INTERNATION UNIVERSITIES POWER ENGINEERING CONFERENCE (UPEC 2002)

9-11 September 2002, Staffordshire University, Stafford, UK

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The 37th International Universities Power Engineering Conference (UPEC 2002) was held 9-11 September 2002 at the Beaconside campus, Staffordshire University, Stafford, UK. It excelled previous conferences by the quality of the presentations, the technical content of the papers, the number of delegates attending and the number of countries represented. As in the past, it had a broad theme, covering all aspects of electrical power engineering, and was attended by academics, research workers, and members of the power service and manufacturing organizations. During the sessions, 195 papers from 36 countries were debated. A plenary session, 28 technical sessions, and a closing session were held, where all technical papers were presented orally in four groups of parallel sessions. The high standard of the papers, presentations, and technical discussions was particularly gratifying.

Held annually, UPEC provides a forum for the exchange of ideas among practicing engineers from the universities, consultants, and in the manufacturing and supply industries. The first full conference was held at the University of Glasgow, UK, in 1967, following an inaugural meeting in Newcastle. Last year the conference was held at the University of Wales Swansea, UK. The thirty-eighth (2003) conference will be hosted by Aristotle University of Thessaloniki, Greece; and the 39th Conference will be held in Bristol, UK. Future venues under consideration by the International Steering Committee include University of Cork, Ireland; University of Northumbia, UK; and Universities in Germany, Portugal and Spain. The working language at all meetings is English.

This year the technical sponsors included IEEE PES, IMechE, IIE and IEE; and industrial sponsors included ALSTOM T & D Ltd, Leoni Wire Cable Wiring Systems, Stafford Borough Council, and Staffordshire University.

The conference was hosted by the School of Engineering and Advanced Technology, Staffordshire University, UK. It was residential lasting 3 full days with both en-suite and standard accommodation provided in the Stafford Court Halls of Residence on the main Beaconside campus, Stafford.

1. OPENING SESSION

Dr Moofik Al-Tai, Chairman of the Organizing Committee, welcomed delegates and accompanying persons to the conference, Stafford, England and the UK. He outlined the aims of the conference, summarized the detailed organization of the meeting, and reviewed the program. He said that over 300 abstracts were received from all five continents and 195 papers would be presented orally in four parallel groups of sessions. The full conference papers were published in the two volumes of the Conference Proceedings and on CD-ROM.

Dr Al-Tai thanked the institutions and the companies supporting the conference. The contributions of members of the International Steering Committee and the Local Organizing Committee, the reviewers, and the session chairpersons were highly appreciated.

This conference review article was prepared by T. J. Hammons, Chair of the UKRI Section Power Engineering Chapter; Past Chair of the UKRI Section; and Chair of International Practices for Energy Development and Power Generation; University of Glasgow, United Kingdom.

Tom Ruxton, Dean of School of Engineering and Advanced Technology, Staffordshire University and Former President of Institute of Marine Engineering, Science and Technology welcomed participants to the University for the conference and formally opened the conference.

He said it gave him great pleasure to welcome delegates to the 37th International Universities Power Engineering Conference (UPEC 2002) here at Staffordshire University.

It is a fantastic achievement to have 195 papers from 36 countries in the Conference Proceedings and he congratulated the 200 delegates who have contributed to make today happen.

Engineering Education is going through a very difficult period. University departments are closing and indeed there is a shortage of Electrical Power Engineers in the UK.

A tremendous amount of work needs to be done to remedy this situation both in education and industry and he had no doubt that the success of UPEC 2002 will make a substantial impact and contribution.

On behalf of Staffordshire University he wished you all a successful conference and an enjoyable stay in Stafford and it gave him great pleasure to declare the conference open.

Then, Dr Keith Ralls, former Chairman of ALSTOM T & D Ltd. presented the Plenary Address.

2. PLENARY ADDRESS

This followed the Opening Remarks and was given by Keith J. Ralls, Former Chairman of ALSTOM T&D Ltd, Stafford, UK and Governor of Staffordshire University.

