denis Rooke who will be addressing us shortly. However, before inviting them to speak I would like to introduce Dorothy Hatfield, President of the Women's Engineering Society, who wishes to say a few words on behalf of the Society.

DOROTHY HATFIELD

PRESIDENT
WOMEN'S ENGINEERING SOCIETY

Good Morning Everyone, and may I**,** on behalf of the Women's Engineering Society, add my voice to the welcome expressed by Betty Laverick. I am delighted to see so many of you here today and I hope you will all find the week interesting - and most important - that you will really enjoy ICWES9.

It is about four years since a group of WES members met in Hilda Blount's home not far from here and decided we would like to invite the next ICWES to the UK. At that time we could not foresee the recession in which most of the world is now trapped, nor the man- made and natural disasters which have assailed us over the past year.

So, although it has been difficult for many of you to get here -and there have been many problems for the organising committee, we are now at the beginning of a week which I am confident will bring you interest excitement, friendship - and fun. We are grateful to you all for joining us - and to all the individuals and organisations not represented here who have made this conference possible - despite the present hard times.

WES came into being in 1919 and has been through good times and bad since then. Our basic aim of promoting the study and practice of engineering among women has never altered but the way in which we do it has been modified to suit the changing needs of members and to meet new challenges.

At present we have three main roles:

- Provision of careers advice - at all stages of people's careers;
- A network of and for women engineers;
- Representing the interests of women engineers to official and government bodies.

We have about 700 members throughout the UK - and in some other countries - with groups in Higher Education establishments. Some members meet locally as Branches or Circles and we publish a quarterly journal- The Woman Engineer - of which you should all have a copy. Although full membership is restricted to women who are engineers, anyone sharing our aims is welcomed as an Associate. There are also special categories for students at school or college, and we also welcome Company Members.

Our total administrative staff - Gwen Maxwell - is here with us this week. She works from a very small office made available to us at Imperial College in London.

I hope you will all take time to look at our stand, and those of our sister organisations at the Institute of Physics and the Royal Society of Chemistry.

As time goes on it seems more and more clear to me that the future of the planet and its people lies with engineers. It is they who must provide the basic necessities of heat, light and water, as well as having a major part to play in producing food - and getting it to where it is needed. Modern medicine relies heavily on us and certainly so too do the creators and providers of entertainment.

And if anything is absolutely essential to a peaceful future it is COMMUNICATION - the theme of this conference. Without good communication we get ourselves into all sorts of difficulties and disasters. And that good communication must be the product of human skills and effort with sound, reliable engineering.

I believe I was one of the people who suggested this theme and I make no apology for that it is a matter about which I feel very strongly. And so I hope you will remember this week for many things - including clear, positive, entertaining communication - to you and by you.

The conference was formally opened by Baroness Platt of Writtle CBE, former Chair of the Equal Opprtunities Commission. In her address, Lady Platt called on delegates to "explode the myth" of engineering as a career only suitable for men and to communicate the message to schoolchildren around the world.

"Sadly," she said, "women engineers and scientists are still pioneers. This situation must change and I believe this conference will provide an international momentum for that change."

Sir Denis Rooke CBE, former Chairman of British Gas, posited that Britain had lost its way as an industrial nation and must concentrate on developing a society in which the creation of national wealth is regarded as both essential and praiseworthy.

Sir Denis continued his comments by calling for a national change in attitude towards industry and wealth creation: "...nothing short of a cultural revolution will be necessary to overcome the current anti-industrial bias which has been built up over several generations of misdirected educational practice. "

CIVIC RECEPTION

Hosted by **The Right Worshipful The Lord Mayor of Coventry, Councillor David H Edwards,** the Civic Reception for Delegates included a tour of the Museum of British Road Transport followed by a finger buffet with wine.

The Vote of Thanks was given by **Dorothy Hatfield**, President of The Women's Engineering Society .

"Councillor Edwards, Ladies and Gentlemen, ICWES9 would like to thank the City of Coventry most sincerely both for the hospitality displayed to us this evening and also for the opportunity to experience this most interesting Museum of Transport.

We feel it is particularly appropriate that we are holding our conference here in a city which is notable both for the scientific and engineering basis on which it has built its prosperity over the centuries and for women who have made their mark here.

It would be difficult for a gathering of women here not to remember Lady Godiva, the 11 th century wife of the local Lord and a woman of great principle and determination who rode naked through the streets in protest against her own husband. Her statue is now well installed right in the city centre.

Not much after Lady Godiva's ride, Coventry started to build a reputation as a centre for dye works and the manufacture of woollen goods, particularly caps. It remained important in commerce and industry through the years until the time when bicycles were made here in the 19th century. And soon the local engineers diversified from making bikes and turned their attention and skill to the manufacture of cars.

It was in Coventry in 1896 that the first car a Daimler, was ever offered for sale to the British public. And Coventry has continued to make cars and parts for cars from that day to this.

Coventry is also renowned for the way it has regrown after the bombing of the Second World War. From that terrible destruction has grown a fine modern city centre and a superb cathedral.

My own experience of the city is limited but I have swum here and have visited excellent hotels, restaurants and shops. I have even had occasion to visit a local hospital which holds clinics in a disused church! I had not before this evening visited this excellent and well presented museum, so I thank you, Councillor Edwards, for bringing it to my attention and that of the other delegates to ICWES9."

CONFERENCE DINNER

The Conference Dinner was held at the National Motorcycle Museum in Solihull. The Delegates and their guests were greeted on their arrival by the President of the Women's Engineering Society, **Dorothy Hatfield**, and Conference Chairman, **Dr Elizabeth Laverick**.

The four-course dinner was preceded by drinks and an opportunity to see some of the exhibits in the prestigious museum. Following the Dinner, the evening was concluded by toasts and responses.

The main toast to the Conference and the Women's Engineering Society was proposed by **Sir Eric Ash KB CBE FRS FEng**, Rector of Imperial College of Science, Technology and Medicine and Patron of ICWES9.

Sir Eric, with his usual charming mixture of the serious and the lighthearted, commented on the shortage of women in engineering and science in this country. He went on to discuss the genetic differences which exist between the sexes and concluded that women do bring a different perspective to both science and engineering, a fact which is now appreciated by both industry and academia in this country, even though he believed that 95% of the difference was nurture!. He congratulated the Society on its achievements over the last 72 years (WES was formed in 1919 by a group of women who had been introduced to a career in engineering as a result of the First World War) but highlighted how much there remained still to do. This, the Ninth International Conference of Women Engineers and Scientists was a marvellous opportunity to publicise the achievements of women engineers and scientists throughout the world within the chosen theme 'Communication'. He was proud to be associated with the Conference as one of its patrons, and it gave him great pleasure to propose the toast to the Conference and to the Women's Engineering Society.

he top table

In responding to the toast **Dr Elizabeth Laverick** thanked Sir Eric for all the things he had said about the Conference, the Society and about women engineers and scientists.

"It is at this point in the week that I, and my hardworking Organising Committee can start to breathe freely, aware that, although some hurdles may yet lie ahead, all has gone relatively smoothly, everyone seems to be enjoying themselves and the ICWES phenomenon as I call it has worked again.

"The first ICWES was held in the USA in 1964, hosted by the American Society of Women Engineers - its theme **Focus on the Future**. It attracted almost 400 delegates. We in the UK were so inspired by this meeting that we offered to host a second, in the UK, in 1967 . We chose as our theme **The Application of Technology to World Food Problems**, and as our venue, Cambridge University. It brought in delegates - about 350 - from 35 different countries and this has been the record until now. I am delighted to announce that ICWES9 has broken that record with 42 countries represented here at Warwick University, and a total of 466 delegates. After 1967, ICWES' s were held normally every three years - at Turin in 1971 **Planning for Progress**, Poland in 1975 **New Techniques in the Service of Mankind**, France in 1978 **Technology and Freedom**, India in 1981 **Science, Technology and Society**, a second visit to the USA in 1984 **Technology - an International Bridge**, and in 1987, the Ivory Coast **Science, Technology and Development**. I attended them all, except for the first and last, and I assure you that although each was different and had its own unique flavour, the stimulation and spirit of camaraderie generated each time was out of this world. This is what I call the ICWES phenomenon.

"In organising ICWES9 we were most fortunate in having the support of many donors - our members, industry, government, the public sector, the professional Institutions. Apart from help in kind and prizes for posters and various categories of papers, we raised more than £100,000 in cash with which we subsidised the Conference fees and provided more than 60 bursaries and studentships. Our deepest thanks go to all those who contributed so generously and also to our Fundraising Committee and our voluntary fundraiser, without whose help we could not have achieved such a satisfactory result. Our thanks must also go to our patrons for their support. We are indeed pleased that so many of them could be with us tonight.

"Last, but not least, I would like to give my personal thanks to members of my organising committee and their sub-committees. It is their dedication and hard work over the last three years that has made ICWES9 another memorable conference. And indeed for me it has been a memorable time - hard work, but lots of fun.

"What would I have done in retirement without ICWES9? I suppose my garden would now be free of weeds and full of blooms! I might have finished the painting and decorating, and that tapestry which stands there on its frame! I wouldn't have all these grey hairs, and last but not least I wouldn't have witnessed Gazza arriving at Marylebone Hospital the other Saturday as I wended my way home from one of our Committee meetings. Seriously though, it has been an exciting and rewarding three years, and I am proud to have had the opportunity to help recreate the ICWES phenomenon here at Warwick.

"So what of the future ? Well, this morning we held the Delegates Meeting at which delegates representing the various scientific and engineering organisations from all over the world elected the Continuity Committee, whose job it is to ensure that there is an ICWES 10 in three years time. Although no proposals to host ICWES 10 had been received prior to the meeting, four countries made oral representations, Nigeria, Uganda, India and Scandinavia, the latter two being more in the nature of an offer to consider the possibility on their return home. I shall be announcing the results of the ballot officially at the close of Conference tomorrow, but it is no secret that Nigeria won and will be sending their detailed proposals for approval by the Continuity Committee in the next six months. I wish them success for their plans and I look forward to meeting you all again at ICWES 10."

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Miss Cicely Thompson, Chairman of ICWES2 and Past President of WES, then proposed the toast to the delegates and guests, and thanked them for their various contributions to the success of the Conference.

First she introduced the delegates and guests on the top table:

"**The Worshipful The Lord Mayor** and the **Lady Mayoress of the City of Coventry**, who entertained us at the Museum of Road Transport on Monday evening;

" We also have **Professor Rhys Williams**, Main Board Director of Research for GEC (a major engineering company), who also serves as Pro-Chancellor of Warwick University, which has encouraged women into engineering from its early days and on whose beautiful campus we have lived this week.

"Several of the Patrons of the Conference are here tonight: some of you may wonder why we have Patrons - first, they are known as persons eminent in their particular field of activity, and the fact that they allow us to use their names assures others that they believe us to be responsible and honest in what we aim to do; secondly, they may go further and actively support us.

"We have been fortunate in our Patrons. For instance, most of the funds raised to help us keep the costs to delegates as low as possible have come through the advice or direct action of one or other of the Patrons, together with our official fund raiser, **Mr Alan Gunson.**

"We thank them all.

"Here on this table are:

Mr Robert Malpas CBE, who has had a distinguished career in the chemical engineering industry and is currently a member of the Engineering Council, Vice President of the Fellowship of Engineering and non-executive Director of several companies including Eurotunnel.

Mr Basil Butler OBE, recently retired from the Board of Directors of British Petroleum, where his responsibilities included Engineering and also Operations in the Near and Middle East and Australasia.

Sir Denis Rooke, accompanied by Lady Rooke. Sir Denis was formerly Chairman of British Gas and is currently President of the Fellowship of Engineering and of the British Association for the Advancement of Science. He is also Chancellor of Loughborough University - the first technological University in the UK.

Sir Eric Ash, Rector of Imperial College of Science, Technology and Medicine and Past President of the Institution of Electrical Engineers.

Dame Anne Warburton, now President of Lucy Cavendish College in Cambridge, following a career in the Diplomatic Service, which included being UK Ambassador to Denmark and the United Nations. Lucy Cavendish College is of special interest to women as it takes only mature women students.

