Landwards

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TRAINING IN A CHANGING WORLD

Report on Colleges Day conference

FUTURE OF AGRICULTURAL ENGINNEERING

Dr Abdul Mounem Mouazen outlines new research at Cranfield University

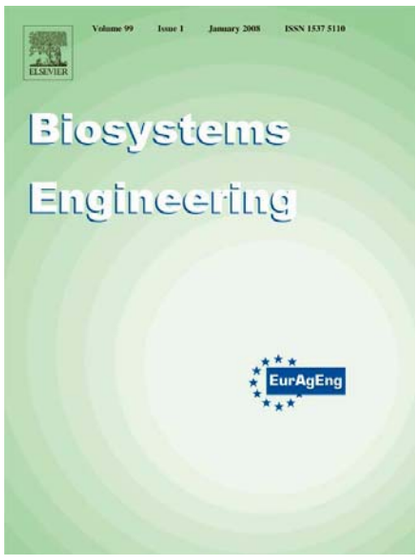
FARMING EFFECTS ON ARCHAEOLOGICAL REMAINS

Study on soil cultivation practices to minimise damage

IAgrE Professional Journal www.iagre.org Volume 65, Number 3 Autumn 2010

Biosystems Engineering

***Biosystems Engineering*, owned by IAgrE, and the Official Scientific Journal of EurAgEng, is published monthly with occasional special issues.**



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IAgrE

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The Managing Editor of ***Biosystems Engineering***, ***Dr Steve Parkin***, has kindly summarised some of the papers published in the last three issues which he thinks may be of interest to IAgrE members

Biosystems Engineering
Volume 106, Issue 1, May 2010, Pages 26-36

Fault diagnostic systems for agricultural machinery

Geert Craessaerts, Josse De Baerdemaeker, Wouter Saeys
Department of Biosystems, Katholieke Universiteit Leuven, Kasteelpark Arenberg 30, B-3001 Leuven, Belgium

There is an abundance of literature on process fault diagnosis ranging from analytical methods to artificial and statistical methods. Up till now, farmers and contractors still observe the process in order to detect process and sensor failures which can disturb the actions of the controllers and cause severe damage to the machine. In the future, the complete reliance on human operators for the correct functioning of these systems will become too risky, due to the increasing complexity of this type of machinery. A systematic and comparative study of various fault diagnostic methods, from an agricultural machinery perspective, is provided. As a first step towards more advanced fault detection and isolation systems, the general applicability of intelligent neural network techniques like supervised self-organising maps (SOMs) and back-propagation neural networks was illustrated for the detection and isolation of sensor failures on a New Holland CX combine harvester. Pattern recognition techniques, such as neural networks, were found to be very suitable for this kind of application because a lot of historical process data is available since the recent generation of combine harvesters is equipped with a wide range of sensors and actuators, which are continuously monitored.

Volume 106, Issue 2, June 2010, Pages 166-174

Gradients of temperature, humidity and CO^2 along a fan-ventilated greenhouse

M. Teitel, M. Atias, M. Barak
Institute of Agricultural Engineering, A.R.O., The Volcani Center, Bet Dagan Israel

Around the world in warm climates fans are used to ventilate commercial greenhouses. They are usually mounted at one end of the greenhouse and suck ambient air through openings at the opposite end. As the air moves from one end of the greenhouse to the other, gradients of temperature, humidity and CO2 develop along the structure. These gradients result in an inhomogeneous microclimate for the crop and are, therefore, undesirable for growers. Models to predict these gradients were developed for the case of constant (with respect to time) ventilation rate, and were verified by experiments in a greenhouse in which pepper was grown. The experimental results were based on measurements in which the 'open chamber' approach was applied to the whole greenhouse. The models were then used to predict changes in temperature, humidity ratio and CO2 concentration in the air along the greenhouse at different hours of the day. The model results show that the largest gradients are to be expected at around midday (11:00-12:00), when the intensity of solar radiation is greatest.

Volume 106, Issue 3, July 2010, Pages 303-314

Analysis of the soil and water assessment tool (SWAT) to model Cryptosporidium in surface water sources

Rory Coffey, Enda Cummins, Vincent O' Flaherty, Martin Cormican
Biosystems Engineering, School of Agriculture, University College Dublin, Ireland
Departments of Microbiology & Bacteriology, National University of Ireland, Galway, Ireland

Limited information exists on the modelling of *Cryptosporidium* in water catchments. This lack of data underlines the uncertainty that surrounds the catchment modelling of *Cryptosporidium*, the variability observed in model predictions, and the need to expand research in modelling this parasite. The objective was to examine and evaluate the use of the Soil and Water Assessment Tool (SWAT) to simulate *Cryptosporidium* populations for water catchments. The Fergus catchment in the west of Ireland was the focus of SWAT model development because it has been susceptible to *Cryptosporidium* contamination of raw water. Predictions highlight late autumn/winter and early spring as being the highest risk periods. Manure application was identified as being a significant source of the pathogen to which management strategies could be focussed to reduce potential levels of *Cryptosporidium* in catchment waters. Further model development is needed to quantitatively assess model accuracy.

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Landwards
Agriculture • Horticulture • Forestry • Environment • Amenity

VOLUME 65 Number 3 2010

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EDITORIAL

Reassurance from the archives

THIS month I make no apology for quoting from a editorial I came across recently in an old farm machinery trade magazine.

> ❝ Farming, in all its aspects, becomes daily more and more of a scientific operation, and all who are in anyway associated with it realise that the science involved must be put into practice.
>
> There are some purists, we believe, who will argue that engineering is not really a science! But there is undoubtedly a great deal of science about agricultural engineering, and it is science which is continuously applied in a thoroughly practical manner.
>
> It is however regrettable that in some circles in this country, it is not always recognised that agricultural engineering has earned for itself a status equal to that of other engineering disciplines. Too frequently alas, agricultural engineering is looked upon not as a profession, but rather as a trade still not very far removed from old-time tinkering.
>
> For this reason, we never hesitate to applaud and encourage the efforts of the Institution of Agricultural Engineers, a body which - sometimes against fearful odds - has striven to enhance the professional status of agricultural engineering.
>
> In the technological revolution which is going on throughout the world, agricultural engineers have an important and challenging part to play. They must therefore lose no opportunity of keeping up to date with agricultural and engineering science.❞

That editorial was in the July 1966 issue of *Farm Implement and Machinery Review* - just ahead of the Royal Show with its 'rows and rows of machinery lines'.

But could the editor ever have envisaged that over four decades later the Royal Show - and the Royal Smithfield - would be distant memories? As would the National Institute of Agricultural Engineering, the reporting of which filled many pages.

However it is reassuring to be reminded that not only are issues of recognition of our industry's achievements nothing new - but that throughout the years the Institution has been a beacon for professional standards despite wholesale change.

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IAgrE is a founder member of ***EurAgEng,*** *a licensed body of the* ***Engineering Council*** *and a founder constituent of the* ***Society for the Environment***

NSTS scheme beats targets

THE National Sprayer Testing Scheme continues to build on previous success with the 2009/2010 end-of-year figures showing a 2% increase in the number of sprayers tested - the most successful year in the scheme's history.

In total, 13,800 sprayers were checked last year, exceeding government targets and covering 89.2% of the UK sprayed area.

"Owners and operators are now seeing the NSTS as a vital second pair of eyes," explains Duncan Russell, NSTS manager. "We are providing them with an annual check of the machines and making sure that they are safe for both the environment and the operator."

Launched in 2003 as one of the central pillars of the VI, NSTS has become an accepted part of UK agriculture. It was designed by the AEA as a practical test to ensure that machinery could deliver pesticides efficiently with minimal environmental impact.

According to Mr Russell, the scheme is proving its worth because the tests often highlight a range of problems that need to be addressed. The most commonly arising faults over the last year include leaks and drips, poor hose condition, pressure gauge inaccuracy and worn nozzles.

"We're finding that nearly two-thirds of sprayers need some form of repair or rectification," he says. "Of course, this is a positive because all faults spotted during the test are being repaired before the machines go back to work.

"What's more," says Mr Russell, "operators are reporting that annual inspections carried out by NSTS are reducing downtime and making machines far more reliable during the busy spraying season."

New science partnership harnesses 40 years of people power

Earthwatch Institute and the Open University join forces

IN 2010, International Year of Biodiversity, two of the world's leading research organisations announce the launch of a major new collaboration to empower 'citizen scientists' to contribute to the understanding of global environmental issues.

Earthwatch Institute and the Open University (OU) have joined forces, combining over 80 years of experience of involving people in learning about, and taking action to protect, the natural environment.

Speaking at the launch of the partnership, Nigel Winser – Executive Vice President of Earthwatch said, "As natural resources come under increasing pressure, it is now more critical than ever that we each take individual responsibility for protecting the species and ecosystems on which we depend for our livelihoods. For the past four decades, Earthwatch and the Open University have been tapping into people's sense of global citizenship, allowing scientific research to benefit from the contributions of individual volunteers."

Winser continued, "The launch of our partnership with the Open University is a milestone. Earthwatch volunteers have contributed over 90 million hours to saving species and habitats, understanding climate change, protecting our marine environment and preserving our cultural heritage. We are inspired by the opportunities this collaboration presents for our work to reach an even greater global network of citizen scientists. OU students will work alongside Earthwatch scientists carrying out vital environmental research, and their learning experiences will contribute to their own academic and personal goals."

The Open University's Dr Hazel Rymer, lead researcher on Earthwatch expedition 'Volcano' said, "We are proud that Earthwatch has chosen this university to be their partner in this exciting venture. This is a great opportunity to engage students as volunteers and volunteers as students.

"The global reach of Earthwatch will help us to deliver our new BSc Natural Science to markets we could not otherwise penetrate. The OU and Earthwatch brands fit well together, both seeking participation and engagement in science by the widest possible constituencies."

The five-year global partnership will enable the partners to develop co-funded research projects; provide funding for upcoming field scientists; allow OU students worldwide to gain valuable field experience as Earthwatch volunteers as part of their course, and offer Earthwatch volunteers the opportunity to gain transferable academic credit on OU courses. Lastly both organisations are committed to enhancing the field and virtual learning experiences through the use of cutting edge mobile technology applications.

Industry still struggling with skills shortages

IAgrE calls for STEM skills to be promoted in schools

THE Institution of Agricultural Engineers (IAgrE) endorses research carried out by the Confederation of British Industry and the EDI (the vocational qualifications body) that has revealed over 350 organisations are struggling to find staff with skills in science, technology, engineering and maths (STEM), while even more companies expect to experience staff skill shortages in the next three years.

"The government needs to do more to promote basic skills in schools. It is vital young people leave school and university with the right skills to succeed at work. It is becoming increasingly difficult to find people with the right technical or engineering skills and the new government should look to actively encourage the take up of STEM subjects in schools," said Chris Whetnall IAgrE's Chief Executive.

"Indeed, that one fifth of new employees receive remedial Maths/English is scandalous. In addition to promoting basic skills in schools, the government needs to seriously consider allocating more resources to the FE sector. Many colleges are insufficiently resourced to deliver the levels of technical skills required by industry.

"Our members report it is increasingly difficult to recruit people with the right level of science and technology skills and as the economy recovers it is going to become even harder.

"We are lagging behind other European countries so we need the Government to implement changes before we lose out to our global competitors," added Chris.

The survey found young people would definitely improve their job prospects if they studied business studies, maths, English and physics or chemistry at A-level.

New scientific body for world community of researchers

Int. Society for Precision Agriculture formed

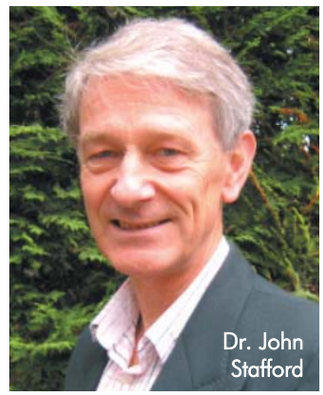
THE new International Society of Precision Agriculture was launched at the 10th International Conference on Precision Agriculture (ICPA) in Denver, July 18-21.

It aims to be a learned scientific society for the world community of researchers and others in the topic of precision agriculture - which is a form of management system that aims to target agricultural inputs and operations according to soil, crop, livestock and environmental needs.

The concept, which was first seriously proposed in the 1980s, took off with the general availability of GPS for within-field location and is now considered a mainstream approach to responsible agricultural management systems. Scientific disciplines embraced by precision agriculture include soil and crop science, agronomy and engineering/technology, weed science and economics, pest and disease science, livestock management - and many more.

The Society is the brain-child of Prof. Raj Khosla of Colorado State University, USA. At the Denver conference, he was


Prof. Raj Khosla


Dr. John Stafford

elected President for two years; Dr. John Stafford of Silsoe Solutions, Ampthill, UK was elected President-Elect, Dr. Nicolas Tremblay of Agriculture and Agri-Food Canada at St-Jean-sur-Richelieu, Quebec, Secretary and Dr. Angela Guidry of SGS North America, S. Dakota, USA, Treasurer.

Complimentary membership for the first year was offered to delegates at the 10th ICPA conference and so the Society has an initial membership of over 200 members.

In its first year, the Society aims to establish:

- **a web portal for information and networking,**
- **a regular e-newsletter,**
- **open web access for members to the Springer scientific journal, 'Precision Agriculture' (currently edited by John Stafford)**
- **discussions to bring the 3 regular international conferences on precision agriculture under its wing.**

For more information, contact the secretary via email on *nicolas.tremblay@agr.gc.ca*. Or visit the website at *www.internationalsocietyofprecisionagriculture.org.*

Recognition of outstanding contribution to agriculture & society

SAC awards John Ross Honorary Fellowship

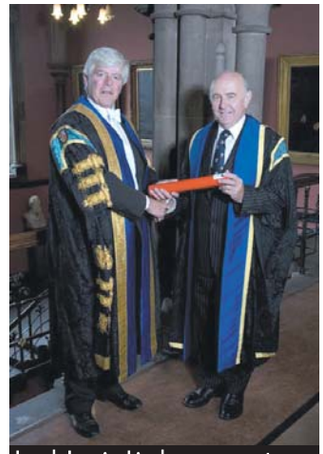
JOHN Ross CBE, farmer and former President of NFU Scotland has been awarded an Honorary Fellowship of SAC (Scottish Agricultural College) in recognition of his outstanding contribution to agriculture and society.