3. DISTINGUISHED LECTURER ADDRESS

This address was on Insulation Co-ordination Studies and was presented in the afternoon of the first day by Stephen R. Lambert, IEEE PES Distinguished Lecturer, Principal Engineer, Shawnee Power Consulting, New York, USA. It concerned areas of insulation co-ordination, substation equipment applications, transmission line design (insulation and field effects), analytical studies and failure analysis. It described the approach to applying equipment insulation and protective devices (surge arresters) so that equipment is adequately protected for the risk.

Types of overvoltages and stresses were presented including fundamental frequency (e.g. transmission line Ferranti rise), switching surges (associated with switching transmission lines, capacitors, reactors etc.) and lightning (described by keraunic level, stroke rise time and stroke current magnitude).

Expected insulation performance of equipment insulation was addressed considering both self-restoring insulation and non-self restoring insulation. The statistical as well as the deterministic approach to insulation performance was also examined

The lecture then examined surge arrester construction and characteristics and their ability to handle continuous voltages as well as temporary overvoltages (fundamental frequency) were discussed. The protective capability of the arresters for limiting switching surges and lightning was presented as well as the ability of the devices to absorb surge energy. Both silicon carbide (gapped arresters) as well as zinc oxide arresters were discussed.

Based on the discussion of fundamental frequency overvoltages, switching surge and lightning surges, as well as the characteristics of arresters, the application of arresters and the selection of equipment insulation levels (BIL, etc.) was presented. Examples were examined and discussed, and other relevant elements such as arrester separation distance were discussed.

4. TECHNICAL PAPER SESSIONS

Topics debated in the four parallel groups of technical sessions on the first day included: power generation, power system harmonics, power system protection, transmission and distribution systems, power system operation and control, and power electronics.

On the second day, there were further parallel groups of sessions on: power electronics, and power system operation and control; and new sessions on high voltage systems and measuring techniques, electrical machines and drives, and power system analysis.

Topics debated in parallel groups of technical paper sessions on the third day included: power system operation and control, electrical machines and drives, power system simulation and analysis, renewable energy sources, high voltage systems and measuring techniques, power system simulation and analysis, and power transformers, utilization and education

5. OTHER CONFERENCE HIGHLIGHTS

Highlights of the conference included:

- Welcome Buffet Supper in the Gallery restaurant, Beacon Building, Main University Campus on the Sunday before the Conference where the Bar was open for bar service.
- Buffet and Civic Reception on the Monday evening which consisted of a drinks reception and finger buffet, at which participants were welcomed to Stafford by the Mayor of Stafford Councilor Ralph Cooke.
- Conference Banquet at the Britannia Football Stadium in Stoke-on-Trent, at which Professor Tom Ruxton Dean of Engineering and Advanced Technology, Staffordshire University gave the welcome, and Mr Ken Sproston, Secretary, Staffordshire University responded.

6. TECHNICAL AND CULTURAL VISITS

Also arranged was a technical and cultural visit on the afternoon of the second day of the conference to the Black Country Living Museum in Dudley where delegates and guests discovered a fascinating world at one of Britain's friendliest open-air museums

7. AFTER DINNER SPEECH

Professor Tom Ruxton, Dean of School of Engineering and Advanced Technology, Staffordshire University and Former President of Institute of Marine Engineering, Science and Technology said he was very honoured to be asked to speak in the light of the success of UPEC 2002. He said he usually tries very hard to make his speeches light hearted with plenty of stories and jokes.

However, tonight in view of the crisis facing engineering education he felt it was a time to be very serious and talk about the problems facing Engineering Education.

It is, he believed, appropriate to be provocative and pose the question:

"Is Engineering Education in terminal decline?"

Annual new students to Engineering Degree Courses in the UK has declined from 22,000 students in 1993 to 15,000 in 2002 while annual new students for all degree courses has increased from 230,000 to 300,000 i.e.; 10 years ago 10% of new students starting degree courses were engineering students. Now only 5% of new degree students are Engineering Students.

Comparing some engineering disciplines, the numbers are.

	1993	2002
Mechanical Engineering	3829	3208
Electronic Engineering	3212	2504
Electrical Engineering	1295	102

It is this last figure that you will be particularly interested in only 100 students this year enrolled on Electrical Engineering Degree Courses in the UK Higher Education Institutions.

The next question to be posed is should Engineering Education re-invent itself on the basis of SUPPLY & DEMAND.

We have moved from an Industrial Age that was driven by Engineering to a Knowledge/Information Age that is driven by Technology.