"Other guests and delegates at this table are:

Professor Cyril Hilsum, Research Director of one of the component companies of GEC and Immediate Past President of the Institute of Physics;

Mr David Barton from Royal Mail Research, who co-ordinated the Leonardo da Vinci Lecture, commissioned by the Institute of Mechanical Engineers, which was presented to local school pupils here during the Conference;

Miss Lydia Pickup from the USA, Past President of the Society of Women Engineers in the USA, which was inspired to organise the first ICWES in 1964;

Ms Ila Ghose from India, formerly Principal of the Women's Polytechnic in Calcutta, and Deputy Chairman of ICWES6 in 1981;

Dr Monique Frize, Professor of Engineering at the University of New Brunswick, Canada;

Mme Achy-Brou, Chairman of ICWES8 and Deputy Chairman of the National Assembly of the Cote d'Ivoire;

Miss Sheila Waddell, for many years the Honorary Treasurer of the Women's Engineering Society.

"There are also guests scattered among the tables, who may be spouses, off-spring or friends of delegates. Their support in the home or as friends is invaluable to us as women engineers and we would like them to know how much it is appreciated.

"Finally, we have a group from the **European Network of Women's Studies**, which includes representatives from ten countries from Russia and Turkey in the east to Ireland in the west.Their work includes studies relevant to women engineers and scientists and we welcome them tonight.

"I would, therefore, now ask all members of the Women's Engineering Society, as hosts of ICWES9 to stand and drink a toast-

"The toast is **other ICWES delegates and our guests.**

***

Dr Monique Frize, Northern Telecom/NSERC Women in Engineering Chair at the University of New Brunswick, Canada, responded to the toast as follows:

"I had a bit of a culture shock on Monday evening, when I was greeted by Lady Godiva at the English Fayre! As the media had reported in Canada last February, I had sent her riding into the sunset, never to return to our Canadian Engineering Campuses. Let me explain: for decades, engineering students, who were predominantly male, organised a Lady Godiva ride during engineering or orientation week. A woman, half naked on a horse, was paraded all around the campus. Many times they used a person who held the oldest profession in the world. At other times a student was persuaded to cooperate.

"Needless to say that the majority of female students felt quite uncomfortable with this practice. During media interviews which I did as holder of the Chair of Women in Engineering, I clearly stated that such practices would deter many young women from considering engineering as a career. Acts which demean or devalue women must be banished from our campuses. This type of behaviour contributes to a poor image of the engineering profession and is totally unacceptable. Well, the last of the Godiva rides occurred in 1990.

"I was indeed pleased to meet a modestly dressed Lady Godiva on Monday, in England. However, I shall keep this a secret from my Canadian colleagues and students, as the risk of reviving sexist old habits is far too great. As far as I know, she went riding into the sunset, at least in Canada!

"A second story comes to mind, about a little boy of three, Eric, having dinner with his mother and grandmother. The grandmother asks Eric: "What are you going to be when you grow up? An engineer, like your Mom?" Eric replied: "Oh no, grandma. Engineering is for girls!" Well. if there were many little Erics in the world, perhaps a lot more girls would choose this field in which women are still drastically under-represented.

"In closing, I would like to say what an exciting, enriching experience this conference was for me and I hope never to miss another one in the future. I take this opportunity to thank the organisers for a job well done! It was indeed a unique and rich experience for all of us! Thank you."

THE HARDWICH AWARD

The Hardwich Award is presented every year to a member of The Women's Engineering Society, for long and outstanding service to the Society. Created in 1987, in memory of Isabel Hardwich, a member of The Women's Engineering Society for many years, the award is in the form of a silver brooch. In the past, the presentation has been made by Isabel Hardwich's widower, but his ill health prevented him making the presentation in 1991, and it is with deep regret that the Society note his recent death.

In his absence, Dorothy Hatfield, President of the Women's Engineering Society, made the presentation at the Conference Dinner, to **May Maple**, who has been a member of WES for 42 years, in recognition of her work for the Society.

Making the presentation, Dorothy Hatfield spoke of her long service to the Women's Engineering Society:

"May joined WES in 1950 and became an Honorary Member in 1979. *She has held almost every post in the Society as well as doing a great deal of careers work. A Council Member for many years, she was elected President in* 1971. *May has also qlited the Journal and raised advertising and represented WES to various other organisations and currently the Court of Surrey University.*

She was part of the team who ran ICWES2 in Cambridge in 1967.

She has also held various offices in the London Branch, most notably as Press Secretary, Hon Secretary and Chairman."

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THE ICWES9 DELEGATES MEETING

At each ICWES a meeting is held of the delegates who represent recognised associations or societies of women engineers and scientists in the different countries. It is chaired by the Chairman of the current conference, and also includes the Chairmen Emeriti of past conferences with their personally named deputies, and one delegate representing the unaffiliated registrants at the conference (ie. those registrants from countries that have no official delegate).

The main purpose of this meeting is:

- to consider offers to host the next ICWES;
- to appoint the **ICWES Continuity Committee** whose responsibilities are to assist the organisers of the next ICWES by disseminating the details in those areas of the world they represent;
- to encourage organisations to submit offers to host the ICWES following;
- to discuss matters relating to the ICWES Guidelines and the organisation of the Conference. /

At ICWES 9 the Delegates Meeting was held on Thursday 18 July, chaired by the Conference Chairman, Dr Elizabeth Laverick. Fifteen official delegates attended from Belgium, Canada, Denmark, France, Germany, Japan, Mali, The Netherlands, Nigeria, Switzerland, Uganda, United Kingdom, USA, Zaire and Zimbabwe. Professor Mahin Rahmani from Iran represented the unaffiliated countries. Three past Chairmen (or their deputies) from ICWES 2, 6 and 8 attended, and there were also 21 observers from 11 countries.

As no bids for ICWES 10 had been received in writing prior to the meeting, it was agreed to accept informal bids at the meeting and decide an order of preference by ballot. Detailed proposals would then be prepared to be submitted within six months and a final decision would be made by the Continuity Committee.

Presentations were made by **Nigeria, Uganda, India** and **Scandinavia**, the latter two being in the nature of an offer to consider the possibility on their return home. Both the Ugandan and Nigerian organisations were confident of the support of their Governments and, in the case of Uganda, official approval and international support had already been secured. However, the Ugandan delegate made it clear that should Nigeria submit a written proposal, the Ugandan bid would be withdrawn and reissued for a subsequent ICWES. The order of preference resulting from the ballot was first **Nigeria,** then Uganda, India and Scandinavia.

Finally, steps were taken to appoint the Continuity Committee, which will be composed of:

Dr Elizabeth Laverick	Convenor
Professor Dormer Ellis	North America (Canada and USA)
Angeline Lopez	Latin America
Mahin Rahmani	Middle East
IIa Ghose	India
Chebaane Hassiba	Africa - Arabic speaking
Joanne Maduka	Africa - English speaking
Loteta Dimandja	Africa - French speaking
Marjo de Kryger	Western Europe

The United Kingdom, Australia and New Zealand will be represented by the **President of the Women's Engineering Society.**

Subsequent to the meeting, **Professor Mitsuko Kazuno** agreed to represent the Far East, but no representative has yet been found for Eastern Europe.

CLOSING SESSION

The closing session of the Conference on the Friday afternoon started with the award of prizes for papers and posters.

Criteria	Title	Winner
Practical Applications in Electronics	Speaker Verification -Security for Remote Computer Access	Amanda Moody Prize: £50 Donor: Inst of Electrical & Electronics Incorporated Engineers
Best Papers presented by a Young Delegate	Molecular Sensors	Dr GM Greenway, Hull University Prize: £50 Donor: Inst of Chemical Engineers
	The Aerospace Plane - Transport for the next Century	GM Kelly, Queensland University Prize: £50 Donor: Inst of Chemical Engineers
Best Papers related to Manufacturing	Using the Grai Method	S Partington et al Surrey University Prize: £50 Donor:Inst of Manufacturing Engineers
	Technology Transfer in Nuclear Fuel Manufacture	Dr SE Ion, British Nuclear Fuels Ltd Prize: £50 Donor:Inst of Manufacturing Engineers
Best Papers in Physical Sciences	Optical Neural Networks for Pattern Recognition	KB Russ, Pilkington Technology Centre Research Prize: £66 Donor: Inst of Physics Publishing

	Photoelectric Methods in the Study of Electron Processes at the Real Silicon Surface	Dr B Adamowicz, Silesian Technical University Prize: £66 Donor: Inst of Physics Publishing
	Operation Smart: A Hands-on Program that Encourages Girls to Enjoy Mastering Maths & Science	AE Goins et al, Girls Inc Prize: £66 Donor: Inst of Physics Publishing
Best Papers in Materials	A Biomacromolecule as an Acoustic Emission Source	OD Brazhnik, USSR Academy of Sciences Prize: £25 Donor: Inst of Metals
	Study of the Mechanical Properties and Microstructure in Aircraft Materials AI-Li Alloys	XXia, University of Leuven Prize: £25 Donor: Inst of Metals
	Engineering Education and Job Opportunities for Women - a Kenyan Experience and View	MM Wambugu, University of Nairobi Prize: £50 Donor: Inst of Measurement and Control

Following the awarding of the prizes, a lighthearted note was struck by television presenter, **Kate Bellingham** from the BBC TV programme ‘ Tomorrow's World’ .

“I work as a TV presenter on 'Tomorrow's World' - a live weekly science and technology magazine show that goes out at prime viewing time.

I am often asked 'How do you become a TV presenter?' In general, my advice is to work hard at getting the right skills (knowledge of the technical or production side of broadcasting, journalism, experience at hospital or local radio), and try to build up some useful contacts. This gives you a better chance of being at the right place at the right time - and a better chance of proving you're the right person for the job.

My story, however, is rather different. After joining the BBC as a trainee electronic engineer, I joined the presenting team for the IEE/BBC Faraday lecture tour. Then I was asked to co- present a programme for schools TV and it was only when I was offered the 'Tomorrow's World' job that I finally gave up the engineering post.

My former engineering boss told me 'You'll do more for engineering by leaving. ' He did not mean that I was a bad engineer, but that I was going into a high profile job, where as a trained engineer, I could be a role model for young women. I am pleased that I frequently have opportunities to share my enthusiasm for science and engineering.

The items and subjects we feature come from various sources - from big business to single inventors, personal contacts, trade journals, contacting research centres and, of course,people writing in to us. We look for things that are new, and preferably 'revolutionary' rather than 'evolutionary' in terms of the design, technology or approach.

I have learned a lot in my two and a half years in the show. We are much more likely to feature things that look good - if there 's *nothing to see, it's not good television - and when it comes to interviews, being knowledgeable isn't enough, you've got to be able to communicate as well. (This might sound obvious, but it's worth remembering if you find yourself dealing with TV!)*

A final word of advice if you do find yourself being interviewed and wearing a radio mic. When the soundperson puts it on you and says 'Just forget it's there' - don't! I have learned to check mine's switched off before I start gossiping - you never know who is listening. And always turn the mic off before you go to the too!*"*

This was followed by an excellent slide show at which Lynette Willoughby, Junior Vice President of WES, provided flashbacks of the Conference, accompanied by a most amusing commentary.

To close the Conference, Chairman, Elizabeth Laverick, thanked delegates for their support and announced that, subject to approval by the Continuity Committee of written proposals, the Delegates Meeting had accepted **Nigeria's** offer to host ICWES 10 in 1994.