The honour was presented in June during the SAC Graduation Ceremony in Bute Hall, University of Glasgow.

In recent years Alex Ferguson MSP, Presiding Officer of the Scottish Parliament and RSPB Scotland Chief Executive Stuart Housden have both received Honorary Fellowships. John Ross described himself as proud to be recognised in such a way.

"I am delighted to be receiving this tremendous honour. I have been privileged to serve the agricultural and wider community in various ways and it is very pleasing to be acknowledged by an organisation with its own proud record of supporting rural communities and industry in Scotland and further afield."

In presenting the Honorary Fellowship SAC Chairman Lord Jamie Lindsay said SAC was proud to have worked with John Ross in his leadership role for the agriculture industry. "We applaud his energy, enthusiasm and skills as displayed with his work in the areas of healthcare, rural and urban communities, scientific research and business. We look forward to continuing our relationship with him as agriculture and rural communities move forward to meet the challenges of our times,"


Lord Jamie Lindsay presents John Ross CBE with his Honorary Fellowship

Robin Lennie to Chair OPE Council

ROBIN Lennie of Andreas Stihl Ltd has been nominated Chairman of the OPE Council of the Agricultural Engineers Association and chaired his first meeting in July.


Robin Lennie

OPEC is the Outdoor Power Equipment Council of the AEA and comprises representatives from the major Companies in the sector.

Robin is Managing Director of the British operations of the German family-owned Stihl Group. He has been with Andreas Stihl Ltd, based at Camberley in Surrey for 20 years. He is a Graduate chartered Accountant who also obtained the IOD Chartered Director qualification in 2006.

He said, "The Outdoor Power Equipment industry is confronted by a number of commercial, technical and environmental issues and the Council provides a valuable means of addressing policy in these areas. We have particular tasks on noise and emissions legislation, consumer safety, training and collection of market intelligence."

• UK registrations of agricultural tractors (over 50hp) reached 7,772 units in the first 6 months of 2010, a decline of 15.7% on the same period in the previous year.

Since reaching an extraordinarily high peak in March 2009 (on a moving total basis) the market has been in steady decline to a level closer to the average for the last decade and is presently running at an annual rate of a little over 13,500 units.

All regions show a decline on last year with the West Midlands showing the largest.

Action urged to make Campaign For Farmed Environment a success

ORGANISERS say awareness of the Campaign for the Farmed Environment remains high and many farmers and land managers intend to take voluntary action to ensure the CFE is a success, according to a survey published by Defra.

During February and March this year over 3,000 farmers across the country responded to the CFE survey and, while awareness levels are high, partners in the Campaign say that good intentions to manage land voluntarily now need to be converted into action.

County-based postcard campaigns and local CFE events have highlighted how farmers and land managers can play their part and at Cereals this year there was a trail which was developed by the Campaign partnership to help farmers gain a greater understanding of how they can get involved.

The trail provided them with advice about the voluntary management measures which can be put in place on farm. A dedicated Campaign stand also provided farmers and land managers with an opportunity to meet local coordinators and farmer chairmen, and partners on the trail helped answer burning questions about the Campaign.

CLA President William Worsley said, "It's encouraging to see that so many farmers and land managers are behind the Campaign but we must not become complacent. Now is the time to turn supportive words into action.

"Farmers and land managers need to replace their expired ELS management plan options with in-field options and remember that everyone can undertake a Campaign voluntary measure regardless of whether they're in ELS or not.

CAMPAIGN FOR THE FARMED ENVIRONMENT

"There is still a lot of work to be done in order to make the Campaign a success and avoid compulsory regulation."

NFU President Peter Kendall said, "It is encouraging that so many farmers, land managers and advisers are behind the Campaign but we have reached a critical point where good intentions need to be turned into action for the initiative to meet its targets and avoid regulation in the future."

For more information visit *www.cfeonline.org.uk*.

•A new electronic tool has been launched for advisers and agronomists which demonstrates how the Campaign for the Farmed Environment is economically viable.

The Campaign Cost Calculator shows the economic benefits to farmers taking part in the Campaign in comparison with the regulatory alternative.

The calculator fills a gap when it comes to evaluating the economic impact of voluntary measures and ELS options. It also highlights the potential consequences of the reintroduction of compulsory set-aside. It's easy to use and gross margins can be quickly amended as situations change.

A personal copy of the Cost Calculator can be requested from the Campaign Programme Office by sending an email to *cfeonline@nfu.org.uk* or calling 024 7685 8607.

Grant for women

A TRAINING grant worth £450 is now available to help 670 women working in male dominated industries, including land-based engineering, raise their skills levels and progress their careers.

The new funding, which sees Lantra's Women and Work programme in its fourth year, will continue to enable women in land-based engineering to access funding for a variety of skills development activities in areas such as IT, technical skills, administration, finance, people management and more.

Industry Partnership Manager for land-based engineering, John Godden, said, "This is a great opportunity for women working in the industry to receive funded support and develop their skills. Research shows firms that do not train are 2.5 times more likely to fail than those who do, so with a £450 training grant available there really is no excuse not to invest in skills."

To register interest call 0845 707 8007 or email *connect@lantra.co.uk*.

Tillage 2010 offers spray more

VISITORS to this year's Tillage event can expect a new addition to the usual line up, in the form of '*Sprayers @ Tillage*', a new area devoted entirely to spraying.

It will showcase the very latest in sprayer technology and give growers the chance to chat to experts and see the newest technological advances from the major sprayer manufacturers and suppliers in addition to seeing machines in action on the industry's biggest demonstration site.

"In recent years, sprayer specialists have repeatedly approached us about exhibiting at Tillage because of its great reputation within the farming community," said Duncan Russell of event organisers, the Agricultural Engineers Association. "It became clear that this would bring an interesting new angle to the event.

"*Sprayers @ Tillage* will add a new dimension and give the opportunity to assess the latest from the other side of arable production."

A host of exhibitors offering non-machinery related advice will be present and ready to assist growers wherever possible. High on the list of priorities for many at this time of year will be slug control and with the new regulations on metaldehyde output, event sponsors De Sangosse will be on site and ready to offer solutions for sustainable and effective slug control.

What's more, visitors to De Sangosse can register to the National Register of Sprayer Operators, the professional body which offers ongoing training and assessment to members of the agricultural industry. Existing members will be awarded three NRoSO points for attending.

The Tillage 2010 event will be held at Leverton Farms, Burton near Lincoln on September 14th and at Burghill Farms, Brechin in Angus on October 7th - full details and directions are on the Tillage website at *www.tillage.uk.com*.

Professional Engineers still in demand

Only 1.5% of survey respondents unemployed

THE Engineering Council's recent survey of registered engineers provides sound evidence that those holding the professional engineering qualifications Chartered Engineer (CEng), Incorporated Engineer (IEng) or Engineering Technician (EngTech) are likely to have held on to their jobs during the recession.

Asked their employment status, only 1.5% of respondents were "unemployed and seeking re-employment" in May this year, which sits well below the national unemployment figure of 7.3% (Office for National Statistics).

Andrew Ramsay, Chief Executive of the Engineering Council says: "It would be amazing if registered engineers had not suffered some effects from the cold economic climate, but the message from this survey, although a big increase on the 0.6% in this category in 2007, seems to be that qualified engineers are still in demand in the UK.

Based on responses from nearly 3,000 registered engineers resident in the UK and below the official retirement age of 65, the survey is one of a series that have been conducted regularly since 1981. Collection of this data every two to three years allows the Engineering Council and its partners to keep track of earnings and compare trends in the employment of registered engineers. In each case the research has been carried out on behalf of the Engineering Council by ERS Research, part of the Electoral Reform Services Group.

The survey also revealed that all levels of registrant have seen a rise in total earnings since 2007; up 10% for CEngs, 6% for IEngs and 12% for EngTechs. Median annual total earnings in 2010 were £55k for CEngs, £43k for IEngs and £37k for EngTechs.

For CEngs the increase in mean total earnings is somewhat higher, at 15%, accounted for by a considerable increase in the number earning more than £60k, including 11% now earning over £100k. Those employed in the energy and telecommunications sectors seem to enjoy the highest salaries, with mean annual earnings approaching £80k.

There is a slow but sure increase in the proportion of registered engineers who have their subscriptions and registration fees paid by their employer, with figures rising from 47% in 2003 to 57% in 2010.

Andrew Ramsay adds "The 2010 survey has produced another set of interesting and, on the whole, positive statistics. We have also this year for the first time commissioned a survey of non-registered engineers and look forward to reporting on those results shortly."

Five new research appointments at Harper Adams

FIVE new members of staff have been appointed at Harper Adams University College in Shropshire with the aim of developing research.

The five new post-holders who will be starting between now and the Autumn have filled roles in the agri-food and land-based research fields at the University College to address the global challenges of food and bio-energy security.

The research positions are in quantitative economics, social psychology, animal molecular biology and soil ecology.

Dr David Llewellyn, Principal of Harper Adams, said, "These appointments will enable us to expand our work with business and Government to help the UK and other countries produce healthy and environmentally-friendly food."

Dr Donna Johnson has been appointed as Research Lecturer in Animal Molecular Biology in the Animals Department. Dr Johnson has a BSc in Genetics and Molecular Biology from the University of Wolverhampton, and a PhD in Genetics from the University of Manchester.

In the Business Management and Marketing Department, **Domenica Gentile** has filled a post as Research Lecturer in Social Psychology. Ms Gentile has Bachelors and Masters degrees from the University of Rome and is currently completing her PhD thesis at the University of Nottingham on productive and counter-productive workplace behaviours.

Dr Sam Bonnett has been appointed as Research Lecturer in Soil Ecology and will be joining the Crops Department. Dr Bonnett has a PhD in Wetland Biogeochemistry from Bangor University in addition to Bachelors and Masters degrees.

Daniel May has filled the final post as Research Lecturer in Quantitative Economic in the Rural Affairs and Environment Department. Mr May's qualifications include Bachelors and Masters degrees from universities in Chile as well as an MPhil in Economics from the University of Essex, and he is currently completing his PhD thesis at the University of Wolverhampton on farmers' economic and strategic behaviour.

In the Research Office **Kreseda Smith** will take up the post of Research Grants Administrator. Kreseda has a BSc in Criminology and Psychology from Keele University, and five years experience as Taught Postgraduate and Timetable Administrator at Harper Adams.

New Holland launch Clean Energy site

NEW Holland has launched a new website which explains their solutions for more efficient farming whilst respecting the environment - *www.thecleanenergyleader.com*

The company says the Clean Energy Leader site welcomes users to a clean and environmentally friendly world, which represents the very essence of New Holland. Images of the brand's machines are contrasted with those of nature and the faces of those who have turned this strategy into reality, together with testimony from environmentally-aware farmers, who are already using these solutions.

The website's structure is based around the three pillars which constitute the Clean Energy Leader strategy: Tier 4, biodiesel and the world's only hydrogen powered tractor, the NH2, within the Energy Independent Farm concept.

The new website is packed with further information on each section. As users navigate around the website, they can watch video interviews with specialists from the sector, browse through animations explaining the functionality of the brand's tailor made solutions and find answers to specific issues in the FAQ sections. They can download one of the desktop wall papers or images of environmentally friendly products.

Pierre Lahutte, head of Global and Europe Marketing & Communications said, "Our brand is the agricultural industry's point of reference for environmentally friendly farming, and courtesy of this new website, we will also become the first port of call for all internet users who are looking for information on clean energy in our sector."

The site will be updated regularly and will soon be available in multi-languages.

Biodiesel could stage a revival as a non-transport Biofuel

New market for the sector will be announced at EBEC 2010 exhibition

THE Renewable Heat Incentive (proposed April 2011) will be a major focus at EBEC (European Bioenergy Expo and Conference) 2010.

Under the proposed RHI a new market for Biodiesel will be created as it will be blended with heating oil to provide a real growth opportunity for the Biodiesel sector estimated at 900 million litres. This will stimulate significant production volumes again in the UK and sustainable growth for the industry as many investors have left this market over the last two years.

It is believed Biodiesel could become a market leader in the UK for home heating fuel.

Delegates and visitors to EBEC 2010, 6th & 7th October, at Stoneleigh Park Warwickshire, can attend a dedicated workshop given by Clean Energy Consultancy and learn just how big the opportunities are for Biodiesel within the home heating oil sector. The workshop will highlight the financial and carbon benefits of liquid biofuel heating compared with heating oil, LPG and heat pumps.

Case studies will be shown to highlight this monumental chapter that will cause a phenomenal and integral change to the Biodiesel sector. The workshop will also look at the blending requirements, sustainability criteria, taxation, incentives and other issues ahead of implementation.

Heating oil (kerosene) is the main fuel used in the domestic oil heating market and has similar properties to liquid biofuels such as biodiesel. Importantly, this means the heating appliances that are currently installed in houses up and down the country will be compatible with the alternative biofuel, potentially eliminating prohibitive capital costs to convert existing central heating boilers to biofuels.

As a result of the project, the UK government has withdrawn fuel duty on liquid biofuel heating oil, and has included this fuel type in the latest Building Regulations and in the forthcoming Renewable Heat Incentive (RHI) Legislation.

Richard Price, Director of EBEC commented, "The Bioenergy sectors are set to grow significantly in the coming years, however, there are challenges ahead. At EBEC 2010 we hope to address some of these issues such as financing, Environment Agency issues, the classification of Glycerol in the UK, the new market for Biodiesel and demonstrate how many of the Bioenergy sectors are integrated."

For information or to register to attend EBEC or the REA Bioenergy 2010 Conference, visit *www.ebec.co.uk.*

Making IAgrE membership matter to our pre-professionals

CEO VIEW

(i.e. preaching the need for demonstrating professionalism)

IN the Summer edition of *Landwards*, the Editor's piece was about engaging the 18 year olds. My topic in this issue is on a similar subject - how can we engage with our younger members, in particular, our student and pre-professional members, in a meaningful way?