However, one of our major problems is to find acceptable definitions for Engineering and Technology. I am sure if I asked everyone here tonight to define engineering we would probably collect at least 100 different definitions.

I believe we need simple definitions for Science, Technology and Engineering that we can communicate to the public at large. I would propose the following definitions: -

SCIENCE	Understanding of the character and behaviour of nature.
TECHNOLOGY	Knowledge of how to use Science to satisfy the needs of Society.
ENGINEERING	Practice of using Technology to satisfy the needs of Society.

The differences are:

Science is <u>Understanding</u> (know why)
Technology is <u>Knowledge</u> (know how/know what)
Engineering is the <u>Practice</u> (Skills and Competence)

The Engineer then is defined as a Practitioner.

We can use the analogy with law and medicine i.e.:

Doctors are Medical Practitioners
Lawyers are Legal Practitioners and Engineers are Technology Practitioners.

What would this mean for Engineering Degree Education. If we look at the education of doctors and lawyers, Doctors study for a degree in medicine and then have a number of year's professional development before becoming a doctor.

Solicitors or Barristers study for a degree in law and then have a number of years professional development before becoming a solicitor or barrister.

So why should engineers not study a degree in technology and then have a number of years professional development before becoming an engineer.

A more radical approach would be to drop the title Engineer and replace it with Technologist where the Technologist is the Technology Practitioner who is involved in:

TECHNOLOGY CREATION
TECHNOLOGY INNOVATION
TECHNOLOGY APPLICATION
TECHNOLOGY MANAGEMENT

Which are in effect the activities of Engineers.

A response to this could be that this is trivial as it is all about the semantics of names and titles. I acknowledge this but unfortunately we live in a society where perceptions, and brand image prevails and if we are to prevent the terminal decline of engineering education we need to have radical change.

Engineering is all about Wealth Creation and improving the Quality of life.

Engineering education provides the capability to achieve these objectives and professional development through work experience provides the competence to achieve these objectives.

The perception and image of engineering must be changed and I will finish by saying that when I visit school children and parents I do not say Engineering I say Technology. I do not say Industry I say Business. I do not say Manufacturing I say Creation of Products.

I put these comments to you for FOOD FOR THOUGHT for the future.

Thank you.

Ken Sproston, University Secretary at Staffordshire University in reply addressed delegates and guests and noted the following impressive aspects of the conference:

- 195 high quality papers were published in the conference proceedings
- particular encouragement was given to young researchers to produce papers
- over 200 delegates from almost 30 countries worldwide were attending the conference
- a range of very high quality technical sessions had been organized.

He said he would support fully Professor Tom Ruxton's remarks at the dinner.

In his opinion it was crucially important that the Engineering professions and Engineering related higher education continued to grow and develop. They must continue to emphasise the importance of Engineering and Engineering related activities to the world's economy and future development and prosperity. In recent years the UK has suffered from a decline in the number of young people who wish to undertake Engineering higher education programmes, particularly those leading to Chartered Engineering status. There have been two main reasons for this decline:

- less young people taking Mathematics and Physics at GCE A-Level
- the high entry requirements introduced by SARTOR in the late 1990's for Chartered Engineering courses.

To give a practical example of this problem, Staffordshire University had over 1000 students studying on full-time Engineering and related courses in the late 1980's and early 1990's. By the mid-1990's this number had decreased by over half to just over 500 and at that time the University considered whether Engineering had a long term future. Thanks to the appointment of Professor Tom Ruxton as Dean of the School in 1996 it was possible to turn things round dramatically. The University has moved away from the traditional Chartered Engineering courses to develop a wide range of new programmes and courses in Technology areas. These include degrees in Music Technology, Design Technology, Robotic Technology, Film & TV Production Technology and many others. At the start of this year the University had recovered its position in terms of student

numbers and again has over 1000 studying Engineering and Technology related courses. This approach has now been replicated by many other institutions in this country and the number of Technology students as opposed to traditional Chartered Engineering students is continuing to grow. The students who have gained their degrees in Technology based areas are now in a position to move either straight into full-time employment in a range of different areas and/or to consider undertaking further education which in some cases will lead to them obtaining Chartered Engineering status.