IMAGES OF THE CONFERENCE

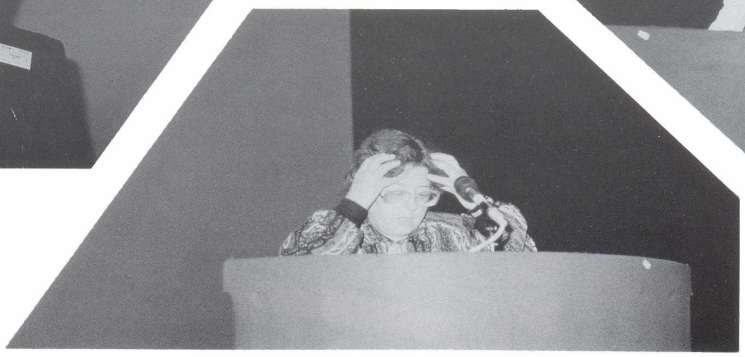
Lynette Willoughby

clockwise -
a) "Dancing boys at a women's conference!" ;
b) Patrons with ICWES9 'handbags' ;

c) Dorothy Hatfield WES President, with Patrons Sir Eric Ash and Sir Denis Rocke;

d) an impish smile from Patron Baroness Platt;
e) the rich range and diversity of sponsored delegates;
f) the WISE bus notorious English weather.

a) *Dr Good - ''If I'd known what it was like to have it all I might have settled for less''*



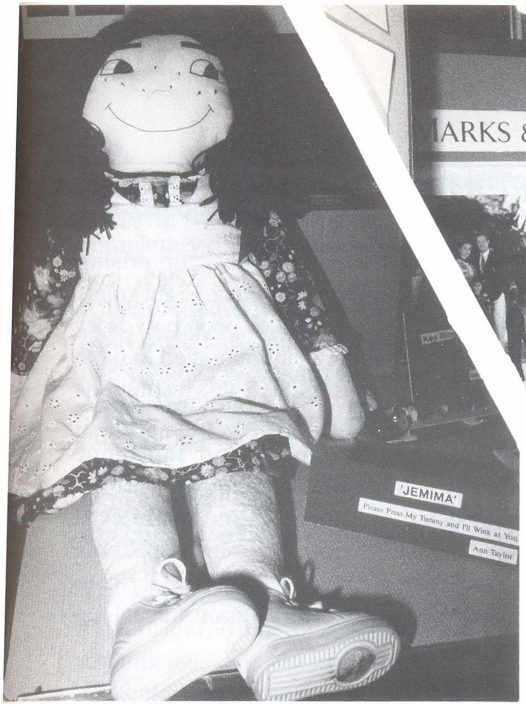
b) *Baroness Denton - ''We need to get our heroes back'';*

c) *Prof. Byrne - time for monitoring not role models;*

d) *some delegates had been to EVERY ICWES;*

e) *mentoring in practice;*

f) *Valerie Amos EOC visits the exhibition.*



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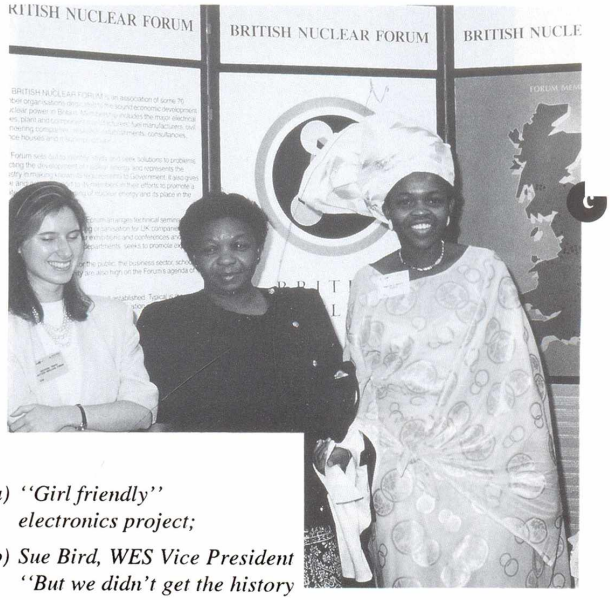

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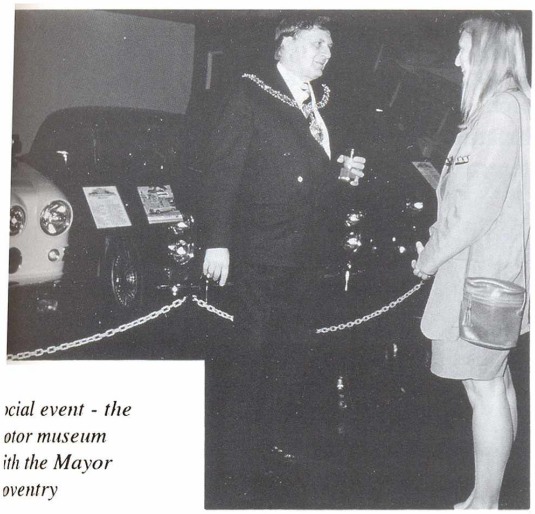


ɔcial event - the otor museum ith the Mayor oventry

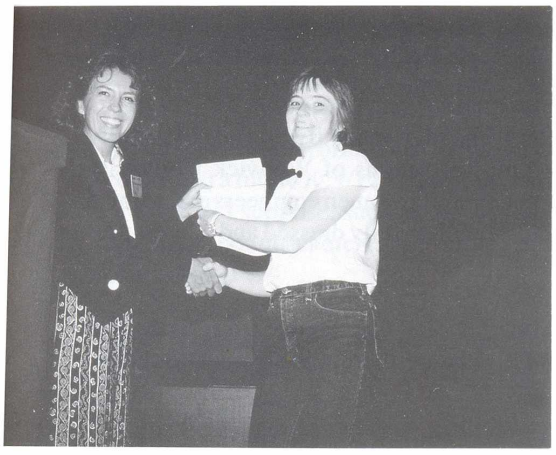
a) ''Girl friendly'' electronics project;

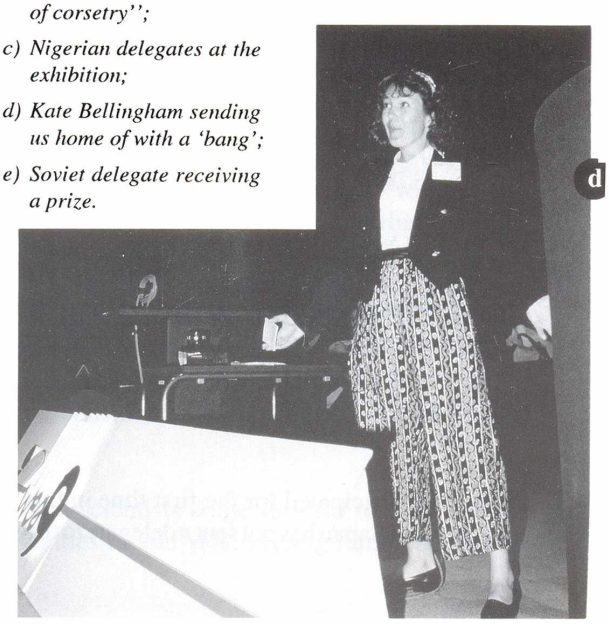
b) Sue Bird, WES Vice President ''But we didn't get the history of corsetry'';

c) Nigerian delegates at the exhibition;

d) Kate Bellingham sending us home of with a 'bang';

e) Soviet delegate receiving a prize.





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Jacqueline Juillard

We were nine Swiss delegates, comprising eight engineers and one architect. Eight grants were given to eight of these people in order to attend the conference. I managed to have them granted by prestigious Swiss institutions such as the **Swiss Academy of Technical Sciences,** the two **Zurich and Lausanne Federal Schools of Technology**, and the **Swiss Society of Engineers and Architects**. Five of them were from the French-speaking part of Switzerland, two from the Germanspeaking one and one from Tessin, the Italian-speaking one.

Jacqueline Perrotet, an agricultural engineer, found - and it was confirmed during ICWES - that women talk a lot more than men before making a sound decision,which should therefore be a better one. **Christina Zanini,** a civil engineer, was interested to meet a lot of women in the profession, when usually one is surrounded by men. **VeroniqueJost-Gara**, a mathematician, was surprised by the great number of highly qualified delegates from far-away countries,especially from Africa.

The general impression, which was also mine from the eight ICWES's that I have attended, is that the presentation of the subjects was a funny mixture: either highly technical or very much popularized. But the main interest of the conference is in fact the contacts established professionally, friendly and especially with colleagues from far-away continents. A sort of beginning of a professional women engineers' and scientists' networking the world-over.

Jacqueline Juillard
Chambesy, Switzerland

'FROM JAPAN WITH LOVE'

It was a bit of a surprise to me to find the spectacular scene of so many lively and colourfully dressed women from all over the world gathered on the campus of Warwick University between 14 and 19 June 1991. Of course, the conference was for women engineers and women scientists. People from African countries are particularly colourfully dressed and create an air of gaiety.

I myself participated for the first time in this 9th International Conference from Japan. For many years, Japan has not sent a delegate to the ICWES, although there is an organization called

'The Society of Japanese Women Scientists', to which I belong. For me, having only attended international conferences on high energy physics or nuclear physics, the atmosphere was completely different from what I was used to.

All participants were cheerful and friendly. I soon became friendly with a number of women from different countries. A young Russian woman who is a physicist showed me some photographs of her lovely children although she was worried about her country's serious economic condition. We talked about how she could manage both childcare and her professional work. Such a conversation would never be brought up in other conferences. A young woman from Denmark was worried about her career because she is laid off from her professional work while her children grow up. I realised that all women there at the conference had completely different problems and yet common problems too.

The conference was well organised. The white denim shoulder bag bearing the conference symbol and an umbrella were handed out together with the conference proceedings and related documents. The sessions were so organised that one could attend most of the major presentations of the programme without overlapping. The subject of talks were related to the vast fields of Research and Development and Education. From their presentations, I felt many women are indeed supporting today' s technology world. They talk about canal construction, traffic management and satellite communications. The Gender issues were unique in this conference with lectures on 'women returners fellowship scheme' or 'career guidance', 'girl's technology training' and so on.

Mitsuko Kazullo with (L to R) Dorothy Hatfield, Elizabeth Laverick and Maljorie Bell from the UK

We enjoyed visiting historical places and saw the beautiful scenery around Warwick between the lectures. I enjoyed visiting Shakespeare's village. We felt the long traditions and deep culture of the country. I also enjoyed talking to a few members of the organizing committee, who were so busy during the conference to make sure that everything should go well without any trouble. Nevertheless, they extended a warm hospitality to the participants who came from the far ends of the world. The Conference Chairman, Dr Laverick, suggested to me that Japan could host a future ICWES. I wondered why Japan had not done so already. There are a number of excuses I suppose, such as the language problem, the high cost of living and the distance from most countries etc. However, Japan today is considered as one of the major technological countries.

Why shouldn't Japanese women engineers and scientists come forward to host a future ICWES? I know there are a number of difficulties on our side. Having returned from the

conference, I reported the features of this successful ICWES 9 to The Society of Japanese Women Scientists, a very academically oriented society. We seriously thought of this task. At the moment we have decided to form the 'Japanese Women Engineers Forum' and we will discuss the possibility of hosting ICWES sometime in the future.

The Women's Engineering Society, established in 1919 in the UK, has about 700 members and was the host of this conference. I had an opportunity to talk with a past-President of WES, Dr Cicely Thompson, who kindly provided me with some information on past ICWES conferences at my request. She has also written a book about the history of the Society.

In the last but not the least, I thank again all the people who conducted and supported this successful ICWES9.

Mitsuko Kazuno
Miyama, Japan

The ICWES9 Conference was an event I had spent four years looking forward to - and I was not disappointed. I now look back on it as a week spent with old friends, reminiscing about previous meetings, and making new friends in a benign environment.

I was in England in 1987 at the time of ICWES8, but was unable to attend that conference (in the Ivory Coast) as I was in the process of moving to Australia and couldn't really be in two places at the same time. As Chairperson of the London Branch of the Women's Engineering Society I was very keen that the next ICWES be held in the UK, and it was an opportunity for me to return to England to attend the conference.

What particularly impressed me about ICWES9 was that so many delegates attended, from so many countries. There was a marvellous feeling of international camaraderie. In particular, a number of the African delegates got together, and held meetings relating to the progress of science and technology in those countries; this was an aspect of the conference that had not been planned, but with so many African states represented (some ten or more) it seemed too good an opportunity to miss. So, even with the mix of languages (we had to use French as well as English; one of the other Australian delegates acted as interpreter!) we were able to consider setting up efficient avenues for networking between the scientific and engineering organisations in the various African countries, which was very exciting.

Another plus point for me was to be able to catch up with the activities of my colleagues in England, some of whom I had not seen for four years. A number of them too had moved overseas as part of their jobs (to Pakistan, Hong Kong, Europe and even another to Australia!); for those I was able to catch up with.