Over the past years, Dr Dan Mitchell has, with assistance from the Douglas Bomford Trust, been very active on the Institution's behalf, in recruiting hundreds of students in the HE and FE sector into free (student) membership of the IAgrE. Recently, it was decided to extend this free membership into the first year following the completion of their college course. We call this group pre-professionals.

Our aim is to provide a seamless transition from student through to full professional membership of IAgrE.

It is a major challenge for IAgrE to both communicate with and engage with this community. Typically, they are not inclined to attend Branch or Technical Group meetings unless at their own college and even then only if large and noisy tractors are involved.

What we need to do is underline the long term career importance of outwardly demonstrating professionalism.

When I was a student, John Turner - Principal of Rycotewood College and then, a future President of IAgrE, insisted that we join IAgrE and also that we attend IAgrE meetings at the College. This we did. He also said that we would thank him in 10 years time. I in fact had cause to thank him in five years when, at the end of my apprenticeship, I believe that IAgrE membership (and in no small part John's name as a referee on my application form) was instrumental in my being accepted under the Voluntary Service Overseas programme. Indeed John was always willing to offer advice and career guidance.

This is in part (and an important part at that) what IAgrE can offer to young and aspiring professionals, a mentoring service, via senior members of the Institution, that provides the opportunity to help them get the right training and find their place in the engineering work world. Mentors can also give practical career advice on the day-to-day issues facing them in the workplace.

The other part that IAgrE plays is the demonstration, first by virtue of IAgrE membership then with the addition of other internationally recognised professional qualifications, that you are seriously committed to being a professional.

In my case, the addition of the letters IEng to MIAgrE after my name was the key to an international career spanning 5 continents.

We get many letters from members (usually in response to their receipt of long service certificates) who have similar stories to tell; of the importance of IAgrE membership and other professional qualifications in their careers; of how your Institution may be the one stable thing in your career; and the networking opportunities that Institution membership provides.

So the message to all (not just our younger community) is clear…Membership really Matters.

(See the letter from Alan McKenzie in Membership Matters. Ed)

Christopher Whetnall

Primary resource for intelligent solutions based in Kaiserslautern

Deere opens Technology & Innovation Centre

JOHN Deere has officially opened its new European Technology and Innovation Centre (ETIC) in Kaiserslautern, Germany.

The company says the new facility will serve as a primary resource for intelligent solutions and advanced technologies aimed at customers throughout Europe, CIS, Northern Africa, Near and Middle East, and other markets using state-of-the-art John Deere technology.

"Since John Deere invests approximately four per cent of its equipment sales revenue into research and development - around US $4.5 million every working day - it is only natural for us to allocate a good portion of our R&D expenditure to one of Europe's most demanding markets" said agricultural & turf division president Mark von Pentz at the ETIC opening.

The ETIC currently accommodates around 90 engineers, computer experts, technicians and administrative personnel. Their main focus will be on the development of intelligent solutions, the integration of electronics into tractors and harvesting equipment, and on related technologies that help to automate machine operation, reduce operator fatigue and increase machine productivity in the field. Staff numbers will gradually increase over the next few years to around 200 employees.

"From John Deere's perspective, Kaiserslautern is an ideal place to establish such a facility, as we can fully exploit a number of highly qualified resources," said ETIC deputy director Professor Dr Pickel.

"Apart from the technical university of Kaiserslautern, we maintain close partnerships with two nearby Fraunhofer Society institutes, the Institute for Experimental Software Engineering (IESE) and the Institute of Techno- and Business Mathematics (ITWM). John Deere has also recently become a shareholder in the German Research Centre for Artificial Intelligence (DFKI), which will be of great value to our future developments."

The newly opened European Technology and Innovation Centre

The 10,000m² ETIC site includes an office building, laboratories and workshops, and features a modern, architecturally appealing design. The facility has also been designed to meet the stringent standards of the German Society for Sustainable Building (DGNB), and is equipped with an innovative sun protection system, sun-sensor controlled interior lighting, a geothermal heating and cooling system and a photovoltaic energy system. Compared to traditional oil-based heating and electrical supply systems, the geothermal and photovoltaic systems will help to reduce annual CO^2 emission levels by over 142 tonnes.

Engineering for safety in agriculture

ALAN PLOM explains how IAgrE Council has created a Safe Project award for students

NEW statistics from the Health and Safety Executive (HSE) show that 38 people died working in agriculture last year (2009-10).

Around one in five of all work-related deaths occur in agriculture, yet only 1.5 percent of the population work in the industry. The fatal injury rates are higher for agriculture than any of the other main industrial sectors, including construction.

Workplace transport and contact with machinery are two of the main causes of fatal and major injuries in farming each year. Other common causes include falls from height, and being struck by moving objects and livestock.

HSE has been working to reduce this tragic toll and has called on the industry to play an active role in improving safety.

Agricultural engineers obviously have an important part to play in the future design or supply of machinery to farmers, reflecting the many key roles they hold - in manufacturing, machinery sales, research and many others.

HSE is working closely with AEA, BAGMA, IAgrE and others through its '*Equipment Supply Chain Project*' to identify how we can all do our bit.

For example, colleges have a key role to play not only in educating students but also in spreading good practice to the farming community as a whole. IAgrE Council has created the Safe Project award for students and HSE is encouraging all colleges to put forward work that shows how improvements in health and safety could be achieved.

This is not just about coming up with the next big idea in machine design, but looking at how equipment is used in practice, adapting and developing techniques and processes, and managing operations. Suitable projects could involve improvements in livestock handling or manual handling, avoiding hazards such as steep slopes and overhead power lines or any other activity which could reduce the risk of injury or ill health.

A wide range of information about agricultural safety is freely available on HSE's website, including a new page intended for those involved in design, manufacture and supply of machinery. It provides links to relevant guidance and other key documents, so should be an essential source of reference for college lecturers, students, farmers and other users. See: ***http://www.hse.gov.uk/agriculture/topics/machinery/index.htm***

The poignant human stories about why improving farm safety is so important are told on the *Make the Promise* page on HSE's website.

A series of farming families tell the tragic consequences of accidents from their perspective, either as bereaved relatives or horribly injured survivors.

The moving story of a young farmer killed by his tractor and the struggles of a farmer whose arm was torn off by an unguarded PTO shaft have been turned into videos at ***http://www.hse.gov.uk/agriculture/makethepromise/index.htm***

The *Make the Promise* page also invites individuals and organisations to become 'Promise Partners', which provides access to additional resources.

If you want further information or know farmers who have their own safety story to tell, please contact IAgrE Council member Alan Plom on *alan.plom@hse.gsi.gov.uk*

Bali launches '*Bali 2011 - The Landscaping Show*'

THE British Association of Landscape Industries (BALI) has joined forces with professional event organisers Brintex, organisers of the PlayFair children's play equipment exhibition, to launch a major new landscaping event for landscape architects and designers, contractors, specifiers and procurement professionals: *BALI 2011 - The Landscaping Show*.

Taking place on a three acre open space in front of BALI's headquarters Landscape House at Stoneleigh Park near Coventry on 14th and 15th June 2011, this new annual event will comprise three key elements: an exhibition for suppliers to showcase their products and services to an exclusively professional audience; demonstration areas for machinery, product installations and landscaping skills; and a two-day seminar programme with CPD-accredited sessions delivered by key industry speakers in the adjacent Warwick Conference Centre.

The decision to launch this new annual event was taken following consultation with BALI Affiliate (supplier) members who felt there was a genuine need for a focused event for the professional landscape industry. A major objective of the event is to provide opportunities to increase visitors' skills and knowledge base and an additional highlight of the event will be the finals of the WorldSkills UK Landscape Gardening Competition where teams of trainee landscapers will construct identical gardens to be judged by a team of industry specialists.

The opportunity to exhibit will be available to BALI members and, space permitting, to established, reputable suppliers who are not currently members.

The event is free to attend for all landscape industry professionals.

For further information Ray Baxter at Brintex on 020 7973 4695 or email *r.Baxter@hgluk.com*. Visit *www.brintex.com* or *www.bali.org.uk*.

Communication is the key

In his first musings as IAgrE President, PETER LEECH considers how young engineers should give themselves an advantage in global business

I AM writing this in the middle of August, its 17°C and raining!

The average says it should be 21 and fine. The countryside where I live should be buzzing with combines, balers and large tractors cultivating yet it is silent due to the wet conditions. Is this now the norm?

I seem to remember the last few years of decent weather up to August and then a cold and wet harvest. I do hope it improves and our farmer customers have some decent harvest conditions. At least the price of wheat has been improving quite considerably recently which is very good for our farmer customers and will no doubt feed through to the supply chain side and hopefully benefit all of us in due course.

However that again is due to abnormal and adverse weather which has caused the massive heat wave and fires in Russia. With a predicted 20% - 25% loss of Russian wheat output as a result causing President Putin to halt the export of wheat until Christmas, thus triggering concerns of a world grain shortage and rapidly increasing prices.

IN my new position I have been travelling a considerable amount and just yesterday stepped of the plane from a trip to Kansas and North Carolina in the US, over there they are also suffering from a heat wave with temperatures running at 38°C by day (100 to them in F) and no less than 30°C at night, when their norm is around 30°C by day.

I was glad to be back I can tell you, our abnormally low temperatures are much more comfortable than their abnormally high temperatures. It is however raining there quite frequently so crops are generally in good condition.

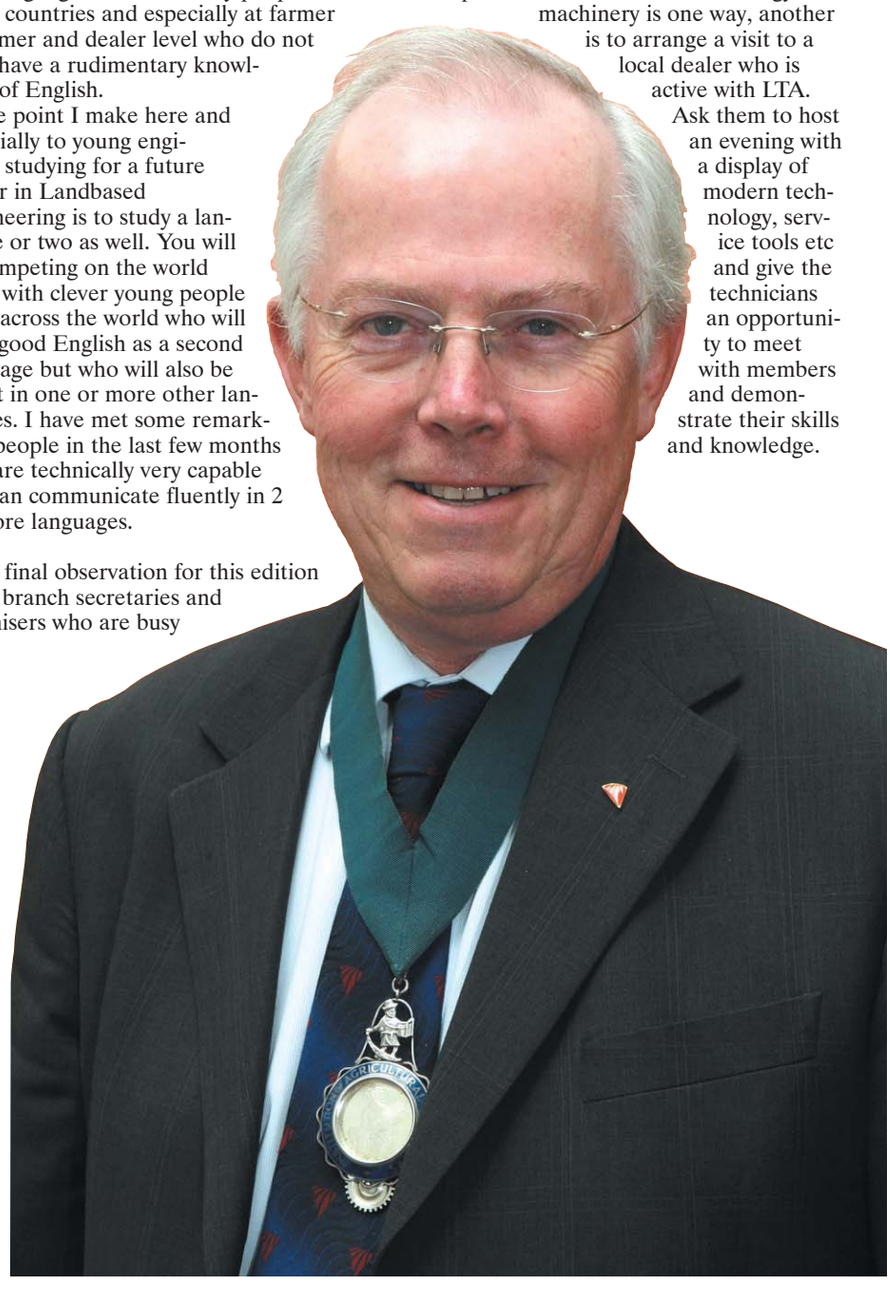
During these travels to many European countries I have become more aware than ever of the most important barrier to business development and growth within our region and that is Language. While English is more and more established as the business language there are many people in many countries and especially at farmer customer and dealer level who do not even have a rudimentary knowledge of English.

The point I make here and especially to young engineers studying for a future career in Landbased Engineering is to study a language or two as well. You will be competing on the world stage with clever young people from across the world who will have good English as a second language but who will also be fluent in one or more other languages. I have met some remarkable people in the last few months who are technically very capable and can communicate fluently in 2 or more languages.

ONE final observation for this edition is for branch secretaries and organisers who are busy planning their winter programme of events at present.

There is a need and a desire to engage with the growing community of technicians in your area who are now members through the LTA scheme. Many of them do not yet feel included in our organisation and unlikely to attend local branch meetings without some direct contact, therefore in the planning of your events please try to consider and accommodate them.

Topics of interest around technology and machinery is one way, another is to arrange a visit to a local dealer who is active with LTA. Ask them to host an evening with a display of modern technology, service tools etc and give the technicians an opportunity to meet with members and demonstrate their skills and knowledge.