He re-emphasised that all interested parties needed to be involved on a continual basis in promoting the Engineering profession, encouraging young people particularly to take up Engineering and Technology based courses and Engineering employment once they had qualified.

Finally, he thanked the following:

1. Professor Tom Ruxton for his after dinner address.
2. The sponsors who have all contributed significantly to the success of the conference. All of the main UK Engineering institutions had been involved together with Alstom, Stafford Borough Council and a number of others.
3. Moofik Al-Tai and the organising conference committee and all colleagues who had been involved in presenting papers and leading sessions at the conference.

8. CONFERENCE PROCEEDINGS

All technical papers were incorporated in the UPEC 2002 Proceedings in Hard Copy and CD-ROM that was distributed to delegates at the conference. UPEC 2002 Proceedings may be purchased (Hard Copy and CD-ROM for £100 (sterling), or Hard Copy only for £75, or CD-ROM only for £50), until supplies are exhausted, from Dr Moofik Al-Tai, UPEC 2002 Conference Chairman, School of Advanced Technology, Staffordshire University, PO Box 333, Beaconside, Stafford ST18 0DF, UK, Tel: +44 1785 35 3469. Fax: +44 1785 35 3552, E-mail: m.al-tai@staffs.ac.uk

9. AWARDS

Prizes were awarded for the Best Technical Paper and for the Best Technical Presentation by a Young Engineer.

The recipients of the Best Technical Paper Prize were N. Harid, A. Mghairbi, H. Griffiths, A. Haddad (Cardiff University, UK) and L. Sparrow, J. Moore, P. Jones (National Grid, UK), for their paper entitled " The Effect of AC Mutual Coupling on Earth Impedance Measurement of Shielded Transmission Lines". The paper was presented in a Session on High Voltage Systems and Measuring Techniques.

The recipient of the Best Technical Presentation by a Young Engineer prize was S. Jayasoma (Control Techniques Dynamics, UK) for the paper entitled: "Robust Vector Control of Synchronous Motor Drives with FPGA Orientated Algorithms". This paper was presented in a Session on Electric Machines and Drives.

10. CONFERENCE WRAP-UP

Papers were well thought out and benefited from the 15 minutes allowed for presentation and discussion of each paper. The general level of the discussions was extraordinarily high and stimulating. Of particular note was the high standard of the presentations by the younger members of

the profession. The pleasure the participants experienced in meeting colleagues with similar interests from so many countries should be particularly noted

Gratitude is expressed to Dr Moofik Al-Tai, UPEC 2002 Conference Chairman, Members of UPEC Steering Committee, and colleagues at Staffordshire University for the detailed organization of the meeting.

The conference closed with a unanimous vote of thanks to Dr Moofik Al-Tai for organizing a very successful event.

11. UPEC 2003

In closing the conference, Dr Moofik Al-Tai stated that the 38th International Universities Power Engineering Conference (UPEC 2003) will be organized by Aristotle University Thessaloniki, Greece, and will be held September 1-3, 2003. It will be co-sponsored by IEEE PES. Its aim will be to provide engineers and academia with the opportunity to explore recent developments, current practices and future trends in power engineering. Young engineers and research students are especially invited to contribute. There will be a Technical Exhibition at the conference. This will provide the opportunity to keep participants up-to-date on recent developments in Power Engineering. The conference will again have a broad theme covering all aspects of power engineering. The working language will be English. The accepted papers are to be presented in oral sessions.

For more information on UPEC 2003, contact Professor C. A. Stassinopoulos, Conference Chairman, Director of the High Voltage Laboratory, Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, GR-541 24 Thessaloniki, Greece, Tel: +30 310 99 6313, +30 977 22 1062, Fax: +30 310 99 6389 E-mail: castas@mail.otenet.gr cas@eng.auth.gr or Mr Charalampos Yakinthos (Conference Secretary), UPEC 2003, High Voltage Laboratory, Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, GR 541 24 Thessaloniki, Greece, Tel: +30 310 99 6389, +30 944 77 4577, Fax: +30 310 99 6389, E-mail: hvl@eng.auth.gr bakis@hnioxos.ee.auth.gr

Abstracts are to be submitted by 31 January 2003, notification of acceptance of papers will be on 28th March, 2003, and receipt of full papers will be required by 18th May, 2003.