Olivia Wellesley –Cole

I found that it was a time of consolidation in our career plans. Some had already changed jobs, or career direction; some (like myself) were considering change, and debating the best way to go about it. For me, the strategy of staying with the same employer and looking for an internal move (from design engineering to product marketing) has recently paid off; I wonder how others, contemplating similar moves, have fared? While there were not the twenty or thirty delegates from Australia that I had hoped for, there were three of us, a very creditable number considering the distance we had to travel to reach the UK. I was able to meet the other two delegates, and have been in touch with them since returning here.

So all in all, I enjoyed ICWES9, and it was well worth attending. I look forward to the next one, and am already saving for the plane fare!

Olivia Wellesley-Cole
Australia

SIGNPOST YOUR HORIZONS

Nearly 50 people responded to the invitation " Take a day to make a start..." and came along to the seminar run by **Kay Smith** to see about getting the momentum of their lives rolling in the right direction. There was a rich mix of people - from students to the long experienced, from those who had received a lot of training and guidance to those who felt themselves circling in the fog and of course, this being ICWES9, from many different countries.

It was great to see so many people taking responsibility for helping themselves and willing to assist others if they could. While a great deal of wisdom came from Kay Smith in the chair, a lot also came from the floor as people shared experiences and built on what was said. The great thing was that many continued to share for days afterwards.

Different Experiences?
Were people's experiences different in different cultures? In essence no. People found that they had a lot in common with people of vastly differing backgrounds - it's nice to know one isn't totally unique and alone in one's own little web.

So what did this diverse group learn? Talking to lots of people afterwards there were many excited and contemplative faces with people emphasising different bits that were important to them. Some people felt it had helped their confidence and desire to change a lot while others were more aware of the need for some hard delving in future and were psyching themselves up for it.

The day sparked off some wonderful thoughts plans and ideas. While it is not possible to capture everything that went on for the readers, here are a few notes on the main themes of the day.

Self Direction
A key point for the day was the need to know where you are going so that you don't end up where you don't want to be without knowing how on earth you got there. Make sure you have got on the right train for you and not just one roller-coasting to the top if that's not where you want to be. Once you start on the right train, there are so many routes to where you want to go - you can get on and off at will and change direction so long as you know where you started from, where you initially wanted to go and for what reason you want to alter things.

It is also very important to know what you want to achieve and why. Kay used a wonderful saying: "A lot of people spend time trying to kill the alligators when all they really wanted to do was drain the swamp." Do you move off at a tangent and get embroiled in sideline issues - I must confess to being guilty (more than occasionally).

Personal Effectiveness
Kay defined personal effectiveness as the ability to set objectives and achieve them successfully. Sounds a bit daunting? What things will help us to enhance our personal effectiveness?

- Know who you are, where you are coming from and where you are going to (This one kept on cropping up);
- Recognise opportunities and learn how to grasp them;
- Take responsibility for you own advancement by doing things for yourself - you could be a long time waiting for others to do it.
- Communicate well at all levels. Handle situations so that the outcome is mutually acceptable to all parties (ie respect yourself and others and be responsive to both needs; don't sweep your own needs under the carpet in your rush to do things for others).
- Know what you can change and what's worth changing for you. If you take something new on, you may need to be prepared to drop something else - evaluate what you really want;
- Develop strategies and techniques that work for you individually;
- Make sure you choose things that are important to you and that you are not just working on someone else's agenda.

The Balance In Your Life

To be successful, you need to have as well balanced and healthy lifestyle as possible. For balance, people need:

- Mental stimulation to keep interest up;
- Friends and contacts for emotional sustenance;
- Physical exercise and a healthy diet so the body matches up.

When we are out of balance, our efficiency drops and we cannot accommodate the derailments in life. Also, if a person overcommits to one thing (eg career) s/he can often end up wondering if that's what s/he really wanted in the first place.

Guilt is a great whittler away of our personal balance and is often induced by trying to meet our perception of society's expectations of us. We need to look at what our own value systems are and whether we are really operating on them or on someone else's

Try a little exercise. Write down 'I believe...' (say 5 key things).

Are these beliefs reflected in the way you run your life?

Think also about the things that drive you. Is it 'desire to achieve something' or 'fear of consequences'? If one is motivated by fear, one always thinks ' I won't do... because... ' Seems a shame to waste life and energy that way.

A Model To Use

Using a Force Field Analysis helps to check on the balance of life and see where changes can be made. To do this, draw a circle and divide it into three segments to cover:

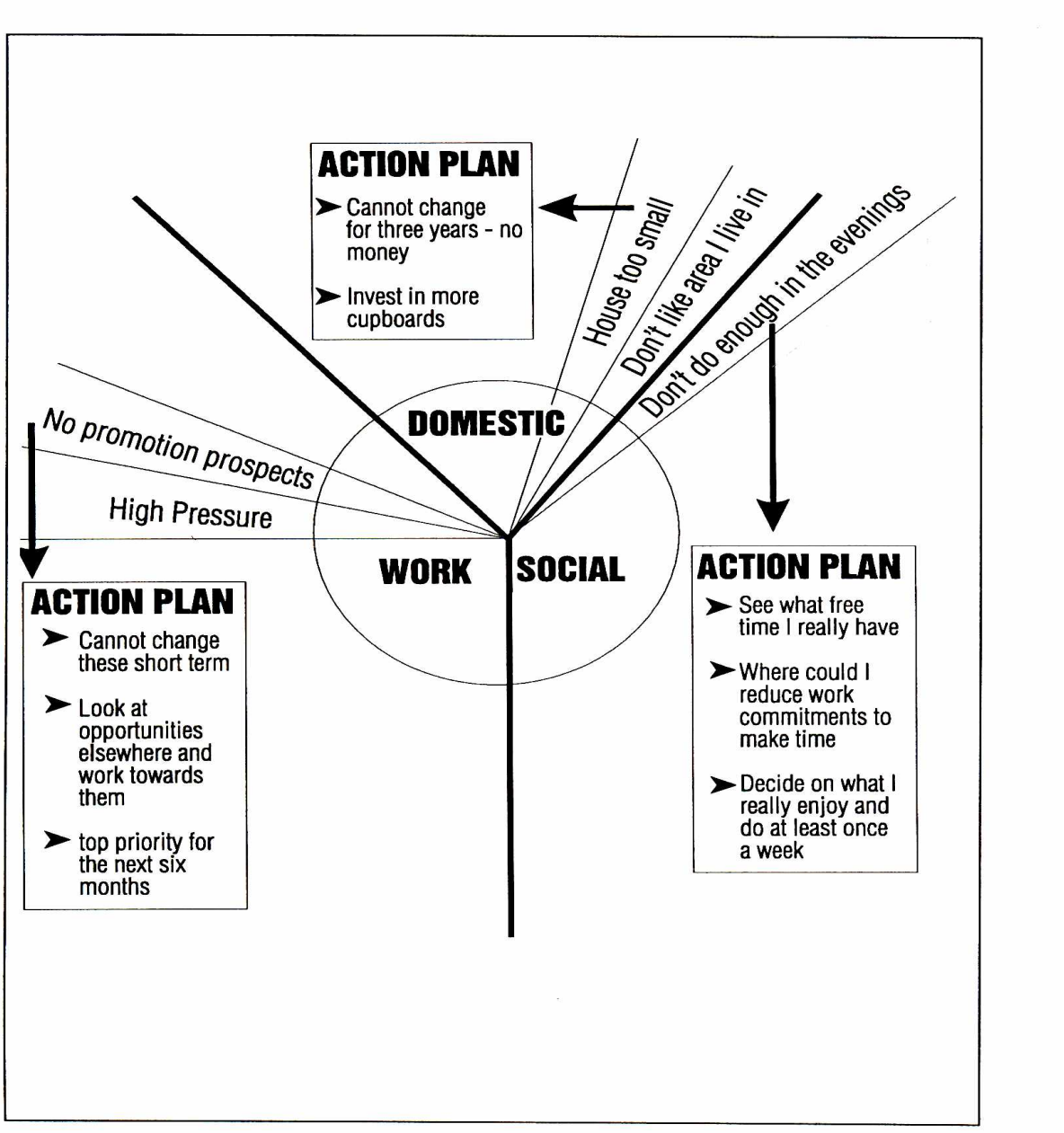
- Domestic (includes emotional balance);
- Work (includes mental balance and stimulation);
- Social (can include physical balance).

Under each heading, look at the good and the bad things in your life and see how the balance lies; you may well find that things are better than you thought.

For the items that you feel are bad, analyse as follows:

- What can't I change;
- What can I change over time;
- What can I change immediately.

For the items that you can change, you can radiate out further to develop an action plan. It is probably best not to try and change more than three things at once or you may get bogged down!



A fictitious force field is shown in the diagram as an example to clarify the above. If you want, you can also do the same exercise using different headings to suit yourself (ie you might like to try four segments covering Domestic, Emotional, Social and mental).

If, when you have done your force field, you feel it is more doom and gloom than good news, tinkering around on the edges on some of the less important items probably won't solve your life problems and you will need to take your courage in hand and alter some of the fundamentals such as job, family life, etc...Change can be scary but it's a lot better to do something and to take the hassle than to end up years later still in the same situation saying “If only...”

Make A Plan !

So, look at your life, see where you want to alter things and make your plans like the girl who came up to me two days after the course and said “ I've had a good think. I'm going to take more interest in how I look, I'm going to value myself more and I'm going to take the foreign assignment I was offered at work and enjoy it.” She was a bit quicker than me... but now that I've got this article written I'm going to sit down this very weekend and who knows!

Marianne Neal

(This article appeared originally in 'The Woman Engineer' in Autumn 1991.)

WES President Dorothy Hatfield reviews the closing Demographics session at ICWES9:

One of the great things about ICWES9 was meeting women engineers and scientists from overseas. Not only did we get the chance to talk informally about how our working situations differed, but one morning of the conference was given over to a formal comparison of how women engineers are faring the world over.

In the **Demographics** session, papers were presented by speakers from seven different countries and there followed some lively discussion. It is only possible to give a flavour of the morning in this article but it is intended to publish a full version of the proceedings.

AUSTRALIA

Olivia Wellesley-Cole opened by giving a comprehensive account of the situation in Australia. In 1988, objectives were set of 95,000 engineers by the year 2000, 20% female by 1997. By 1990, only 2% of professional engineers and 8-9% of students were women. However, in the last year a number of colleges were reporting much higher intakes of female students. A 1990 initiative - the Engineering 2000 Awards - attracted 11 female entries out of 29. The 1992 awards will be judged in September.

The final year project of one Civil Engineering student was Factors Influencing Women's Progression in Engineering. Her findings were that women were affected by bad careers information, lack of role models and women lecturers, the difficulty of combining career and family, and the beer and pornography orientation of the social life.

BELGIUM

Paula Taupert spoke first. Although across all disciplines 50% of Belgian students are female ad all youngsters are educated to 18, the girls tend to concentrate on classics, languages and the soft sciences. A survey of 6000 students found that they are much influenced by the media but could find no particular reason why girls are not motivated to start engineering courses. This survey compared the interest of girls in the 'exact sciences' with those in 'agricultural sciences' and set an objective of 50% female enrolment by 2000.

The second speaker from Belgium was **Kristel Phlippo**, Director of the Women's section in the Belgian Engineering Chamber. She explained that a very high proportion of Belgian women are not employed although many would like to be. She also commented about the inappropriate subject choices made by girls at school and told us how restrictive the Belgian employment laws are about matters like night work, hazards and maternity leave. Women are perceived as taking excessive sick leave and refusing to travel.

CANADA

For Canada, **Dormer Ellis** first emphasised the variable situations across the nation. Canadian girls do not in general have high career expectations and tend to drop maths and the hard sciences early .

The influence of the Montreal massacre - when an anti-feminist shot women engineering students - has considerably raised the profile of women engineers and has given rise to support for a number of initiatives and ideas. One proposal is for the foundation of an exclusively female engineering faculty.

It is necessary to attack basic causes of disinterest in engineering careers, the lack of interest in the hard sciences and the lack of understanding that a good career can form the basis of a satisfying lifestyle.

FRANCE

Elisabeth Thouret-Lemaitre told us that 8% of all French engineers are women. She presented some very comprehensive statistics and explained the complexity of the routes to becoming a professional engineer.

Some work to be published in Autumn 1991 shows that the average woman engineer is 29 years old, lives in the Paris area and is happy in her career. More are now moving into smaller companies. The overall conclusion was that French women would find it easier than those of many other countries to train for and pursue an engineering career.