The most important barrier to business development and growth within our region is language

CONFERENCE

New Concepts for the Future of Agricultural Engineering

In the first of a series of IAgrE-organised lectures, a packed house at the Cranfield University Lecture Theatre heard Professor Abdul Mounem Mouazen outline the challenges facing those involved in agricultural research over the coming years

WITH the current focus on rising food prices, particularly in developing countries, and the recent agreement from the G8 meeting to mobilise $20 billion over three years for a comprehensive strategy focused on sustainable agricultural development, agriculture is at the forefront of many political agendas, Dr Abdul Mounem Mouazen told the sizeable audience at Cranfield University recently.

Dr Mouazen was presenting the first in a series of lectures organised by IAgrE over the coming months to consider the challenges facing the agricultural sector, and in particular the role of scientists and researchers.

A graduate in Agricultural Engineering at the University of Aleppo in Syria, Dr Mouazen specialises in the application of engineering principles to soil and water management.

He later joined the University of Leuven in Belgium, where he was the Senior Researcher on soil technology, developing an 'on-the-go' soil bulk density sensor and 'on-the-go' variable P fertilisation using an on-the-go Vis-NIR sensor.

An Associate Editor of *Soil & Tillage Research*, Dr Mouazen joined Cranfield as Course Director for Agricultural and Environmental Engineering in December 2007.

"Sustainable agriculture in particular is an area of interest for researchers. With the development of new technologies, there is huge potential to optimise production while considering the impact of production processes on the land and surrounding ecosystems," he said.

"Relevant digital technology is becoming increasingly powerful and is creating new opportunities.

"However, there is little doubt that research and funding for UK Agricultural Engineering has declined in recent years.

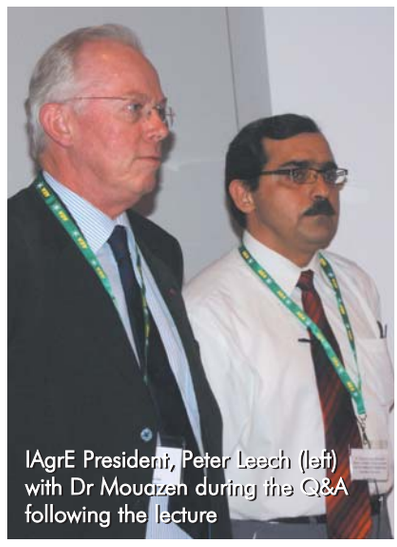
"There are a number of reasons including the lack of technologies; the fact that energy and food prices were at reasonable levels and of course the closure of the Silsoe Agriculture Engineering Research Institute".

But, said Dr Mouazen, the need for such research was now compelling when taking into account all the high-profile issues of food security, rising commodity prices, rising population, environmental protection, climate change and the move to bio-fuels.

"We need to develop new technologies and concepts, but at the same time maintain traditional methodologies - and strike a balance between theoretical and applied research.

"Nor can we be isolated in our work here in the UK, we seek ways for effective technology transfer and overcoming the difference in approach where, for instance agricultural engineering is considered as Biosystems Engineering across Europe."

TURNING to the role of Cranfield University, Dr Mouazen said that there was a collective belief across the rele-



IAgrE President, Peter Leech (left) with Dr Mouazen during the Q&A following the lecture

> “. . . we need to strike a balance between theoretical and applied research”

vant groups at the University that Agricultural Engineering could be influential once again

“To address this need, NSRI (National Soil Research Institute) is developing a new frontier in agricultural systems engineering.”

The group will aim to build on the Institute’s heritage in agricultural engineering and complement its current research, he said.

“The focus will be on the application of new digital technology to optimise field operations.

“The vision is to combine cutting-edge sensor and system control technology with predictive modelling of the soil-plant-water system at field scales.

“This might be described as ‘second wave’ precision agriculture. With activities in agricultural engineering, geographical information management and soil and land management, the Institute is well placed to play a significant role in this important area.

“We not only have a very impressive track record and history in this field through the likes of Professor Gordon Spoor and Professor Dick Godwin, but our current staff have an international reputation in soil dynamics, post-harvest technologies, advance sensing technologies and and precision agriculture.

“We are helped by the excellent facilities here at Cranfield including the new Soil Bin facility, soil dynamics test rigs, soil erosion simulation facility, the online vis-NIR sensing system, and also the world’s newest post-harvest laboratory and the Cranfield University experimental farm.

“At Cranfield we adopt an integrated approach combining all the elements of our research.”

Dr Mouazen then presented an overview of past and current research on soil compaction, moisture content and grain yield and quality measurement.

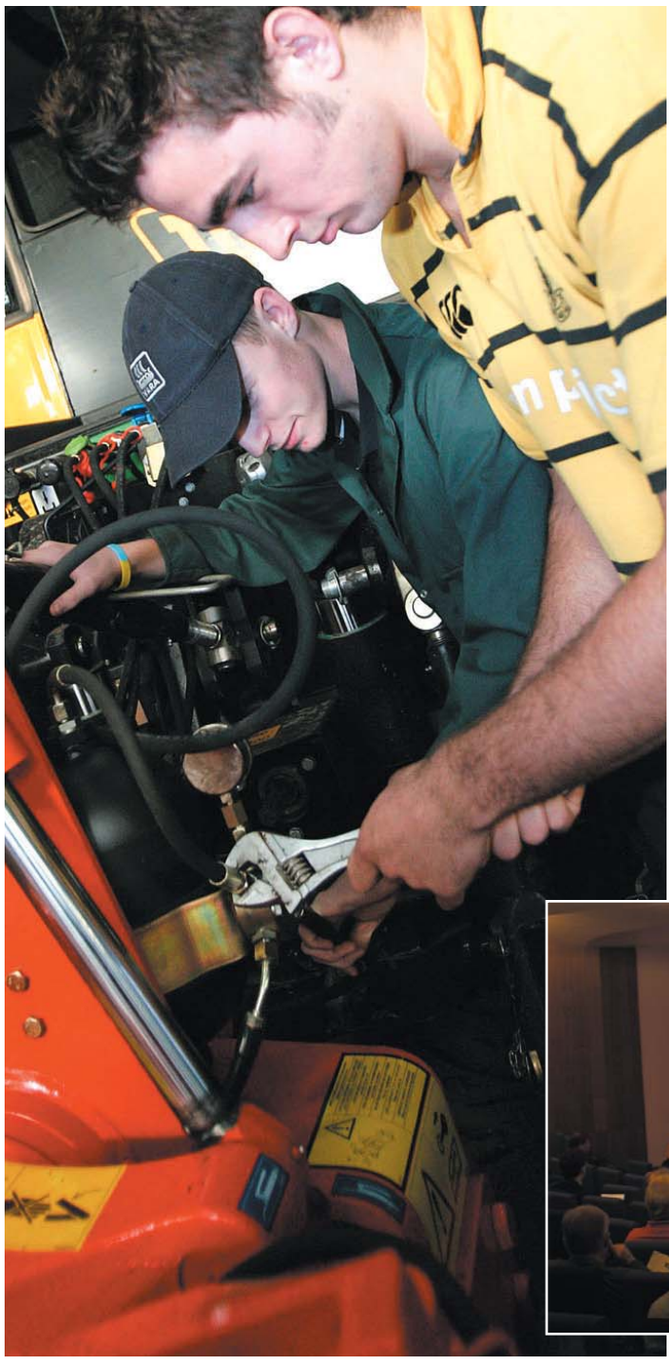
An overview of Dr Mouazen’s paper is on **www.iagre.org**

Dr Abdul Mounem Mouazen presenting lecture at Cranfield University

Training in a changing world

The recent Colleges Day held at Cranfield University organised by AEA, brought together everyone interested in ensuring a constant supply of well-trained, motivated people to work in the land-based engineering sector. A measure of consensus on the key issues was achieved, but no clear blueprint that would involve all the leading stakeholders.

CHRIS BIDDLE reports.



CREDIT where credit's due. Over the past decade or so, the land-based engineering sector has worked hard and with considerable success to put itself on the map. New initiatives have been launched such as the LTA Scheme (Land-based Technician Accreditation Scheme), careers publications and videos, even a scheme to put tractors into schools to tap into the age-old fascination of the young with tractors, trains and diggers.

In short the industry has had to work damn hard to pop its head above the parapet because the very nature of its work is largely unsung, unheralded and virtually ignored by those in power and a media obsessed with popular culture.

And we are not alone.

Many so called unglamorous industries, particularly in the field of engineering, face the same challenges - and it is clear that the land-based engineering sector (a name that defies definition from most outsiders) has done more than many other industry sectors. Perhaps because it is small, niche, nimble and close-knit. Nor is recruitment a numbers game. We want quality not quantity.

But let nobody be complacent, the work of connecting manufacturers and dealers with well-resourced, well-funded, competent and affordable training providers has no end.

The most startling observation at the Colleges Day came from a manufacturer who said that dealer staff attending one college were asked to work on "equipment dating from the 1970s!".

And in a way, this anecdotal indictment was at the heart of the discussion at Cranfield. For training to be meaningful it had to involve the very latest technology. Technology which now includes such developments as hybrid power, sophisticated power trains, GPS systems and the like - where a laptop takes the place of a spanner.

And yet . .

Amongst all the talk of specialism, a cry from many that we ignore the 'generalists at our peril'.

The majority of equipment still in use on the land needs a

high degree of general engineering competence, not necessarily specialist skills.

As ever it's a balance between attracting high quality skills (for which a price has to be paid) and good, honest-to-goodness, committed people who love the job and relish the challenges.

WAS it ever thus? No, said **Alastair Tulloch** (below) of Claas and chairman of the AEA Training and Education Committee.

"Looking back, you can say we viewed the world then through rose-tinted spectacles.

"There were more students,

flexible funding, less technology and less bureaucracy.

"Today we are faced with looking after fewer machines, for fewer customers, with fewer dealers and fewer apprentices.

"Added to which the total agricultural market is down, the global economy is in recession, technology is rampant - and neither agriculture nor engineering are respected as they should be.

"In short, as an industry we have to achieve more with less."

Alastair Tulloch concluded by trying to put some numbers on the recruitment issue.

"I think as an industry we are aiming to attract some 250 - 300 apprentices a year, and 25-30 graduates.

"If that is the case, then you have to ask how many colleges can remain viable to provide that level of input?

"We have to put quality above quantity, and that applies to the colleges as well as the students we need to attract".

.

THERE followed an analysis from the 'Demand Side', providing a platform for manufacturers and dealers to outline what they wanted from the Further and Higher Education system.

John Palmer of Claas (below) nailed his colours to the mast immediately.

"As things stand, our industry can only support, perhaps four colleges providing well-resourced further education for the industry.

"Modern machinery is awash with technology, there is no going back and only the rate of development will change.

"Workshops are evolving rapidly, there have to be more systems specialists; more product specialists; a greater reliance on specialist tools and equipment and a reliance on regular software updates.

"Today's professional technicians need core engineering ability, an understanding of modern technology together with effective use of diagnostic tools and techniques.

"They also need customer-facing and communication skills.

"That all means that the colleges need access to modern documentation, modern technology, modern equipment - and have in place staff with current product knowledge and expertise.

"Above all they need to consistently need to invest in facilities, resources and staffing if they are to play an integral part in the landbased engineering sector.

"In my view, not all colleges meet these requirements.

"Facilities lack investment, resources are outdated, too many staff lack current technical knowledge, qualifications lack technical rigor - and as a result enrolments are too low.

"We all agree the numbers we require are limited, manufacturers simply cannot support all the training providers out there. Frankly the present situation is not viable - that is why I believe there is place for perhaps just four specialist training establishments strategically located across the UK.

"These colleges would have a clear development plan to meet certain objectives for facilities, resources, staffing levels and technical CPD, with the aim to channel maximum enrolments (perhaps +50 each site). Then manufacturers would have the

continues over

What do the Colleges need from the industry?

PUTTING the case for the Further Education and Higher Education sector were **Melvin Johnston** (below), Head of Engineering at Reaseheath College and **Dr David Llewellyn,** principal of Harper Adams University College (right).

Both acknowledged that global recession and subsequent threat to future funding of FE and HE establishments, made forecasting a hazardous occupation at present.

However, both welcomed the opportunity to connect with the industry - and believed that tangible benefits would result from the Colleges Day.

"We face the same problems as you," said Melvin Johnston, "such as being able to attract and retain quality staff.

"Industry can play a key part in this by providing technical information and updating to college teaching staff.

"We have to become more flexible in our approach by providing different study models to suit business needs, particularly in the field of blended or distance learning.

"Yes, we face considerable challenges to fund quality provision and to invest in resources - at the same time managing the expectations of bodies such as Ofsted. But by working closely with industry we can achieve much"

"Higher Education plays a different role," said David Llewellyn.

"We aim to provide graduates with higher level education and skills which are not necessarily tailored to company needs, but who have the ability to address core principles.

"Ideally they should have independence of thought matched in many cases with practical experience.

"I also would welcome more placement opportunities from industry, help with the provision of leading edge equipment and instrumentation, joint-research programmes, short-secondments for our staff in industry as well as guest lecturers to maintain the flow of current information.

"Above all we should aim for knowledge exchange not just knowledge transfer.

"We need greater clarity of your requirements, time to build relationships - and an understanding of the impact of current financial constraints on future 'supply lines' for the industry".

confidence to commit full support with equipment, documentation and training.

"Skilled staff are a premium resource for our industry. Their development cannot be left to chance".

THE theme of new technology was echoed by **Jason King** of Ransomes-Jacobsen *(left)*.

"When you look at grass cutting equipment today, the basic principle has hardly changed since Edwin Budding invented the lawnmower in 1832 - but there the similarities end.

"Today's machines are packed with the latest state of the art technology. We use such things as a CAN (Controller Area Network) system to drive hybrid machines and drive-by-wire electronics.

"No longer do service departments need to simply sharpen and set a cutting cylinder or service a petrol engine.

"They need advanced knowledge and training on hydraulics, electrics, reel technology and power train systems.

"Although core principles remain the same, we must ensure that staff and lecturers are fully up-to-date with today's technology and evolve teaching methods accordingly".

Concluding for the Demand Side, **Keith Christian** of BAGMA (right) outlined the services that the trade association was providing for dealers including its role as a training provider for NPTC, City & Guilds and LANTRA Awards, working also with colleges to develop BAGMA and LTA Training Centres.