PAKISTAN

Durdana Habib of the Pakistan Ordnance Factories emphasised that the situation of women in her country is based entirely on the Muslim culture - which has always insisted on the formal education of girls. Since the foundation of Pakistan in 1947, women have had the right to work, equal privileges and salaries and maternity leave. Nevertheless, the literacy rate is low.

She gave the following reasons for women's lack of progress:
- the few women feel isolated;
- no child care;
- families will not allow work of which husbands do not approve;
- no 'proper' facilities for women;
- few training opportunities.

Medicine is the most popular science-based career but women have increasingly joined the engineering profession over the last ten years. There are now 354 women registered with the Pakistan Engineering Council.

It is recommended that science, or basic health hygiene, should be introduced to Pakistani girls; that shorter working hours should be introduced and that child care facilities should be mandatory .

SWITZERLAND

Jacqueline Juillard from Switzerland reminded us that she comes from a very small country. There are two major organisations of engineers and scientists -the Federal Institute of Technology and the Society of Engineers and Architects.

A 1988 survey showed about 40% women studying agricultural sciences, 10-12% studying engineering, mostly from the German speaking areas.

The SIA has 2% women engineer members (5% if the architects are included). A survey to be published shows that one third of women in management are responsible for an average of 80 people, whereas 50% of the men are responsible for up to 1000 people. Fifteen percent of women engineers are unhappy with their career choice, compared with 10% of men.

The major problems facing Swiss women engineers are a lack of basic information and balancing work and family demands.

USA

Evelyn Murray spoke for the USA. Whereas 53% of holders of first degrees are women, men PhDs outnumber women by 2: 1. Four fifths of women PhDs are in the life sciences, rather than the mathematically-based sciences.

She speculated that the reason for the proportionately greater number of black women engineers than white may be due to the matriarchal nature of black society.

Female recruitment to engineering courses peaked at 15% and has levelled off. Reasons may be the American culture and society and the level of confidence of teenage girls.

Mentoring is essential and must be encouraged. However the concept of the glass ceiling could become an excuse. It is necessary to watch legislation very carefully as this can easily mitigate against the cause of expanding female employment. We must remain on guard she concluded.

DISCUSSION

The discussion started with a view that mentors are much needed and their availability should be expanded. Role models are much less helpful.

A question was raised about the impact of the late enfranchisement of women in Switzerland. It was suggested that despite this Belgium might, in fact, be considered less advanced than Switzerland.

Susan Meschel commented that in the US policy makers speak as though no problems remain, whereas she perceives the need to continue the fight. It was suggested that the fact that nearly all the policy makers are men might have some bearing on the matter.

Lee Arnold pointed out that we must an pass on the word, we must dare to be rust.

And so it ended, the final working session of the conference. A lively an stimulating look at our issues around the world.

Dorothy Hatfield

(This article originally appeared in 'The Woman Engineer'.)

DELEGATES AT ICWES9

Alphabetically by country

Australia
Professor EM Byrne
Miss G Kelly
Ms O Wellesley-Cole

Barbados
Mrs S Sealy

Belgium
Mrs L Dimandja
Miss K Phlippo
Mrs K Rice
Miss P Talpaert
Dr X Xia

Canada
Dr M-A Armour
Dr DEllis
Dr M Frize
Dr J McDill

China
Mrs S-W Yang
Ms M Zhou

Denmark
Mrs T Christensen
Mrs B Hornemann
Mrs AB Skov

Finland
Mrs M Runeberg
Ms M-B Suvanto

France
Mrs A Hieronimus
Mrs B Labatut-Chabaud
Ms ML Lassalle
Mrs E Thouret-Lemaitre

Germany
Mrs U Stricker-Berghoff
Ms B Zich

Ghana
Dr AB Andam

Greece
Ms S Potamianou
Dr K Thoma

Hong Kong
Ms A Liu

India
Dr U Bambawale
Mrs I Ghose
Mrs B Kaur
Mrs P Madhuranath
Mrs V Nashikkar

Iran
Professor M Rahmani

Republic of Ireland
Professor DM Donnelly

Ivory Coast
Mrs M Achy Brou

Japan
Professor M Kazuno
Ms S Matsuzaki

Kenya
Dr G Bambrah
Miss J Gathogo
Mrs CK Gitobu
Mrs E Kiilu
Ms S Kirea
Miss R Kung'u
Miss J Nyambala
Miss MM Wambugu

Mali
Mrs O Coulibaly
Mrs G Fofona

Mauritius
Miss D Bahadoor

Mexico
Mrs N Blazquez Graf
Dr M Perez-Armendariz
Mrs A Perez Lopez

The Netherlands
Miss MJ de Kryger

New Zealand
Dr C Locke

Nigeria
Miss O Adams
Mrs MA Adebiyi
Mrs C Afolami
Mrs I Amusu
Mrs L Ezeoke
Miss N Isigwe
Miss A Jacobs
Mrs JO Maduka
Dr E Okeke
Mrs M Ovuewhorie
Mrs B Oyeneken
Mrs Y Soyinka-Jacobs
Dr M Taiwo
Mrs M Uwechue

Norway
Ms G Asland

Pakistan
Mrs D Habib
Mrs K J afri

Poland
Dr B Adamowicz

South Africa
Dr B Glass
Ms B Sudano

Spain
Ms I Castilla y Cortazar
Dr RM Gilabert

Sri Lanka
Dr S Devarajan
Mrs B Jayaweer

Sweden
DrHRyd

Switzerland
Mrs M Courvoisier
Miss AF Giovannoni
Miss V Hrdliczka
Mrs V Jost-Gara
Mrs J Juillard-Feyler
Mrs J Perrotet
Mrs R Reinhardt-Kongimbo
Ms LA Stuckrath
Miss C Zanini

Tanzania
Mrs S Mutagwaba

Trinidad & Tobago
Miss F Lum Young

Uganda
Ms W Byanyima
Mrs E Kyobe
Mrs IM Muloni

United Kingdom
Ms K Abbott
Mrs S Abdelhalim
Mrs L Adelaja
Ms D Adeoye
Miss T Akisanya
Miss J Allen
Miss D Anthony
Ms L Armitage
Mrs M Armstrong
Mr NP Armstrong
Sir Eric Ash CBE
Ms ME Ayre
Ms PJ Ayton
Miss PD Barber
Mrs C Barral
Mrs M-N Barton
Mr C Baumber
Miss E Beck
Ms DM Beddow
Miss M Bell
Miss K Bellingham
Ms E Bennett
Ms M Benson
Dr CA Bentley
Mrs K Bhanot
Ms C Bielefeldt
Ms SM Bird
Miss AN Birkett
Ms S Blackwood
Miss EH Blount
Ms A Boniface
Miss L Bonnett
Ms K Bonthrone
Miss A Botejue
Mrs C Bowser
Mrs EBright
Miss J Brilliant
Mrs D Broadbent
Mrs KJ Brodie
Ms J Brooke
Mrs J Brookes
Miss S Brookes
Ms J Brophy
Miss F Brown
Mr R Brown
Miss V Budd
Dr S Bullivant
Miss L Bulmer
Ms L Burchall
Dr KAH Burt
Mr BR Butler
Dr D Byrne
Mrs J Carpenter
Mrs C Carter
Miss E Chui
Ms A Churchill
Ms A Clark
Ms S Clement Dent
Miss S Cloggie
Dr R Cobley
Professor MM Cole
Ms R Collington
Ms P Collins
Miss S Colman
Ms S Colston
Ms M Cook
Ms JM Cooper
Miss P Cooper
Ms D Cornick
Miss E Courtney
Miss J Cox
Dr A Coyle
Mrs J Crabtree
Mrs C Crook
Mrs K Crowhurst
Dr M Crowther
Dr S Croxall
Mrs AE Cumming
Ms S Daft
Miss R Darbar
Dr ME Davies
Miss N Davison
Miss H Day
Mrs AM Dean
Mrs K De Maillet
Baroness Denton
Mrs A Dewing
Miss P Dillon
Miss K Ditchfield
Mrs G Doel
Dr M Dowson
Miss K Duncan
Mrs J Eagles
Mr K Early
Dr J Efstathiou
Miss V Eijo
Mrs E Eldridge
Dr VA Ellis
Miss J Everard
Miss N Faragher
Dr M Farago
Miss T Farmer
Mrs P Fawcett
Mrs J Felgate
Miss MI Ferguson
Ms P Ferrie

Mr D Filer
Miss E Fleming
Ms E Fosbrooke
Ms A Fraser
Ms J Freeman
Ms A Froggatt
Mrs X Fu
Ms B Gammon
Professor GA Gehring
Miss PM Godwin
Ms C Goodman
Miss J Goorney
Miss D Gordon
Dr G Greenway
Mrs Y Green
Ms J Griffiths
Mrs G Groves
Mrs L Hall
Mr P Hanson
Mr IN Hardwich
Dr M Harris
Dr G Harte
Mrs S Harvey
Mrs DH Hatfield
Miss J Hawkins
Dr B Hay
Mrs E Hayes
Miss S Hayward
Mrs K Hide
Mrs S Higham
Mrs R Hilhorst
Mr C Hilsum
Miss M Hindley
Ms RK Hoare
Miss AJ Hodgson
Dr K Holford
Ms S Hughes
Ms AML Humphrey
Mrs CM Hunsley
Ms T Hutchinson
Ms S Ibrahim
Dr A Ilumoka-Nwabuzor
Dr S Ion
Miss R Isaac
Ms S Jamshidi
Mrs J Jennings
Dr E Johnson
Ms S Johnson
Mrs C Jones
Miss H Jones
Mrs T Juckes
Ms L Kalinina
Professor AA Kaposi
Ms P Kaur
Miss CE Kelly
Mrs M Kendrick
Miss M Khan
Mrs DL King
Miss R King
Ms G Kirkup
Ms J Knight
Miss CLam
Ms S Landuziere
Mrs J Lang
Mrs J Lange
Dr E Laverick
Miss N Lawson
Ms S Lindars
Ms T Long
Ms J Longworth
Ms F Lowry
Miss CB McCarthy
Ms J McDonnell
Miss S McIntosh
Ms B Mackman
Ms TS Macrea
Mr R Malpas
Ms H Mancktelow
Mrs M Maple
Dr S Mason
Mrs LM Maynard
Miss T Medhurst
Miss CA Mercer
Miss H Mercer
Dr S Merry
Ms T Micheeva
Ms M Mirza
Mrs JM Misell
Miss P Miskaki
Ms J Mitchell
Mrs A Moody
Miss S Mookerjee
Miss J Morrey
Dr A Morton
Dr S Mukhopadhyay
Miss K Mullarney
Ms E Naylor
Mrs M Neal
Ms A Newell
Mrs L Oakes
Miss B Onifade
Miss A Opoku-Banful
Ms B Ovsttun
Mrs J Owens
Miss V Owusu
Miss K Paddock
Miss B Parry
Ms C Parsons
Ms SR Partington
Dr I Patel
Mrs A Paterson
Mrs J Pavelin
Dr K Pendlebury
Miss J Penrose

Ms J Peters
Ms S Phanda
Miss MA Pickup
Miss R Pickup
Mrs SPilling
Baroness Platt of Writtle
Miss K Pollock
Mrs D Potter
Mrs B Puplampu
Miss S Puri
Miss A Rapier
Ms RA Raymond
Ms D Reeve
Ms H Reid
Dr E Rhodes
Ms D Richards
Dr M Rizk
Miss S Robertson
Dr E Robinson
Dr NJ Rockc1iff
Sir Denis Rooke
Ms E Ross
Miss N Rubasingam
Mrs S Runham
Dr K Russ
Mrs A Ryde Weller
Ms C Saffell