Where to next?

FOLLOWING the Colleges Day presentation and debate, chaired by **Roger Lane-Nott,** CEO of the AEA and **Alastair Taylor** (IAgrE Education and Training Committee), the main points raised during the meeting were summarised


Richard Trevathen addresses the meeting during the debate

INDUSTRY ISSUES

- Industry has changed dramatically over last 15 years
- We seem to be producing specialists without underpinning of generalist / core knowledge
- AEA / IAgrE / BAGMA to engage with LANDEX and establish joint programme
- Need to be more pro-active not reactive
- AEA to invite College Principals to meet the senior manufacturers' representatives to exchange views
- Issue of Food Security is of Strategic importance to UK Government and industry needs to emphasise key role it plays
- Why has industry specified NOS been watered down to suit college delivery?

COLLEGE ISSUES

- Need to grasp the nettle that there are too many colleges expecting industry support trying to service the sector
- Funding & investment strategy not right
- Funding should fit the training and not training fit the funding
- AEA to invite College Principals to meet the senior manufacturers' representatives to exchange views
- Difficulty for college staff to remain up-to-date with evolving technology

ISSUES WITH GOVERNMENT

- Have to lobby regardless of likely progress
- Funding & investment strategy not right
- We now have an oversupply of colleges trying to meet the shrinking demands of the LBE
- Feedcorn is of much lower quality and the education system is not providing the right skills out of school
- However there is a need for quality rather than quantity thus putting much greater pressure on the colleges and LBE industry

ACTIONS

- IAgrE / AEA Combined Training and Education Committee meeting to discuss today's debate and look at further actions that could be taken
- IAgrE & AEA write to key Government departments outlining the LBE sector's concerns expressed on the day
- David Llewellyn to inform LANDEX that we wish to engage to discuss future approach to LBE training
- AEA to invite College Principals to meet the senior manufacturers' representatives to exchange views.

Who was there?

COLLEGES

Askham Bryan
Barony College
Bicton College
Bishop Burton College
Brooksby Melton College
Coleg Sir Gar
Easton College
Hadlow College
Harper Adams University College
Hartpury College
Hereford College of Technology
Moulton College
Oatridge College
Plumpton College
Reaseheath College
South Worcestershire College
University of Cumbria
Walford and North Shropshire College
Warwickshire College
Wiltshire College Lackham
Writtle College

OTHERS

Representatives from AEA, BAGMA, IAgrE, LANTRA, manufacturers and dealers.

Presentations are available on AEA website www.aea.uk.com

Funding your R&D?

DAVID TINKER offers updates on UK and EU R&D Funding

TECHNOLOGY Strategy Board: This UK source of matched funding issued a call for Crop Protection research projects back in January 2010.

Apparently they did not expect the amount of interest that this raised but hopefully there are some IAgrE members benefiting and that are now working on the projects.

I have heard that the Technology Strategy Board is close to making the final decisions on what topics to fund with the next call of the Sustainable Agriculture and Food Innovation Platform. In fact by the time you are reading this there maybe a call out.

They are planning to have wider topic coverage than previously and also provide more details relatively earlier. Keep checking the Technology Strategy Board.

It is probably easiest going via the Innovation Platform: Sustainable Agriculture and Food site and looking at the bottom of the page for new competitions. Link is:

www.innovateuk.org/ourstrategy/innovationplatforms/sustainableagricultureandfood.ashx.

Hopefully the IAgrE and AEA will get a link to the call out to members via the emailed updates: - make sure that your email is registered with the IAgrE.

Don't forget that this matching funding is worth around £75-90 million over the next 4-5 years.

It is never too early to start discussing with colleagues, customers and potential collaborators what project you could do. It is important that the consortium is led by a commercial partner who expects to commercialise the output and the TSB would like to see income for the UK economy.

I know of one grouping that has not only been talking together for a while about what to do and how to do it, but they have also been in contact with the TSB to try to ensure that their ideas will be included; as they say 'you have to be in it to win it.'

EU Framework Programme 7: There were a whole series of research calls issued on July 20th with closing dates generally on 25 January 2011.

I am already involved with at least one European group (but it was good to meet a member of a UK academic establishment there as well). I am sure that there will be lots of discussions going on at the imminent AgEng2010 conference as ideas are firmed up and consortia formed.

The list of calls is at *http://cordis.europa.eu/fp7/dc/index.cfm* and you'll need to click 'More' at the bottom of the page and then look for calls with KBBE in the title.

The Knowledge Based Biotechnology Economy (KBBE) is where the Food, Agriculture, Fisheries and Biotechnology (FAFB) calls are. Follow the link and download the WP (Work Programme) documents and have a glance through.

Most of the detailed calls are for Collaborative Research but there are also Coordinating and Supported Actions as well. If you are interested in any topic there you can get your name on a 'looking for partners' website and it is also worth contacting the DEFRA funded Beta Technology (www.betatechnology.co.uk) who offer help in preparing submissions and finding partners.

Within EurAgEng we are increasingly getting involved in more networks and groupings. One is the Agricultural Engineering and Technologies group that held a meeting recently. This group is a lobby group to get agricultural engineering topics into the various FP7 research calls. It is a sub-platform of the large ManuFuture Technology Platform which again is feeding ideas into the Commission's Research Directorate General to be included in future calls.

The Agricultural Engineering and Technologies sub-group met with senior EC staff early this year and was asked to submit an agricultural engineering research idea for the 2011-2012 call. This draft call has just been prepared and submitted and the group is continuing to work on ideas for further calls. The Germans are prominent in this group, even they say so, and the organisers would like others to get involved and spread the net wider for ideas.

To be invited to be a partner in a call is still generally a question of getting known among other European collaborators for your expertise by attending conferences, preparing papers and joining networks (including EurAgEng of course!) and don't think it is just for the big players. FP7 is very keen on getting the results of the funded research out into the wider community and many research calls now have a mandatory involvement of SMEs (Small and Medium Enterprises) of 15% to 50%.

As a medium sized business is rated at less than 250 employees and 50 million Euro turnover many UK ag-engineers fall into this category and could come into the 'micro' bracket with less than 10 employees and 2 million Euro turnover.

Getting a successful FP7 R&D project is not easy and success rates are low but SMEs do get between 75% and 100% of their costs covered by the EU now.

So what to do?

- **Have a look at the current KBBE Work Programme,**
- **Consider raising your profile within Europe and**
- **Attend some of the conferences, especially Land.Technik-AgEng 2011 in Hannover immediately before the Agritechnica show. If two of the big ag-machinery companies between them send along 160 engineers, from a total of 700 attending, then that really is an audience, and networking opportunity, not to be missed. Last year's programme is still available on *www.vdi-wissensforum.de/index.php?id=1277*. See you in Hannover on 11-12 November 2011?**

CONTACT

David Tinker is the first point of contact for more information and ideas on proposal preparation.

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Biochar made from rotting palm trees, weeds and cassava stems

Biochar - unlocking potential

Dr Michelle Morrison
PRINCIPAL ENVIRONMENTAL SCIENTIST WITH WARDELL ARMSTRONG

AS our planet faces a raft of pressing issues from shrinking energy resources, climate change and over-population to food and fresh water shortages, now would seem like a good time for some foresight, creativity, innovation - and a little risk taking.

No single solution will be the panacea to all our problems. We're going to need to use as many good ideas as we can. Just one of those could be the production of biochar using biomass feedstocks - combining as it does a number of very distinct benefits.

First, as a very stable form of carbon, biochar can provide a reliable means of sequestration - potentially locking away carbon in the soil for hundreds or even thousands of years, rather than allowing it to be released quickly back in to the atmosphere.

Secondly, it could be used to improve soil structure and nutrient retention capacity which can help plants grow - whether in poor quality tropical or dessert soils, or brownfield land closer to home.

And thirdly, the pyrolysis of biomass creates a syn(thetic) gas that can be combusted to produce renewable energy in the form of electricity and heat.

Polarised debate

A lot of the recent discussion of biochar as a method of carbon capture and storage has been focussed on agricultural applications, and the debate has been polarised between pro and anti camps.

Some proponents may have over-hyped its benefits with unsubstantiated claims, while detractors have damned the technology as they foresee massive land grabs with untold environmental and human health impacts. The truth, of course, lies somewhere in between.

So what exactly is biochar? Like charcoal, it's a form of black carbon. But unlike charcoal (which is produced primarily for use as a fuel) biochar is the term used for char generated as a by product or product of biomass pyrolysis, with the potential for applications other than fuel.

Biochar is the carbon-rich by-product that's produced when biomass (such as wood waste, agricultural crop residues, coconut husks and so on) is heated (pyrolysed) in the absence of oxygen, causing its thermal degradation into a syn(thetic) gas and a char. This is different from incineration, which involves the combustion of materials in the presence of oxygen to produce $C0^2$ other gases and ash with little or no organic carbon content.

Like its close cousins 'activated carbon' and 'carbon black', biochar has a number of chemical and physical characteristics which could prove very beneficial across a number of applications. A large surface area, porous structure and particle size distribution are three of the properties which have a marked influence on how biochar behaves in soil.

Pyrolysis technology itself is not new. It's been used in the chemical industry for the production of syn-oils as precursors to certain chemicals and syn-fuels, in the plastics industry for the conversion of ethylene dichloride to vinyl chloride for the production of PVC, for the conversion of coal to coke, and the cracking of heavy hydrocarbons to lighter ones. What is novel is the application of the technology specifically for the production of char.

Combining soil improvement, carbon sequestration and renewable energy

Recent studies have shown that adding biochar to soils can in certain situations improve nutrient retention, water-holding capacity and cation exchange capacity (the ability to hold on to other charged particles such as metals), as well as reducing emissions of other greenhouse gases from soils and holding the carbon in the soil for centuries.

So in addition to potentially improving crop growth, soil productivity and structure, there's also the potential for sequestering the carbon (which was originally taken up by the plant biomass as $C0^2$ when it was growing) by converting it into biochar and burying it.

This is because biochar is largely resistant to microbial attack - soil bacteria get their food and energy from the breakdown of soil organic matter, 'eating' their way through it and releasing greenhouse gases as by-products into the atmosphere.

And there's yet another potential benefit of biochar - the production of renewable energy. The pyrolysis of biomass creates a syn(thetic) gas, that can be combusted to produce electricity and heat. Some can be used to maintain the pyrolysis process, while the rest is exported for external use. The amount will depend on the conditions of pyrolysis. Low-temperature pyrolysis can yield bio-oils which can be used a fuels or processed to produce chemicals.

As the temperature increases, less oil and more biochar is generated. Eventually, at high temperatures with the introduction of a limited quantity of air, gasification takes place - creating mainly syngas with

some ash and little or no organic biochar carbon. So there's a sliding scale of biochar/energy production which is controlled largely by temperature.

Interest in biochar originated from stories of lost civilisations in the Amazon. Initially, scientists didn't believe that large and sophisticated communities could be supported by the poor quality, acidic soils of the river basin. But the discovery of the *Terra Preta* (Dark Earth) soils in tracts of land in the Amazon basin, a metre or so beneath the surface, showed that manmade char (biochar), derived from the slow burning of wood and other organic wastes, was a key component in improving the poor quality tropical soil's productivity. In fact, it's still productive today and still be able to support agriculture some thousands of years later.

Left - a nutrient-poor oxisol; right - an oxisol transformed into fertile terra preta using biochar.

A no-brainer?

The argument for incorporating biochar into agronomy in certain arid/semi-arid/tropical areas looks like a 'no-brainer' - providing a relatively simple and cheap answer to problems of soil fertility, soil structure, water retention and hence soil productivity.

There are some caveats, however. The diverse nature of biochar feedstocks, the physical and chemical conditions within the pyrolysis plant and the eventual application can result in different biochar characteristics and therefore different results.

But in theory, biochar production could be applied to many different organic feedstocks with some adjustment of the operating conditions. The versatility of the technology means that it can be applied to biomass products and/or biomass wastes. If the operation takes in waste biomass it will be subject to the appropriate environmental permitting regulations and may fall under the Waste Incineration Directive in the UK

Other applications could include using biochar as a soil forming material, combined with others for the restoration of brownfield land - acting as an ameliorant for contamination through its capacity to absorb pollutants, as well as a soil improver.

What about the application of biochar technology in the waste resource management sector? Pure biomass feedstocks such as tree cuttings, forestry and crop residues, heather and even diseased plants should all be useable. Some wastes, or course, might contain contaminant levels which render the biochar unsuitable for application to land as a soil improver or pollution ameliorant.

But it may yet be possible to bury this contaminated biochar deep beneath the surface in a landfill cell or disused mine void. This would still result both in reduced volumes of waste going to landfill and in the useful sequestration of carbon, preventing its release to the atmosphere for many years.

The scale of application can also be wide. Small scale family, community or farming projects - especially in developing countries - could benefit from investments in low capex equipment / plant for creating biochar for soil improvement, coupled with localised energy production.

But much larger organisations could exploit the technology too - for example as an integral part of Birmingham City Council's 2026 project to reduce the city's energy requirements by 60%, by 2026.

Fundamental questions

A great deal of research is currently underway into risks to the environment and human health of biochar application, its longevity in the soil, its physico-chemical properties, and potential agronomical and agricultural benefits.

But there are still fundamental questions to be answered before legislation and policy can be drafted. Can biochar from different feedstocks be characterised? Can certain biochars be 'matched' with application scenarios, or are there too many variables? What's the energy and mass balance over the entire life cycle of the production of biochar, and how does it compare with other renewable technologies? It biochar is buried to sequester carbon, what is its longevity in the soil? And what's the cost/benefit analysis?

The UK Biochar Research Centre is at the forefront of multi- and interdisciplinary research into biochar, and is seeking to create a UK hub which can feed into the work already done elsewhere and help to answer these questions. As a consultancy business with a broad and expanding portfolio of work in energy and climate change, Wardell Armstrong is working closely with the UKBRC on a number on a number of projects, providing consultancy on policy and legislative requirements for the implementation of biochar projects.

Much of the commercial focus so far has been on energy production - not a surprise given the incentives offered to the renewable energy sector and energy users. The only current mechanism that exists to provide an incentive for carbon sequestration is the Clean Development Mechanism.