Ms R Sage
Miss J Schwarz
Ms E Sears
Ms S Seymour
Ms S Shah
Mrs B Sharp
Ms G Shaw
Mrs PShaw
Mr T Sheppard
Dr B Shield
Mrs CM Shirley
Miss S Silvera
Ms N Simon
Ms S Simpson
Ms R Singh
Mrs GM Skinner
Miss E Smith
Miss FPJ Smith
Mrs M Smith
Dr K Snidvongs
Miss G Sourani
Mrs R Spears
Mrs A Spurling
Ms A Srivastrava
Dr B Stanford
Mrs J-A Stapleton
Ms B Stephens
Dr M Storm
Miss S Storrod
Miss C Strain
Miss CF Strother
Ms J Sutherland
Ms M Tasker
Ms P Taylor
Dr R Tebb
Ms S Tedder
Mrs C Thompson
Miss C Thompson
Miss C Thompson MBE
Mrs T Thorley
Mrs D Thornton
Miss 0 Threlfall
Mrs A Todman
Miss R Tuffin
Mrs H Utley
Mrs J Venables
Dr M-A Vicencio-Silva
Miss S Waddell
Dr H Walker
Ms T Walker
Mrs J Walls
Miss P Walsh
Dame Anne Warburton
Ms K Ward
Mrs AG Waters
Mrs AE Watkins
Mrs M Watkins
Miss M Watson
Ms C Weatherburn
Mrs RE West
Ms C Westcott
Mrs GF Whapshott
Dr F Wheeler
Miss L Wheeler
Miss J Whitehurst
Ms SJ Wilkinson
Mrs L Willis
Ms L Willoughby
Mrs D Winfield
Miss GP Womack
Miss R Worrall
Dr A W ozencraft
Mrs A Wright
Ms X Xiao
Ms BA Young
Dr C Young
Miss R Young
Mrs S Young
Mrs A Y oungson
Ms Z Zahid

United States of America
Ms S Armentrout
Ms L Arnold
Ms B Bailey
Ms Y Brill
Ms E Brower
Dr L Calcaterra
Ms A Cavanagh
Ms H-M Chapman
Ms J Forbes
Ms A Goins
Dr I Goldberg
Dr M Good
Lt Col AJ Harness
Ms W LaBelle
Ms R Langford
Dr S Marlor
Mrs M McCarthy
Ms M Meade
Dr S Meschel
Ms H Morris
Ms M Munger
Mrs ME Munzer
Ms E Murray
Dr L Ott
Ms L Pickup
Mrs B Preece
Ms M Pritchard
Ms J Shirazi
Professor M Sloan
Ms N Smith
Miss J Spear
Mrs S B Sussman
Ms A Swoboda
Ms J Webb
Ms E Williams

USSR
Miss O Brazhnik

Yugoslavia
Mrs S Turajlic

Zaire
Miss B Bobaly
Ms M Djuma
Miss M Langa Ndamvu
Miss S Nzumba
Miss M Omanga Opunga
Mrs G Tshiala Kabioso

Zambia
Ms D Namuchimba

Zimbabwe
Ms LA Reimer
Ms FP Samupindi
Dr V Vokolkova

Monday 15 July

10.15 **Opening Ceremony** Chair: **Dr E Laverick**, UK
11.15

10.15 **Dr E Laverick**, Chainnan ICWES 9 UK

10.25 **D H Hatfield**, President WES UK

10.35 **Sir Denis Rooke CBE FRS FEng**, President of the British Association for Science, Immediate Past President of the Fellowship of Engineering,
Chancellor of Loughborough University of Technology

10.55 **Baroness Platt of Writtle CBE FEng DL** Formerly Chair, Equal Opportunities Commission

11.45- **PLENARY SESSION** Chair: **D H Hatfield**, UK
12.30 Women in Industry **Dr M L Good**, Allied Signal Inc, USA

14.00- **KEYNOTE SESSION 1** Chair: Dr E Rhodes, UK
15.00

14.00 **Transport**
Harbour Channels M P Kendrick MBE, Mersey Conservancy, Department of Transport UK

14.30 **Satellites and Telecommunications**
Worldwide Competition in Communication by Satellite
- the Role of the European Space Agency,
AM Hieronimus, European Space Agency, France

CONCURRENT WORKING SESSION (15.30 - 17.00)
Satellites and Telecommunications Chair: **Dr K A H Burt**, UK

15.30 The Aerospace Plane - Transport for the Next Century
G M Kelly, University of Queensland, Australia

15.45 Deep Space Communication Network Architecture
J R Knight, British Aerospace (Space Systems) Ltd UK

16.00 Integrated Multi-Service Communications Network **G Waters**, University of Essex UK

16.15 Optical Fibre Transmission Systems **D M Beddow**, British Telecom Research Laboratories UK

16.30 A New Satellite Receiver **S Yang** and **Q Xia**, Shenzhen University, China

Transport Chair: B M Stephens, UK

15:30 Flap Setting Estimation for Optimum Lift to Drag Ratio of an Aircraft
P Madhuranath, National Aeronautical Laboratory, India

15.50: Multicriterial Evaluation Techniques for Urban Transportation Systems **Dr V Vokolkova**, University of Zimbabwe, Zimbabwe

16.10 Noise Standards for New Railways **Dr B Shield**, South Bank Polytechnic, UK

16.30 A Brief History of the Midlands Motor Industry **P Taylor**, SS White Industrials Ltd, UK

16.50 The Role of Dual Transit (Guided Busways) as a Rapid Transit Public Transport System
R G P Tebb, Yorkshire Rider, UK

Tuesday 16 July

09.00-10.30 **KEYNOTE SESSION 2** Chair: **Dr K A H Burt**, UK

09.00 **Transport**
Applying Road Transport Informatics in an Integrated Road Transport Environment
C Bielefeldt, MV A Systemica, Germany/UK

09.30 **Satellites and Telecommunications**
Remote Sensors and Global Coverage from Satellites
Dr M Cole, Royal Holloway and Bedford New College, UK

10.00 **Education**
Women, Science and Technology: Shifting the Paradigm from Role Modelling to Mentorship
Professor E M Byrne, The University of Queensland, Australia

CONCURRENT WORKING SESSION (11.15 - 12.45)

11.15 **Education** Chair: **Dr E Rhodes**, UK
Can an Institute of Technology Improve Equality of Opportunity for Women in Technical Education?
Professor H Ryd, Royal Institute of Technology, Sweden

11.30 Women, Higher Education and Culture Change **E C P Sears**, Southampton Institute of Higher Education, UK

11.45 They Can Because They Think They Can **Dr C A Young**, University College of Swansea, UK

12.00 Between the Pit and the Pedestal,
Career Patterns of Women Scientists and Engineers in Western and Eastern Society
Dr S V Meschel, University of Chicago, USA

12.15 Mathematics, Minerals and Molecules - Contributions of Women to Engineering and Science **A C Swoboda**, Maxu Exploration Company, USA and **J S Baylor**,
Stone and Webster Management Consultants Inc, USA

11.15 **Satellites and Telecommunications** Chair: **Professor A A Kaposi**, UK
Echo Cancellation in Telecommunications **Dr M S Rizk**, The City University, UK

11.30 Scientific Visualisation - the Graphical Presentation of Computed Data **Dr M Dowson**, Leicester Polytechnic, UK

11.45 Speaker Verification - Security for Remote Computer Access **A Moody**, Ensigma Ltd, UK

12.00 Communications in an Underwater Environment **Dr S Merry**, University of Southampton, UK

Transport Chair: **B M Stephens**, UK

11.15 Work of the Traffic Management Systems Working Party **S Harvey**, NEDO, UK

11.30 Rural Access and Minor Road Programmes in Kenya **R W Kungu**, Nairobi, Kenya

11.45 Influences on Planning a New Model in the Motor Industry **A Youngson**, Rover Group, UK

12.00 Environmental Considerations in Road Transportation **Dr V Nashikkar** and **A S Bal**, NEERI, India

12.15 Vehicle Safety - What is Next? **J Forbes**, TRW Technar Inc, USA

12.30 Traffic Incident Detection Using Vision-Based Processors **Dr M-A Vicencio**, University College, London, UK

Wednesday 17 July 1991
CONCURRENT WORKING SESSION (10.00 - 13.00)
Career Development/Gender Issues Chair: **B Sharp**, UK

10.00 Daphne Jackson Women Returners Fellowship Scheme **E A Johnson**, Imperial College, London and University of Surrey, UK

11.00 Career Guidance Activities that Work **B P Preece**, USA

11.30- Women Returning to Software Engineering **J Stapleton** and **S Williams**, University of Reading, UK

13.00 Review of Women in Engineering and Science, the Situation in the UK and Initiatives to Improve the Position, **Professor G Chivers**, University of Sheffield, UK

14.00-16.30 **POSTER PRESENTATIONS**

Women, Computers and the Construction Industry **S J Wilkinson**, Oxford Polytechnic, UK

Women in Construction **A W Gale**, University of Manchester Institute of Science and Technology, UK

Participation of Women in the Hong Kong Construction Industry **A M M Liu**, City Polytechnic of Hong Kong

Prospective - A Strategy for Engineers **B Labatut-Chabaud**, Association Francaise des Femmes Ingenieurs, France

British Airways Engineering **J Schwarz**, British Airways, UK,

Barriers to be Broken **C J Baumber**, Rover Group, UK

The Women in Technology (WIT) Project:
Ten Years of Positive Action for Women Technologist Returners (1981-1991)
R Atkins and **A Swarbrick**, The Open University, UK

Women in Science and Technology in Mexico **A Perez Lopez** and **T Santana**, Mexico

Thursday 18 July 1991	
09.00- 10.30	**KEYNOTE SESSION 3** Chair: **Dr M E Farago** UK
09.00	**Basic Sciences** Inter Species Communication **Professor D M X Donnelly**, University College, Dublin, Eire
09.30	**Information Transfer** The Changing Role of Engineers and the Image they Present **Baroness Denton CBE**, Black Country Development Corporation, UK
10.00	**Technology Transfer** Women in Projects or Projects for Women? **Dr R Hillhorst**, Project Development Department, British Council, UK
	CONCURRENT WORKING SESSION (11.00 - 12.30)
	Information Transfer Chair: **J E Pavelin**, UK
11.00	Role of the British Library in Supporting Science and Engineering **S Pilling**, British Library Document Support Centre, UK
11.15	Energy Technologies Transfer **U Stricker-Berghoff**, VOI-GET, Germany
11.30	Multimedia Development for Engineering Education and Training - a Communication Challenge **K Ward and K Hall**, Institute of Irrigation Studies, UK
11.45	Microcomputer Networking **R West**, Loughborough University of Technology, UK
12.00	Communication within the Home **K Y Crowhurst**, GEC-Marconi Ltd, UK
	Technology Transfer Chair: **Dr E Rhodes**, UK
11.00	Technology Transfer - A User's Guide **Dr E Robinson**, British Technology Group, UK
11.15	Technology Transfer in Nuclear Fuel Manufacture **Dr S E Ion**, British Nuclear Fuels, UK
11.30	Appropriate Technology Transfer in the Third World **S Birchmore**, World Vision Britain, UK
11.45	Transfer of Technology: Problems Experienced **D Habib**, Pakistan Ordnance Factories, Pakistan
12.00	Women in the Indian Electronic Industry Poona **Dr U Bambawale**, University of Poona, India
	Basic Sciences Chair: **Dr M E Farago**, UK
11.00	Optical Fibre Sensor for Liquid Density **Professor S Yang**, Shenzhen University, China
11.15	Molecular Sensors **Dr G M Greenway**, University of Hull, UK
11.30	Optical Neural Networks for Pattern Recognition **K B Russ**, Pilkington Group Research, UK
11.45	Photoelectric Methods in Study of Electron Processes at the Real(lll) Silicon Surface **Dr B Adamowicz**, Silesian Technical University, Poland
12.00	Communicate by Numbers - A Systematic Approach to Problem Solving **E Naylor**, Lucas Engineering and Systems, UK, and **S Shah**, Lucas, UK

CONCURRENT WORKING SESSION (14.00 - 15.30)

Education Chair**: Professor E M Byrne**, Australia

14.00 Education of Girls in Physics **Dr F S Wheeler**, Withington Girls School, UK

14.15 Operation Smart: A Hands On Program that Encourages Girls to Enjoy Mastering Maths and Science
A E Goins et al, Girls Incorporated, USA

14.30 Girls and Technology - Some Issues **R Pickup**, UK

14.45 Programs Designed to Encourage Young Women to Study Engineering **M B McCarthy**, Society of Women Engineers, USA

15.00 Introduction of a Record of Achievement for Students in a University Engineering Department
Dr A P Morton, University of Birmingham, UK