Biochar carbon sink - implementation in South Sumatra, Indonesia

Biochar projects in developing countries can apply for registration under the CDM. However, production is unlikely to reach its commercial potential in the UK and other industrialised countries unless a similar commercial incentive is in place which rewards carbon sequestration.

Biochar in the future

If the potential of biochar as one of the ways of alleviating climate change and food shortages is to be realised, there needs to be a concerted application of the technology at a number of scales.

Its great appeal is that it can be applied across a broad range of projects - everything from individuals and small businesses using small scale, low capital equipment, to large scale, high specification plants. Many different biomass feedstocks could be used - organic waste materials such as Waste Water Treatment Works biosolids, waste wood, crop residues and forestry residues or proprietary crops such as short rotation coppice.

Depending on the requirements of a particular project, the technology could be optimised for biochar, bio-oil or syngas production by alerting the pyrolysis conditions. The biochar could be applied to land as a soil improver, for land restoration, for long-term sequestration, or for contamination remediation.

But none of this must come at the expense of the environment or indigenous peoples. The spectre of unethical 'land grabbing' and deforestation for biomass production should be fiercely guarded against to prevent the environmental and socio-economic impacts which accompanied the first wave of biofuel production from happening again.

As long as these risks can be legislated against and avoided, biochar could be an extremely useful and timely tool in combination with other measures for more sustainable living.

We could do worse than support its progress.

the only cost is labour

GEOFFREY WAKEHAM argues that as the only real cost is labour, agricultural engineers should be working towards an increasingly automated industry

RIO Tinto are currently running five autonomous Komatsu 930E trucks to transport ore from the Pilbara mine load area to the dump area in loads of 290 tons under remote supervision from Perth 1500Km away.

This 15 month trial is part of the process towards the world's first fully autonomous mine and they expect to move some 31 million tons during the trials. They also plan to run driverless trains and drilling Rigs.

Super tankers carrying 2 million barrels of oil or a similar quantity of gas have crews of little more than two dozen men. Some have as few as 11, only three or four on active duty much of the time.

In practice it is possible to sail such ships without any active intervention from the crew. The bridge relies on video cameras and monitors to dock, radar and satellite navigation systems to negotiate the high seas. Remote monitoring is feasible and it is not unreasonable to suggest that remote control between berths is technically possible.

The driving force behind these low labour systems is cost, once the capital cost has been recouped then running costs are limited to fuel and routine maintenance and the cost of labour. Energy costs can be reduced by improved design as can maintenance.

Labour costs depend on the number of people involved and the price it costs to persuade someone to carry out the task. It is of interest to note that when canals were built coal prices to Manchester fell by 75%, when Dockers were replaced by containers the cost of shipping as a percentage of total cost was reduced from 30% to 1% in many cases; and a plastic chair costs £5-6 while a hand made wooden version could cost £500-600.

I have long maintained that in reality the only cost is labour, every thing else comes free. If I live by a river in a wooded valley full of game then I can live without money; life may not be easy. If I enslave my neighbours then I can live a life of luxury at no cost. The Greeks and Romans and Sugar Plantation Owners did it but it is no longer an option outside a few distant communities.

AS with Rio Tinto and the owners of large tankers the aim for agricultural engineers should be to produce long-lived, low maintenance, autonomous machinery.

We have vehicles such as tractors and combines not needing minute to minute supervision. Robotic milking parlours are available as are cow controlled feeders. Should we be looking for autonomous forage harvesters loading into autonomous wagons that transport the harvested material to the storage area? Such systems could be available for all extensive harvesting systems.

Detractors say that the agricultural environment is too unpredictable but cropping systems have been changed, vineyards and strawberries being good examples and plant characteristics, as with brussel sprouts, modified to ease mechanisation.

A major problem for such systems in the UK is the layout of our farms and the need to use public roads. This is, however, not always the case and radical realignment of the countryside has occurred on a number of occasions in the past. Whole mountains have been terraced in the Far East using nothing but hand labour and oxen.

For as long as I can remember work towards fully autonomous agricultural machines has been going on, but this has been hampered by the need to accurately locate the vehicle in the landscape. This has been overcome with GPS and one would have expected an explosion in research into fully autonomous agricultural systems.

It was at this stage in this article that I expected to report on all the work going on in the field of autonomous agricultural engineering, tractors that monitored and tracked autonomous combines and silage harvesters and then transported their loads to the storage facilities; tillage and planting equipment, fertilizer spreaders and sprayers serviced by monitoring supply vehicles; equipment manufacturers with temporary traffic lights triggered by approaching driverless transporters wishing to cross public roads; the industry working on a common protocol so Massey tractors may talk to Claas combines, JCB loaders chatting with Vaderstad drills.

Maybe they can already but none of them are listening.

What I found for the UK was reference to Simon Blackmore's sterling work, some dated and less than specific papers but little else. There is work going on round the world but it looks rather like final year BEng project work.

Can we have someone produce a definitive paper on progress and set some goals? Surely manufacturers must be doing work in this area and when real progress is made there will be a need for cross product line integration. Maybe the up and coming Landwards Events day regarding 'Smart farming' will provide some of the answers.

AS there is a bit of space left how about a bit of science fiction relating to the peak energy crisis, man made global warming, desertification and food shortages? Let us think big.

First some history. Two hundred years ago gas lighting was just being introduced to single streets, the gas being piped a few metres. The first practical steam ship is probably the Charlotte Dundas used to tow barges in the Clyde in 1801.

Today, two hundred years later, gas is piped thousands of miles and transported across the globe in tankers up to 550,000 DWT to fuel 2000 megawatt power stations. It is interesting that the number of large tankers required world wide is numbered in hundreds. In time gas reserves will be depleted and to reduce the production of Carbon Dioxide we will need to move to a Hydrogen based economy.

Now here comes the Science Fiction. Jupiter's atmosphere is 90% hydrogen so there is no shortage of available energy. To run tankers to Jupiter in 200 years time is not much different to the steps taken over the past two centuries in bulk transporters on the high seas.

Geostationary docking facilities above the desert regions of the world connected by boron nitride nanotube pipelines will replace steel pipes across the Russian wastelands. Deserts sites will be used, as they will already be the sites of giant solar power stations, and so connected into the world's super grid.

Hydrogen power stations will not only produce electricity but also billions of litres of water. It is possible to calculate how much water if one assumes what proportion of the world's energy might be produced by tankering in the hydrogen without upsetting the atmospheric oxygen balance.

The water can be used to irrigate the dessert, the food crops would thrive in the locally low oxygen atmosphere, lock up carbon and quickly restore oxygen levels to normal.

Figure 1: Arbury Banks, Northamptonshire: ploughing has destroyed half of the overlying medieval ridge and furrow and has damaged the underlying Iron Age fortification which now only survives as a cropmark.
pic courtesy National Monuments Record English Heritage

minimising farming effects on archaeological remains

Oxford Archaeology and Cranfield University have just completed an important project, funded by Defra and English Heritage, looking at the identification of soil cultivation practices to minimise the impact on archaeological sites. The results and recommendations of this project are of interest not only to archaeologists and land managers, but also to soil conservationists.

Klara Spandl
OXFORD ARCHEOLOGY

DAMAGE from modern arable farming practices happens in a number of ways: the mouldboard ploughing of previously uncultivated grassland; the deeper than usual cultivation of crops such as sugar beet and potatoes and finally practices to improve soil structure and drainage such as subsoiling and mole drainage.

More subtle damage also takes place, like the erosive effect of repetitive cultivation - nominally 'to the same depth', the encroachment of ploughing over a number of years into the edges of archaeological sires, and the thinning of soil caused by water, wind and cultivation erosion. Other problems include displacement of archaeological artefacts, and physical and chemical damage caused to them, and the loss of waterlogged and palaeoenvironmental remains by the lowering of the water table through field drainage and erosion.

However, there is very little empirical data identifing how damage is caused, at what rate, and how best it can be minimised, without taking fields containing archaeological sites out of cultivation altogether. In order to address these issues a series of experimental studies was established on the Silsoe Farm of Cranfield University.

Studies were undertaken to look at subsoil pressures resulting from tillage implements and vehicle loads and the effects that these could have on archaeological artefacts. These were undertaken both in the Soil Bin Laboratory at Cranfield University and outside in real field conditions.

The lowest breakage threshold value recorded in the soil bin laboratory experiments using replica historic pots would have been exceeded by the pressure below the plough soil from most everyday arable procedures. Higher moisture contents accounted for up to a 0.25 bar increase in pressure transfer. Mouldboard ploughing caused more pressure transference below ground than non-inversion tillage techniques.

Studies in the field to examine the effects of primary cultivation systems were also carried out by laying out a series of specially constructed archaeological sites, which provided a known baseline to accurately record levels of damage. Both deep (0.20-0.25m) and shallow (0.125m) mouldboard ploughing led to the truncation of archaeological sites over time despite the reinstated ploughsoil being 0.25-0.30 m deep.

Differing rates of archaeological truncation were recorded:

- Accelerated deep mouldboard plough plots, where 30 years worth of cultivation was undertaken over a 3 year period, caused 0.10 m of truncation - 0.003m a year.
- Accelerated shallow mouldboard plough plots caused 0.07m of truncation to the archaeological sites over 30 years of accelerated cultivation in the 3 year time-frame - 0.002m a year.
- Real-time deep mouldboard plots 0.03 m over 3 years - caused 0.01m of truncation to the archaeological sites a year (this faster rare may indicate an initial period of settling).

The effect of subsoiling was also examined and was seen to cause considerable and sustained damage to the archaeological features.

Truncation of archaeological sites over time is likely to be caused by a combination

continues over

of gradual long term truncation through the difficulties in maintaining an exact plough depth (especially if working at a restricted depth). Soil movement created by the forward movement of the plough and more dramatic truncation through cultivation when moisture levels are high are also significant factors.

The use of minimal till/non-inversion and direct drill techniques caused no damage to the archaeological sites.

BASED on these results a number of suggestions were made to prevent damage to archaeological sites in arable land; the most important being that inversion tillage (i.e. any form of mouldboard ploughing) should not be carried out on flat sites.

However, one of the key stumbling blocks to introducing non-inversion tillage agriculture is the perceived need for subsoiling to accompany these techniques to prevent the build up of pans and deep soil compaction. The project therefore also studied the relationship between tractor passes and soil compaction and degradation over the accelerated 30-year period.

The study shows little development of compaction pans away from the wheel passes in any of the plots including the direct drill and non-inversion tillage, even after 30 years of accelerated primary and secondary tillage (carried out in the 3 year time-frame), providing there has not been random wheelings over the soil.

Both conventional and shallow ploughing operations are likely to reduce the natural soil strength and make soils more vulnerable to compaction than non-inversion techniques.

A series of suggestions has also been made to ensure that pressure transference from agricultural machinery does not cause risk to archaeological sites. Ways in which compaction over a field containing archaeological deposits can be avoided include using controlled trafficking, keeping heavier loads off site and using wide section or dual tyres at safe lower inflation pressures commensurate with the load and duty cycle (or tracks) to minimise pressure transference.

Key to reducing risks from pressure and preventing the formation of compaction pans is avoidance of archaeological sites at times when moisture contents exceed field capacity.

Figure 2: Soil bin at Cranfield University, showing the bin, tyre rig set to exert a specific pressure, and the re-excavation of the artefacts after one pass of the rig

If the suggestions discussed in this document and Defra's Good Soil Management Code of Practice (2009) are adhered to then the formation of compaction pans will be minimised and therefore the need for subsoiling can be reduced significantly. In areas of the controlled traffic / wheelings where compaction is seen then shallow loosening can be applied to remove this, to a depth that does not exceed 0.30m.

This work provides practical measures which will now inform policies of heritage protection arising from developments in heritage legislation and allow informed management suggestions to be made.

The results of this work will also be critical for those involved in providing management advice for archaeological sites in arable landscapes, including Natural England and English Heritage. It provides them with tried and tested suggestions based on actual results, rather than hearsay, which can be discussed with farmers and other land managers and implemented through agri-environment schemes

It also reinforces the importance of adhering to the principles of good soil management which help to sustain good agricultural practices by minimising compaction and promoting crop growth, promoted by soil conservation and sustainable farming bodies.

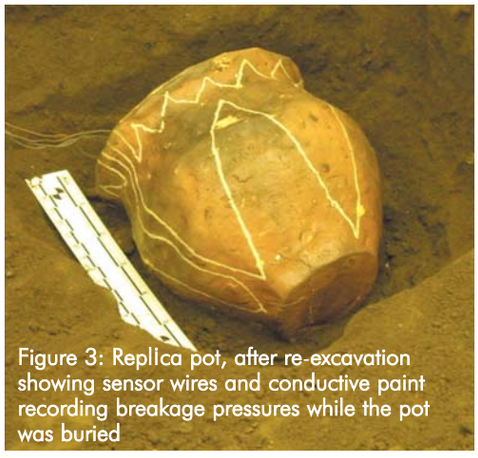
Figure 3: Replica pot, after re-excavation showing sensor wires and conductive paint recording breakage pressures while the pot was buried


Figure 4: Ridge and furrow after 5 years of non-inversion tillage using the Simba Solo. This shows clearly how the wavelength of the earthwork has protected the furrows from disturbance, and how material from the ridges is beginning to fill these furrows up

. . . A series of suggestions has been made to ensure that pressure transference from agricultural machinery does not cause risk to archaeological sites

Multi-disciplines appeal to IAgrE member

Anne Dain-Owens became one of the main people working with Oxford Archaeology through her PhD at Cranfield University. MARION KING spoke to her.

ANNE Dain-Owens, IAgrE member, is a landscape and land engineering specialist who has recently completed a PhD in Soiled Dynamics and Buried Artifacts at Cranfield University.

She was born in Northern California into a family that moved around the US quite a lot and to a Dad who has a love of the environment so she has always led an outdoor life style.

Attracted to developing a career in industry and or research land management she went to UC Davis California where she studied landscape architecture before moving to Sacramento to work as a landscape designer.