Information Transfer Chair: **J E Pavelin**, UK

14.00 Communication between the Operator and the Intelligent Factory Control System **J Efstathiou**, Oxford University, UK

14.15 A Computer Based Process for the Exchange of Information between CAD Systems and Manufacturing Systems
R Singh, Brunei University, UK

14.30 Improving Communication in Small Manufacturing Companies Using the Grai Method
S Partington et al, University of Surrey, UK

14.45 Emerging Technologies for Military Command and Control **Dr D Byrne**, Admiralty Research Establishment, UK

15.00 An Overview of Communications and Information Technology **Shahla Jamshidi**, Ove Arup & Partners, UK

15.15 The Use of Computer Packages in Design and in the Preparation and Management of Civil Engineering Contracts
L Bonnett, Severn Trent Water Authority, UK

Basic Sciences Chair: **Professor D M X Donnelly**, Eire

14.00 The Gap in EC Directives on Noise **Dr B Hay**, Coventry Polytechnic, UK

14.15 The Importance of Good Acoustics for Communication **S Bird**, SM & PC Bird Acoustics Consultants, UK

14.30 Update for Engineers on Elementary Particle Physics **B P Preece**, Science Education Consultant, USA

14.45 Statistical Design of Experiments in Scientific Communication
N E Lapple Smith, EG&G Idaho Inc, USA

15.00 Automatic Finite Element Analysis: Understanding the Technology **M McDill**, Carleton University, Canada

15.15 Continued Optical Monitoring of Electrical Breakdown in Synthetic Resins **J M Cooper**, National Grid Research, UK

	CONCURRENT WORKING SESSION (16.00 - 17.30) **Education** Chair: **L I Pickup**, USA
16.00	WISEST - An Initiative at the University of Alberta **Dr M-A Armour**, University of Alberta, Canada
16.15	Integrated Engineering Degree programme - Opening Doors for Women into Engineering **Dr K M Holford** et al, University of Wales, UK
16.30	Girls' and Women's Access to Engineering **P Ottley**, Lancashire Polytechnic, Uk
17.00	Developing Distance Education for Women in Engineering **G Kirkup** and **R Carter**, Open University, UK
17.15	Women in Engineering in Canada: More than just Numbers .**Dr M Frize**, University of New Brunswick, Canada
	Human Communications Chair: **J Venables**, UK
16.00	Discussion on the Balancing of Personality, Image and Confidence to Promote Effective Communication between Engineers **R J Brown**, Xi Associates, UK
16.20	An Investigative Study into the Influence of TV Advertising of Analgesics on the Consumer Decision-Making Process **Dr B D Glass** et aI, University of Port Elizabeth, South Africa
17.00	Multi-Functional Problem Solving in Organisations: Getting to the Heart of the Matter **M P Armitage**, Mosaic Management Consulting Group, UK
	Friday 19 July 1991 **CONCURRENT WORKING SESSION** (09.00 - 10.30) **Education** Chair: **L I Pickup**, USA and **M Maple**, UK
09.00	A Review of Engineering Education of Women in India **I Ghose**, formerly Women's Polytechnic, India
09.15	Women in Engineering in Zimbabwe **L A Reimer**, Zimbabwe Institute of Engineers
09.30	Engineering Education and Job Opportunities for Women: Kenyan Experience and View **M M Wambugu** and **S M Maranga**, University of Nairobi, Kenya
09.45	Science Education for Women in Ghana **Dr A A Bentil Andam**, Nuclear Research Laboratory, Ghana
10.00	Gender Differences in Communication in Engineering Classes in Nigeria **Dr E A C Okeke**, Department of Science Education, University of Nigeria, Nigeria
10.15	Review of Education Sessions **Professor E M Byrne**, University of Queensland, Australia

Technology Transfer Chair: **Dr E Rhodes,** UK

09.00 The Communication of Environmental Needs **J Brooke** et al, Posford Duvivier Environment, UK

09.15 Engineers are Becoming Ecological Literates **ME Munzer**, Writer and Lecturer, USA

09.30 Rebuilding Afghanistan - A Problem of Communication? **J Parker**, Thames Water, UK

10.15 Improving People's Understanding of our Planet - Involving the Public in Scientific Research Expeditions
Dr C A Locke, University of Auckland, New Zealand

Human Communications Chair: **J Venables**, UK

09.00 Packaging the Truth **Alison Clark**, Shandwick Public Affairs Ltd, UK

09.45 Education and Training for a Successful Total Quality Change Programme
J Eagles and **C Bowser**, Lucas Engineering Systems Ltd, UK

10.00 Human Communications: Issues in Education and Training **R Sage** and **PShaw**, Central School of Speech and Drama, UK

10.15 Communicating the Nuclear Safety Message at Public Enquiries **J Longworth**, Nuclear Electric, UK

11.00-13.00 **PLENARY SESSION - DEMOGRAPHICS**
Chair: **M Maple**, UK

Short Oral Presentations from:

Australia	**0 Wellesley-Cole**
Belgium	**P Talpaert**
Canada	**Professor DEllis**
France	**E Thouret-Lemaitre**
Pakistan	**K Jafri, D Habib**
Switzerland	**J Juillard-Feyler**
UK	**D Mcshane and A Clarke**
USA	**E Murray**

Followed by discussion

14.30-16.00 **CLOSING SESSION**

CONFERENCE ‘ PROCEEDINGS’

Proceedings from ICWES9 are now available in two volumes.

Volume 1 is 515 pages long and deals with **Communications.** The sections discuss: Transport; Satellites and Telecommunications; Education; Basic Sciences; Information Transfer; Technology Transfer; Human Communications and Career and Gender Issues. The volume is introduced by an essay on **Women in Industry,** written by Dr Mary Good, Senior Vice-President, Technology of the American Allied-Signal Inc.

Volume 2 concentrates on **Demographics.** The 174 page volume is introduced by Sir Denis Rooke's opening ceremony address in which he discussed Science and Industry. The following 34 chapters survey the scene both geographically and from the point of view of the professions: from the European Community to Japan, from the USA to Belgium. Topics range from role modelling to women in the construction industry and the professional education of women in Africa.

Both volumes are bound hardback books and may be obtained from:

Science Reviews Ltd,
18 Oaklands Gate,
NORTHWOOD
Middlesex
HA63AA
Tel: 0923 823586

Volume 1 is priced at £60.00 and Volume 2 is £18.00 (both prices include postage and packing). Full-time delegates at ICWES9 should have received a copy of both volumes; in the event of non-receipt, please contact Science Reviews Ltd.

Education

Educating Modem Engineers:
CAD Tools and Communication
R Cobley, University of Exeter, UK

Biomedial Engineering Education
N L Davis, Southern Methodist University,USA

Tracking the Gender Barrier through
Declining Interest in Technology
M McDill and **M Johnston**, Carleton University, Canada

The Marie Curie Society - Encouraging Women to Enter Scientific Careers
K Bonthrone, D Gordon et al, University of Cambridge, UK

Women into Engineering - Recruitment to the Profession **J Jennings** et al, Sheffield City Polytechnic, UK

Basic Sciences

The Design and Development of Molecular Sensors based on Selective Macrocyc1ic Systems
ER Beck, University of Hull, UK

A Study on Modelling Insulating Films with Two Blocking Electrodes for the Case of
Two Mobile Charges
SF Potamlanou,KA T Thoma et al, University of Patras, Greece

The Design of Macromolecules for Selective Chemical Sensors
RP Tuffin, University of Hull, UK

A Biomacromolecule as an Acoustic Emission Source **OD Brazhnlk**, USSR Academy of Sciences, USSR

Simultaneous Optical and Acoustic Measurement of Bubble Cloud Evolution in Tap and Saline Water
J Griffiths, formerly University of Bath, UK

Minimization of the Transverse Effect in Electrodynamic Vibration Measurement
SM Sakr et ai, Ain Shams University, Egypt

Optical Fiber Sensor for Liquid Density **S-W Yang**, Shenzhen University, China

Synthesis, Properties and Application of Metal(O)Polymer Composites
P Milstaki et al, The Polytechnic of North London, UK

Study of the Mechanical Properties and Microstructure of Aircraft Material AI-Li Alloys
X Xia, University of Leuven, Belgium

Career Development and Gender Issues

Synthesis and Cardiac Activity of Novel Benzamide Analogs of Procainamide
BD Glass et al, University of Port Elizabeth, South Africa

Women, Computers and the Construction Industry
SJ Wilkinson, Oxford Polytechnic, UK

Women in Construction
A W Gale, University of Manchester Institute of Science and Technology, UK

Participation of Women in the Hong Kong Construction Industry
AM Llu, City Polytechnic of Hong Kong

Prospective - A Strategy for Engineers
B Labatut-Chabaud, Association Francaise des Femmes Ingenieurs, France

British Airways Engineering
J Schwarz, British Airways, UK

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The Women in Technology (WIT) Project: Ten Years of Positive Action for Women Technologist Returners (1981-1991)
R Atkins and **A Swarbrick**, The Open University, UK

Women in Science and Technology in Mexico
A Perez Lopez and **T Santana**, Mexico

Information Transfer

Communicating about Design: Architectural Features of Expert Systems which Co-operate in Design Activity
J McDonnell, Brunei University, UK

Quality Design
AA Ilumoka and **R Spence**, Imperial College of Science, Technology & Medicine, UK

Technology Transfer

Energy Conservation in the City of Leicester, England
T Thorley and **P Fleming**, Leicester City Council, UK

Communicating to Rural Women and Children in the Developing Countries - Communication Priorities, Bottlenecks and Appropriate Strategies
Y Pathak, MS University of Baroda, India

Demographics

Professional Education of Women in Pakistan: Present Status and Trends
K Jafri, Pakistan Ordnance Factories, Pakistan

Some Factors Hindering Women Scientists
Z Melhe, Chinese Academy of Sciences, China

The Role of Women in the Development of Science and Technology in Mexico
N Blasquez Graf, Universidad Nacional Autonoma de Mexico

Scientific Careers of Women Physicists in Poland
B Adamowicz, Silesian Technical University, Poland

Great Contributions of Chinese Women Scientists and Engineers
S Yang, Shenzhen University, China

A Woman in the Engineering Profession and Education
V Vokolkova, University of Zimbabwe

Women in Chemical Engineering Studies
RM Gllabert and **J Gavalda**, University of Barcelona, Spain

Women in Engineering: A Study of the Professional Orientation of Women in Various Societies
A Taylor, Ahmadu Bello University, Nigeria

Transport

Dimensioning Method for Elastic-Plastic Road Pavement
S Ibrahim, Polytechnic of Central London, UK

Recursive Adaptive Lattice Algorithms in Estimation and Control
SJ Turajllc, University of Belgrade, Yugoslavia

Technology Transfer and its Impact on Human Development
G Bambrah, Engineering Design Consultants Ltd, Kenya

Relevance of Technology Transfer as an Impetus to Technological Innovation in Developing Countries
C Chakrabarti et al, National Environmental Engineering Research Institute, India

A Career in Chemical Engineering - A Viable Option for Women
Dr JM Bainbridge, Teesside Polytechnic, UK

Changes of Soviet Women's Role in Science and Technology during Perestroika
TV Rakhovsky, USSR

The Working Conditions for Women Researchers in National Institutes of Japan
SY Matsuzaki, National Chemical Laboratory for Industry, Japan

Italian Women in Scientific and Technical Research
A-M Campanile and A Fazio, National Research Council, Italy

The Asociacion Mexicana de Mujeres en la CienciaA Descriptive Study
M Perez-Armendariz et al, Centro de Investigacion y Estudios Avanzados del lPN, Mexico
Dr S Devarajan, CIDA, Sri Lanka

Danish Women Engineers
A Skov and **B Hornemann**, Dantest, Denmark

Satellites and Communications

The Work of the Telecommunications Vocational Standards Council
ES Eldridge, Telecommunications Vocational Standards Council, UK

TECHNICAL TOURS

The Technical Tours available to delegates took place on the afternoons of Tuesday 16 July and Thursday 18 July. Delegates were entitled to participate in two tours of their choice.

Albright and Wilson Ltd manufacture chemicals, which are mainly used for consumer products. The Oldbury Works, visited by delegates, is their European headquarters. Delegates were shown their principal chemical process designed for the production of a range of phosphates which are used in matches, detergents and food additives.