Anne then undertook a landscape architecture study tour in Tuscany, Italy and it was during that time she thought about going back to college. After some research she discovered Cranfield's unique MSc programme based at Silsoe, which was in land reclamation and restoration.

"It was a really unique programme. I had some design and ecology background from UC Davis but I didn't have an engineering knowledge. The Silsoe programme is the only one I found that combined design, ecology and engineering all together", said Anne.

Really excited about the course, Anne visited the campus and met visiting Emeritus Professor Peter Leeds-Harrison (BSc PhD MIAgrE) who has 30 years experience in the science, engineering and management of natural systems and, in particular, in the sustainable use of soil and water and as a result she started the course the following year.

"My Masters was in land reclamation and restoration and I studied assessing, planning and creating strategies to restore, reclaim and remediate damaged land in the public and corporate sectors. It also included visits to relevant land reclamation and ecological restoration sites."

Anne thought about getting a job at the end of her Masters but then decided to do a PhD and her MSc led nicely into her next area of study: the effects of soil pressures generated by surface traffic as indicated by damage to buried archaeological artefacts.

She started the PhD in the autumn of 2006. "It was quite a fast project. Cranfield University was sub contracted by Oxford Archaeology to be on the project which was sponsored by English Heritage and Defra. They needed some form of academic empathy and Cranfield had the facilities, the knowledge and interested people who wanted to be a part of the multi-disciplinary project. I came in at the right time and became one of the main people working on this project," said Anne.

Anne's involvement with the project has been in two ways. Firstly through her PhD she was in charge of all the work relating to object breakage, pressure transfer underneath tyres and how these two elements relate to soils. Secondly. she acted as part time project researcher, helping with some of the project management such as meetings and steering committee updates, project progress reports and helping with most of the field work and all of the lab work.

"The reason I thought it would be something I would enjoy was because there were multi-disciplines involved. My background is quite diverse, before I started the project I didn't know a lot about archaeology but I knew about soils, ecology, soil dynamics, mechanics and all that kind of thing. But archaeology was totally new. It gave me an opportunity to take what I had learnt and experienced in one area and apply it to a totally new subject and learn about archaeology at the same time," said Anne.

"Coming from the States to Europe you learn a lot about different cultures and how they relate to the past. In the US you have Native American culture but our history in one sense is a lot shorter than Europe's. American culture is rich but quite different so I've learnt a lot about English culture and English history - how people view their pasts and the value of that was really special," she added.

On the project Anne undertook breakage investigations on replica historical ceramics and human bone. "The message is really that you need to be aware that you must be very careful what kind of operations you put on the soil. Moisture and seasonality make an impact and you need to manage tyre inflations, vehicle weights, how deep you are ploughing, whether the tractor is driving to the depth of the furrow or is still on land. If you can control these activities you have a better chance of minimal damage," said Anne.

It gave me an opportunity to take what I had learnt and experienced in one area and apply it to a totally new subject and learn about archaeology at the same time

Anne Dain-Owens

Four different types of ceramics were used in the study. Two were more able to withstand damage than the other two making it evident that the weaker ceramics would not be able to withstand even normal farming operations, which is likely to cause all kinds of cracking and breakage. "Interestingly, roman tempered pottery survived a respectable amount of sub soil pressure generation," said Anne.

So what does the future now hold for Anne as her PhD is finished? "I'm very interested in large-scale land or soil management. I have such an assorted background I am really interested in being dynamically involved in diverse subjects with different people. I would like the opportunity to develop multi-faceted strategies to solve contemporary issues surrounding land use, rehabilitation and mitigation.

"I also enjoy learning and understanding how other cultures and governments deal with their own land management and environmental issues so hopefully I will find something with an environmental spin that will help people to keep their lands sustainable and environmentally capable," Anne concluded.

agricultural heating systems

RICHARD LANGLEY from Harper Adams University College explains the various methods employed by agriculture to provide warmth for livestock

INTRODUCTION

THERE are many different heating systems that may be used for various applications in agriculture. For example, in pig and poultry houses probably the most common are space heaters, run from gas or oil, electric infra-red heaters and under-floor (electric) heaters. In farm workshops, perhaps the warm air heater is more applicable.

These systems will now be described more fully.

Warm air heaters (floor standing or high-level units)

These units are generally the cheapest to buy and install.

Unflued units burn natural gas, propane or oil directly in the air supplied to the space being heated. Flued units burn the fuel in a heat exchanger, warming the supply air which is then discharged horizontally via a fan. The air discharge louvers are adjustable, allowing the air flow to be directed as required. Alternatively, the supply air can be distributed via ductwork.

The combustion products from the heat exchanger are discharged to the outside via a flue or chimney. Occasionally, the use of fans is recommended to assist air circulation and resist air stratification occurring. This might be essential in some circumstances, for example, in a glasshouse where you do not want the warmer air disappearing through the roof serving no purpose. A combustion air inlet in the building fabric must be provided for flued units.

Flued units operate at approximately 75-80% efficiency (85-90% efficiency for unflued units). Modulating burners are available which match heat output to heat load, hence reducing fuel consumption - i.e they do not run simply on-off.

The main advantages are: low capital cost, flexibility (units can be moved relatively easily to suit new house layouts), and good access for maintenance.

The main disadvantages are: floor space required (unless a high-level unit is used, often suspended from a chain/cable), predominantly convective heat, hence stratification can occur especially in high buildings, high dry bulb temperatures required to achieve the same comfort level compared with radiant systems but increases energy consumption, air movement required to distribute heat (this can cause uncomfortable zones adjacent to the discharge of high velocity hot air), noisy and vulnerability to damage. See Fig 1.

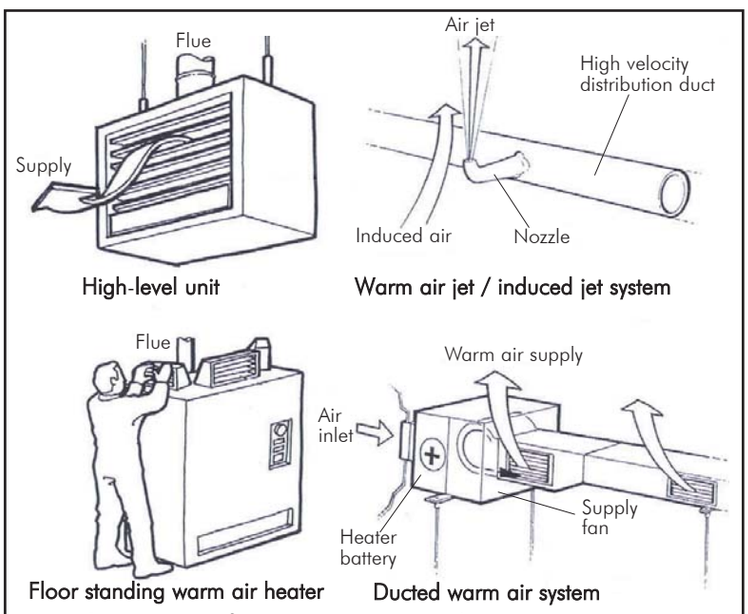

Fig.1: Some types of convective warm air heater

Gas brooders

Brooder heaters are designed for broilers, pullets and duck-brooding layouts.

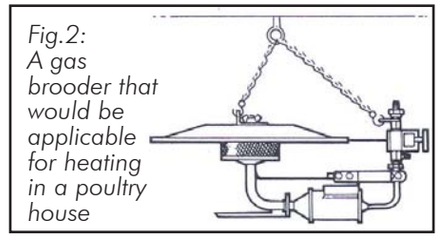

Fig.2: A gas brooder that would be applicable for heating in a poultry house

The diagram (Fig 2) shows the basic layout of one unit; it has a gas burner, a reflector to direct the heat, a gas supply and the relevant control gear. This might vary from a manual high/low control by using a simple tap, to automatic high/low incorporating a non-electric thermostat which adjusts the gas flow between fully on and partly on. A control knob provides the temperature setting.

Another version is an automatic on/off model; this incorporates a non-electric snap-acting thermostat and a permanent pilot. A control knob provides the temperature causing the brooder to be fully on or extinguished.

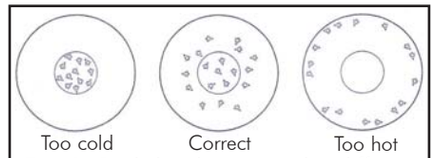

Fig. 3: Bird distribution under different heating levels

The 'bird pattern' (Fig 3) diagram shows how the settled birds demonstrate if the brooder (or any other type of heater) is working as it ought. If the building is too cold, the birds will huddle together; if it is too hot, the birds will disperse to the outer wall of the enclosure. A correct heat will show that the birds are evenly distributed around the building. The diagram (fig 3) shows how the bird pattern demonstrates heating efficiency.

These systems are generally reliable and relatively cheap to run. They can be purchased to suit various bird numbers. In small to medium scale set-ups, spot brooding and partial house brooding will be the most cost effective. Spot brooding is good when brooding indoors, whereas partial brooding will suit brooding on the range.

Electric brooder lamps

These are suitable for the smaller number of animals/birds, up to say 100 birds per lamp. If an infrared lamp is used, not more than 50 birds would be recommended.

These systems can be expensive to run and require costly replacement bulbs.

Electric radiant heaters

These comprise quartz lamps fitted in a polished reflector.

The lamps emit radiant heat which can be directed to the area required and they heat up to full power instantaneously in switching on. Mounting heights can vary from 2m (or less) to 4m.

The lamps operate at 100% efficiency of delivered electrical energy, but use standard rate electricity. A 'black bulb' thermostat senses the radiant temperature and provides control to the heater, switching lamps on and off as necessary. These heaters have been used in many farming situations, including workshops, dairy parlours and calf rearing houses.

The advantages of this heating are: fast heat-up rate, small, lightweight, simple and cheap to install, high level mounting - no floor space is used and thus the occurrence of accidental damage is minimised, low maintenance, no air movement, easily located to suit new building layout and no fumes produced.

The disadvantages are: standard rate electricity is used and high running costs can result with high heat load; it is for this reason these heaters have not become as popular in agriculture as perhaps they might have done. See Figs 4 & 5.

Underfloor electric heaters

Electric underfloor heating - creep heating - will provide an even floor temperature and a warm, clean and stable environment which can be accurately controlled.

Systems may also have timers so that further controllability may be incorporated. This system therefore offers improved animal growth and feed utilisation.

The diagram (fig 6) shows the layout of a typical system; the cables are laid on to the insulated concrete floor using a fixing strip, which is then covered with a sand and cement screed. In situations where there is an existing floor a special thin insulating board can be laid, the cables are then attached direct to the board which is then covered with the screed.

Both applications use heating cables which are double-insulated and typically available in 15m lengths with loadings ranging from 155 to 4260W, thus allowing for individual or multiple creep heating control.

The system may be 40-50% more energy efficient and more comfortable for staff working conditions. Another advantage is that the system may save up to 50% on bedding because the floor is kept warm and dry.

Provided that the floor is laid and terminated correctly, the heating system has a lifespan as long as the building's and is also durable, which means that the floors can be cleaned with a high-pressure hose without having to remove any electrical equipment.

The system can be expensive to install, and a typical 8-12kW system may cost £6-12 000 plus the price of the connection to a distribution system. If the price of the installation can be justified, the farmer could use ground source heat, so further reducing energy bills.

An alternative system is to use heating pads. These may be in various sizes, for instance, 1.2m x 0.4m, 1.2 x 0.6, and so on. Their life expectancy is almost infinite in normal working conditions and they have a high mechanical strength. Urine and water do not present a problem to the pads and they are triple-insulated for safety.

The pads can be embedded in concrete to give a level floor. In trials, pads have held the temperature remarkably steady, even with outside temperature as low as -2°C, giving a better food conversion ratio as well as low running costs (Riverina, 1995).

The main advantage of this type of heater as opposed to the individual cables is that it can be laid as one unit without all the trouble associated with cables. There should be far less room for human error with this type of system.

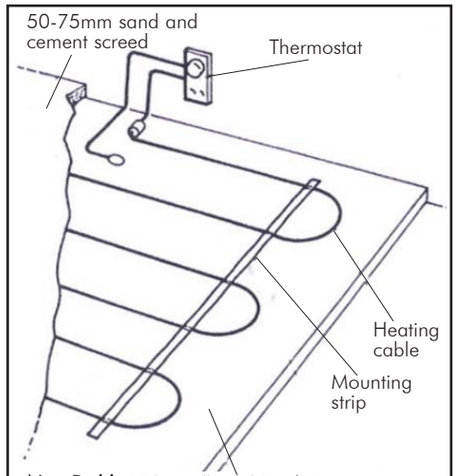

Fig. 6: An underfloor heating system that may be applicable in a piggery. (DEVI, 2006)

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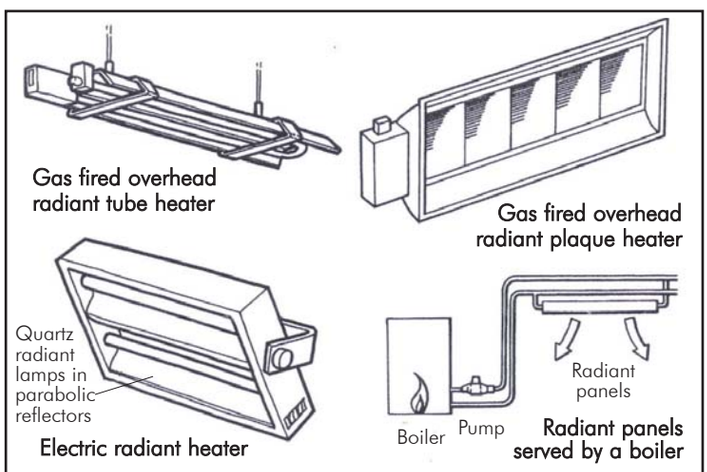


Fig. 4: Radiant heating systems which may be used in agriculture

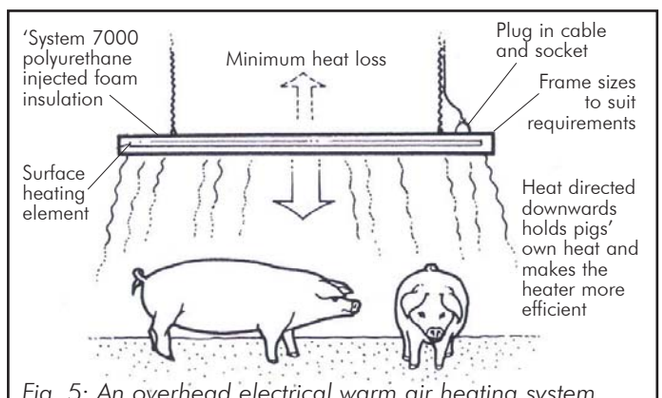


Fig. 5: An overhead electrical warm air heating system used in a piggery. (Pyramid, 1996)

y'canna change the laws of physics*

Recently retired CEO of the Engineering Council, ANDREW RAMSEY, reflects on his years and experience in the profession

ENGINEERING is generally taken for granted in modern society.