Birmingham International Airport is one of the UK's largest regional airports outside the London area. The conducted tour given to ICWES delegates started with a presentation on the operation of the airport.

British Broadcasting Corporation Transmitting Stations provide the staff and equipment to transmit BBC services both in the UK and around the world.
Daventry is one of four HF broadcast sites in the UK. Part of the BBC's World Service Network, it broadcasts in English and many vernacular languages. The site is equipped with fully automatic 300 kilowatt transmitters and an extensive antennaf1eld.
Sutton Coldfield is one the main high power UHF television and VHF radio transmitting stations in the UK. The Monitoring and Information Centre at the site is one of five regional centres for the gathering and dissemination of information on the state of the transmission network.

BBC - Pebble Mill Studios, situated in Birmingham, are one of the main regional studios and the base for drama production as well as local news and current affairs programmes.

British Gasplc is the largest integrated gas undertaking in the west. Delegates were given the opportunity to visit The Midlands Research Station at Solihull, which explores the use of gas in industry, the fire and explosion hazards and gas process technology. The visit to the station covered treatment technology, liquid heating and safety monitoring of control furnaces.

British Rail's Railway Technical Centre at Derby provides the research development and engineering support to ensure safety, reliability and cost-effectiveness. Delegates were given a guided tour of the vehicle testing and engineering development facilities as well as the research and development centre.

British Telecom

The Network Operations Unit at Walsall covers the BT network in the Midland Zone (an area from Crewe in the north to Worcester in the south and from the Welsh border to the East coast) providing service for over two million customers. All operations are carried out remotely using an administration computer, which monitors and deals with all problems as they occur. The centre operates twenty four hours a day, every day of the year. Delegates were also able to visit the back up and technical support groups, who assist in specialised areas such as data and transmission systems and are based on the same site.

The **Diagnostic Testing and Distribution Centre** receives fault reports from business customers in the West Midlands with large BT equipment installations, such as private exchanges. The centre has facilities to access and test customers' equipment remotely and can either clear a fault or diagnose it in order to allocate the appropriate maintenance engineering team.

The **Private Circuit Repair Handling Centre** gave delegates another opportunity to see the technology employed by BT to provide service for its customers. The unit receives fault reports from private circuits, which are rented by organisations with a requirement for heavy use to a particular destination, diagnoses the problems and arranges for faults to be cleared.

Delta Extrusion in West Bromwich is the largest UK producer of brass rod, bar and section, which are used in the engineering and electrical industries for components and finished products. The tour of the foundry, rod mill, profile mill and laboratory was preceded by a presentation about the company.

GPT Limited is one of the ten largest telecommunications manufacturers in the world, and certainly the largest in the UK. Their product range includes advanced network systems as well as telephones for domestic situations. Delegates were able to take advantage of two visits to the company: the first giving them a tour of the manufacturing, test and storage facilities; the second showing the site of 'System X', one of the world's most advanced switching systems.

Lucas Aerospace in Birmingham is part of Lucas Industries, a major aerospace, automotive and industrial systems and components group. The Engine Systems Division produces large compressor and turbine discs for aero engines and automated turbine blade manufacturing cells.

Rover Group

The Longbridge works produces part of the Rover range of motor vehicles.

The **Advanced Technology Centre** of Rover provided delegates with an opportunity to tour the facilities and hear a presentation on the work of the unit.

Royal Mail is responsible for the general distribution of mail within the UK. The District Letter Office at Coventry handles all outward mail for Warwickshire and uses an optical character recognition machine to sort letters at a rate of 36,000 per hour. The sorting office also has a packet sorting machine, which delegates taking this visit were able to see in action.

Severn Trent Water plc provides water services to over 8 million people in the Midlands. The company gathers, purifies and distributes water, then re-collects it and treats it so that it can be safely returned to rivers. Two visits were available: the first to the Longbridge sewage treatment works and the engineering design office; the second provided an opportunity to visit a water treatment works near Leamington.

University of Warwick, Department of Engineering included several disciplines in this tour, since research in this large department frequently crosses contemporary discipline boundaries: telecommunications, civil engineering and electrical engineering were all covered. Delegates were also given the chance to see demonstrations of automation and robotics and learn about the work of the Development Technology Unit, which includes a number of projects in third world countries, as well as instrumentation and nanotechnology, including microengineering.

EXHIBITION AND EDUCATIONAL ACTIVITIES

The ICWES9 exhibition was held in the Arts Centre Gallery of Warwick University from Tuesday 16 July to Thursday 18 July. Officially opened by **Valerie Amos**, Chief Executive of the Equal Opportunities Commission, the exhibition included stands from industry, government, commerce and the professions, demonstrating the latest technical innovations and providing top careers guidance for visitors.

The following companies were represented:

British Aerospace PLC

Having evolved from many of the historic names in aviation, British Aerospace is much more than an aircraft manufacturer. A world leader in the design, development, manufacture and marketing of commercial and military aircraft, space systems, guided weapons and a range of high technology products, the capability of British Aerospace has been increased through the acquisition of Royal Ordnance and the Rover Group among others.

BBC Engineering & Technical Operations

The BBC is widely regarded as a world leader in radio and television broadcasting. It operates two TV networks, five national radio networks, over 30 local radio stations and the World Service.

British Gas PLC

British Gas is the largest integrated gas utility in the western world, employing nearly 80,000 staff. While its main business is to distribute natural gas in the Great Britain, it is involved in all aspects of the gas supply, from exploration to the installation of gas appliances.

In the last four years, British Gas has expanded operations to 20 countries and aims to become the world's first global gas business.

British Nuclear Forum

The British Nuclear Forum is an association of some 70 organisations dedicated to the sound development of nuclear power in Britain. The Forum sets out to identify, study and seek solutions affecting the development of nuclear energy

British Nuclear Fuels PLC

British Nuclear Fuels is one of only two organisations in the world capable of providing a comprehensive range of nuclear fuel services: this ranges from uranium enrichment through fuel manufacture to spent fuel processing and waste management.

British Telecom

BT is one of Europe’s largest companies, serving 25 million customers in the UK. The Research & Development Division has gained a reputation for innovation and vision.

Chevron UK Ltd

Chevron is a leader in the safe development of Britain's North Sea oil and gas reserves, and was the first oil company to drill in the UK sector of the North Sea in 1964.

City and Guilds of London Institute

City and Guilds is Britain's leading testing and awarding body and its certificates are accepted internationally as evidence of the achievement of recognised standards in almost 400 subjects.

General Electric Company PLC

GEC is a federation of autonomous subsidiary and associated companies, active across the whole field of electrical, electronic and power generation apparatus and systems in markets throughout the world.

Inmarsat

Inmarsat, an international cooperative, is the world's leading operator of communications satellites.

The Institution of Electrical Engineers

The IEE has 110,000 members worldwide, engaged in all aspects of electrical, electronic and software engineering. Its information service INSPEC is the world's largest English-language database covering physics, electrical and electronic engineering, computing and control. The IEE plays an active part in encouraging young people into the engineering profession.

Marks & Spencer

Marks & Spencer is known throughout the world and currently has 685 stores in nine countries, a far cry from its beginnings in a 'Penny Bazaar'.

Ministry of Defence

The MOD is the Department of State responsible for the formulation and execution of Defence Policy and the central operational and administrative headquarters of the Armed Forces and the body that procures their equipment.

National Power PLC

National Power is the largest producer of electricity in the UK. It owns 35 power stations, powered by coal, oil, water and wind, to produce 44% of the electricity sold in England and Wales.

Nuclear Electric PLC

Nuclear Electric owns and operates the commercial nuclear power stations in England and Wales. It produces 20% of the country's electricity from 7 Magnox stations, 5 Advanced Gas Cooled Reactor stations and is constructing a Pressurised Water Reactor in Suffolk.

Rover Group

The Rover Group is the UK's largest motor vehicle manufacturer, with over 40,000 employees. The head office is situated in Coventry, with works in various locations throughout the UK.

Severn Trent PLC

Severn Trent PLC provides water services to over 8 million people in the Midlands. It gathers, purifies and distributes water, then re-collects it and treats it so that it can be safely returned to the rivers.

UK Nirex Limited

UK Nirex was set up by the nuclear industry, with Government approval, to dispose of low and short-lived intermediate level radioactive waste.

Student Exhibition

A number of Women's Engineering Society Student Groups set up displays during the Conference to show the work of women engineers. The exhibition was sponsored by Lucas Industries PLC.

WISE Bus

Trent International Centre for School Technology was commissioned by the Equal Opportunities Commission and the Engineering Council, joint sponsors for the WISE project - Women Into Science and Engineering - to convert and operate a single decker bus as a mobile teaching / exhibition vehicle to support a programme of activities to bring the roles and opportunities for women in science and engineering to the attention of girls, their parents and the general public. Six such buses have now been commissioned.

The activities provided by the bus are devised to give girls an opportunity for 'hands on' experience of new technologies. Opportunities are provided for work in Mechanisms, Microelectronics, Pneumatics, Microprocessors for Control, and Communication.

Delegates to the Conference were encouraged to visit one of the WISE buses to see for themselves how the WISE programme is designed to help extend the influence of technology to more girls.

Institution of Mechanical Engineers Leonardo Lecture presented by The Post Office Research Centre, Swindon

The Institution of Mechanical Engineers has been inviting organisations and individuals to present the annual 'Leonardo' Lecture to young people in the UK since 1956. In the process, the lecture has supported careers in other engineering professions and science and technology.

The 1990 Leonardo Lecture, which was presented at ICWES9, was given by the Post Office Research Centre, which is based at Swindon in Wiltshire.

The Post Office is involved in the practical application of science and technology, because mechanisation is the only realistic solution to the delivery of some 54 million letters every working day.

The 1990 Leonardo Lecture, entitled **Engineering is for People**, was presented to 15,000 young people in 18 different UK venues, and was repeated twice at ICWES9 to audiences from local schools.

The presenters drew examples of engineering solutions to everyday problems from the 16th century to the present day, including Leonardo's solutions to draining the low lying land in the north east of Italy which was prone to flooding; Isambard Kingdom
Brunel's revolutionary new track for an Indian railway network and the problems facing engineers when the cameras on Voyager 2 were put out of action only days after the mission had been launched.

The second half of the lecture was dedicated to some of the work done by Post Office engineers to speed the mail, including Optical Character Recognition for reading postcodes; high speed sorting machines and the unique 'Safeglide' parcel chute that regulates the speed of parcels between levels in sorting offices: and showing engineering from the Post Office experience together with a wider view of the service technology through the skills and past and present devotion of engineers and scientists.

ACKNOWLEDGEMENTS

The organisers wish to thank the many individual donors and the following for their kind support of ICWES9:

CommercialOrganisations

Albright & Wilson Ltd
Amoco(UK) Exploration Co.
BBC
BICC Group
Birmingham International Airport
BP
British Airways
British Gas
British Nuclear Fuels pIc
British Rail
The BOC Group
British Steel
British Telecom
Cable and Wireless
Chevron UK Limited
Courtaulds Engineering
Delta Extrusion
Eastern Electricity pIc
Esso UK pIc
GPT Ltd
ICI pIc
IMI pIc
Kobe Steel Limited
Lucas Industries pIc
Marks and Spencer
Mercury Communications
Midland Bank
MSF
National Grid
Nuclear Electric
Occidental International
Oil Oryx UK Energy Company
Pilkington
PowerGen pIc
Rediffusion Simulation
Rolls Royce
Rover Group
Royal Mail
RTZ
Severn Trent Water
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Texaco Ltd

Institutions, Associations and Public Sector

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City of Coventry
Engineers' & Managers Association
The Engineering Council
HM Government, Department of Education and Science
International Relations Division
Fellowship of Engineering
Institute of Energy
Institute of Engineers and Technicians
Institute of Measurement and Control
Institute of Metals
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Institution of Chemical Engineers
Institution of Electrical & Electronics Incorporated Engineers
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Institution of Gas Engineers
Institution of Incorporated Executive Engineers
Institution of Manufacturing Engineers
Institution of Mechanical Engineers
Royal Society of Chemistry
Third World Organisation of Women Scientists
Trent International Centre for School Technology
University of Warwick
Women's Engineering Society

Additional copies of the **ICWES9 Conference Report** are available from:

The Women's Engineering Society
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