Despite our best efforts, most of the population does not wish to know the extraordinary - to us - developments in design, manufacture and project management that underpin their blissful expectation that their aeroplane will arrive at its destination and their mobile will connect seamlessly with a new network.

My entry in 1979 into the professional staff community was in building services engineering - an obscure discipline even to other engineers. When they do think about it, most connect the idea of heating, ventilating, lighting and air-conditioning with their own DIY efforts and wonder how practitioners could ever achieve professional status.

A refugee from the rapidly privatising electricity supply industry, I was also bemused to discover a thriving sector of the economy, grappling with the problems of architect designed buildings that behaved like greenhouses, developments in theatre design, and ensuring shoppers and staff were comfortable and safe in giant retail centres.

Their institution, CIBSE, was a campaigning institution. Long used to underdog status, the institution had taken on ministers, lawmakers, the Privy Council and the engineering establishment - and generally won. The battle I engaged in, almost immediately, was the fight to gain CEng recognition for the undoubtedly competent core of the profession. This involved a lawyerly series of arguments with the newly formed Engineering Council, a public relations campaign, demonstration of rigour and fearless engagement with key opponents.

There I learned the nuances and defects of the professional standards of the day - SARTOR - eventually gaining a sufficient reputation for unwillingness to compromise that I was invited to become, in turn, the first CEO of the Construction Industry Council, and then the 'Convenor' of the Group of 12 - the CEOs of the biggest PEIs of the day. This latter group helped needle the ponderous Engineering Council into a complete reorganisation - but not a happy one, unfortunately.

Nevertheless, perhaps over-impressed with my own achievements, I accepted in 1997 a job as Director for Engineers' Regulation at the newly reformed body, and hence began another long journey to lead, eventually, one of the more successful creations of the engineering profession (although there were times when this would have seemed a most unlikely outcome).

Changes

THE biggest changes I have seen have been in attitudes and influence.

Certainly I have lived through a period when the Engineering Council could do nothing right. The professional community saw it as an external imposition, a diversion from the business of promoting engineering properly, coddling tiny learned societies (forgetting where most had started), and generally creating unnecessary bureaucracy. Somehow we have become for the profession a source of added value, of pride, and of wisdom - I am not foolish enough to believe this is all my own work as I have been privileged to work for a sensitive and intelligent Board and supported by a thoughtful, dedicated and experienced staff.

These changes have arrived at a good time for the profession. I believe that UK society is starting to rediscover the contribution the professions make to our national wellbeing - not particularly in economic terms (though the £2bn surplus on trade in engineering services is quite handy) - but rather in making sense of the miasma of qualifications and courses, providing external verification of their value, ratified by the willingness of employers and clients to trust the results.

Not only that, but we are now in the era of the NGO. Lobbying has got a bad name, but modern democracy thrives on the research and advice that professional bodies can provide. Untainted by profit, but crucial to economic and social progress, the professional societies are recovering from a period when they were seen by both major political parties as self-interested rent-seeking private groupings. I sense in recent actions and pronouncements by governments (the Fair Access to the Professions inquiry, the creation of a Technician Council), a grudging acceptance that the professions have a key role to play in the skills agenda.

Another great sea change I have seen is the widespread acceptance of outcome-based standards. In the UK the engineering profession led much of the development. The National Council for Vocational Qualifications tried to embed the changes, but met huge resistance, apathy, and - it had to be said - caused many expensive, painful and ultimately unsuccessful experiments to be visited on particularly the Further Education community during the 1980s and 1990s.

*Scotty - 'Star Trek: The Original Series' *The Naked Time* first broadcast 29 September 1966

The ill-fated professional engineering standard, SARTOR 3, got it right, but was shot down because, lacking the courage to promote this, the Engineering Council got involved in an ultimately self-destructive attempt to influence university admissions.

It was part of the new Engineering Council's success to recognise this and draw out of the bonfire the attractively slim UK-SPEC - which hit the spot so successfully that it has formed the basis for professional standards in allied professions.

Nobody born after 1970 would recognise the changes that IT has caused in the utility and significance of professional bodies. Always the recipients and coordinators of developments related to practice, professional bodies were restricted in what they could readily disseminate. Everything centred on the library, the conference and the evening lecture - demanding physical presence, or at least delay, and often constraining valuable developments because of the difficulty of identifying who might be interested.

The world wide web broke open those boundaries, and introduced today's professions to the role of providing authority to information ubiquitously available in ways our forefathers could not conceive. My belief is that we have only started on a journey where the sourcing and sharing of knowledge becomes a more and more important part of the work of professional societies.

IF sex was discovered in the 1960s (according to Philip Larkin), globalisation was the discovery for the engineering profession in the noughties.

Engineers from the British Isles had built factories, ports and railways all over the world from Victorian times, but this was a globalisation built on the ease of purchasing components and designs from all over the world, and assembling or creating finished products somewhere else.

Purchasers, employers and governments suddenly needed reassurance about the credentials of the professionals involved - and then to demonstrate their own people measured up. The cosy Washington Accord and FEANI agreements needed to become more rigorous - not only to show they worked, but also to provide meaningful criteria to be met by the orderly queue of national engineering bodies seeking recognition. The UK engineering profession, with its newly restated standard, UK-SPEC, has been in a good position to profit from these developments.

For many years the profession paid lip-service to the role of the technician. The three tiered hierarchy was good in theory, unless you were in the bottom tier. Besotted by status considerations, the profession spent more time worrying about their chartered members and regarded engineering technicians as, at best, "chartered engineer-lite", mainly looked after by the smaller societies who had - in the eyes of the bigger ones - no status anyway.

2002 saw a resolution by the new Board of the Engineering Council (UK) to address this issue. A separate, and refocused standard within the UK-SPEC was published, and the more conservative PEIs urged to look carefully at the importance of the technician.

A separate political campaign was waged to persuade DTI (now BIS) to recognise the deficit in recognition compared with our competitor nations. 2009 was a culmination of our efforts - with all but two PEIs licensed for EngTech, and a White Paper calling for "recognition of a technician class".

There is a long way to go, but the new government has reiterated the call, and the former Science Minister, Lord Sainsbury has indicated that creation of a Technician Council to promote this has the backing of his substantial Gatsby Foundation. After years of decline, the Engineering Technician register has experienced five straight years of growth.

Things that still need fixing

IT is perhaps inevitable that social organisations built on pride, commitment and companionship find sharing with other similar organisations quite hard. And of course much engineering is practised in a very competitive environment. Nevertheless one of the greatest frustrations in working for this great profession has been unwillingness on the part of the PEIs to cooperate for the good of the profession, and the concomitant lack of leadership within the profession.

During 2008/9 the imminence of public castigation for the lack of coordination on policy matters resulted in a rare flash of recognition that this might be a disadvantage. Nevertheless the agreement to support the Royal Academy of Engineering as a representative body for the profession, welcomed by the Select Committee of Inquiry looking into Engineering and Engineers, remains delicate.

In addition to publishing a joint manifesto under the '*Engineering the future*' banner, the profession also published multiple overlapping "manifestos" for the May 2010 election, and is still having difficulty finding common ground on the great issues of the day - energy, environment, and skills.

Equally frustrating has been the reluctance of PEIs to recognise publicly the importance of registration of engineers and technicians. This is not just a private gripe for the Engineering Council, but undermines the standing of their own members, by suggesting that membership is unreferenced to any national standard, and introduces a hurdle for those seeking registration, who can search PEI websites in vain for the doors marked CEng, IEng or EngTech. We have worked hard at the Engineering Council over the past couple of years to address the previous poor marketing of our national standards for engineering, and I am hopeful that PEI promotion of these valuable assets is improving.

DEVELOPMENT of the profession faces another threat in the slow demise of employer-sponsored "initial professional development".

The UK's traditional strengths of the guilds, which became the apprenticeship system, and eventually graduate training schemes and sandwich courses, is gradually evaporating with the changing structure of UK industry. SMEs and profit centres within major corporations have no incentive to invest in training - it is almost always cheaper to poach experienced engineers and technicians. Perhaps accelerated by the privatisations of the 70s and 80s, and reinforced by globalisation releasing UK-based companies from the restrictions of local recruitment, the assumption of employer commitment on which the UK formation processes are based is looking decidedly threadbare.

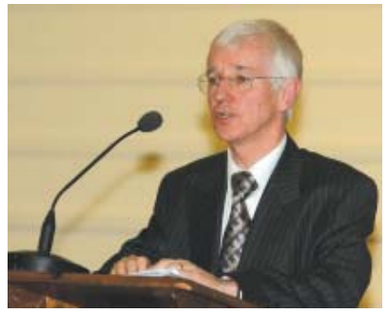
While there remain a large number of organisations that do still train, we need to recognise that it is increasingly up to the individual to seek relevant experience and training. That is the reason I have been committed to developing work-based higher education that links with PEI mentoring and employer interests - our Engineering Gateways scheme. Although still small scale, it has the potential to restore the balance.

Relationships with IT and science are a third concern. Both sectors have found it necessary to redefine their relationship with engineering, but in differing, and possibly damaging ways. IT has developed a gung ho anything-is-possible approach to projects that is far removed from the risk-based evaluations of engineers. It has become almost de rigueur for IT 'professionals' not to belong to a professional body, and the consequences are all around us (and documented by the Royal Academy of Engineering and the Public Accounts Committee, amongst others). We very

. . . Lobbying has got a bad name, but modern democracy thrives on the research and advice that professional bodies can provide

> “. . . The thousands of volunteers who populate our profession, giving their time freely to assess, mentor, share and promote engineering good practice are the profession’s greatest asset”

Andrew Ramsey, recently retired CEO of the Engineering Council



much need to bring the IT profession back into register with the engineering profession, who after all make great use of its products and ideas.

Science is different. The UK has been enormously successful in developing much of the science on which our lives and industries depend. Science consumes large amounts of public money and constantly needs to demonstrate the value everyone gains from its output. Engineered products are easy examples to illustrate this.

However, in recent years science has increasingly sought to suggest that engineering is a subset of science. This is nowhere better illustrated than in the Government’s own organisation of science and engineering advice - led by a single ‘Head of Profession’, with no acknowledgement of the differing approaches of the scientist and engineer to problem-solving, or indeed the differing training and development needs of scientists and engineers.

The concern is that the cheerleaders for science are distorting the public understanding of engineering - and the perception of engineering careers. There is no space between the blue collar artisan and the white-coated theoretician. This leads on to my next point.

Things that never change

THE past 30 years have demonstrated to me that engineers hunger after public acknowledgement to an enormous extent.

The most constant feature of my postbag over the years has been the accusation that the PEIs or the Engineering Council (usually both) are involved in a conspiracy to suppress statutory regulation of the profession and other forms of public recognition of engineers.

Countless inquiries, reviews and reports have had professional recognition as a theme. My personal view is that this will never change. Notwithstanding the views of my correspondents, the lack of acknowledgement is probably inevitable. The first President of the Institution of Civil Engineers, Thomas Telford, wrote . . .

“*It is unnecessary to remark to you on the business of an Engineer; all admit the difficulties of it, and the indefinite character of it; and that by the want of definition its respectability is less than its due, that public confidence which is indispensable is much weakened by the presumption of unskilful and illiterate persons taking upon themselves the name.*”

The number of PEIs is a second complaint. This has reinforced a view that the effectiveness of the profession has been hindered by the existence of multiple bodies with overlapping claims to expertise and influence.

The creation of the CEI was a response to this, but failed to distinguish between current strength and future clout. Who, today, would challenge the likelihood that the Nuclear Institute will grow in size and influence, or be surprised that the two Institutes concerned with mining had coalesced and joined the Institute of Materials.

The Engineering Council currently licenses 36 PEIs - rather fewer than the 44 originally “nominated” by the Engineering Council, but commensurate with the 31 members of the Accreditation Board for Engineering and Technology (USA), or the 42 members of the French Conseil National Des Ingénieurs et des Scientifiques de France (CNISF] that are not schools of higher education.

Engineering will generate further new societies as new technologies and economic engines emerge. Our current structure of 30+ licensed bodies, 20 professional affiliate societies, and, probably, 30 more aspiring societies seems fairly stable and allows for growth and redistribution of emphasis as time goes by.

Any lack of a coherent voice for engineering must be placed fairly and squarely on the leadership of the major institutions, the Royal Academy and the Engineering Council.

The third complaint is the difficulty of gaining registration. This falls into two categories - firstly those who suddenly realise the value of registration and expect to achieve it instantaneously. I have little sympathy with them - a volunteer-fuelled organisation must operate at the pace of committees and individuals within them, who usually have many other calls on their time.

The second category is about the bureaucracy of membership processes. Here there is scope for change - and a real wish on the part of CEOs to do more. Some of the processes lend themselves to IT solutions: more could. Others require modern management techniques to wrestle the obstacles to the ground.

Things I will miss

THE thousands of volunteers who populate our profession, giving their time freely to assess, mentor, share and promote engineering good practice are the profession’s greatest asset.

Working with them has made coming to work a joy and a privilege. Hopefully my relationship with them will not change too much as I join their ranks in the future.

I will miss working with the staff of the organisations I have served: sharing many of my quotidian satisfactions and frustrations. The *esprit de corps* and goodwill will be difficult to replace. We have shared common enemies, guilty pleasures, but most of all a belief that what we are doing is valuable, misunderstood and right.

Our contributions to society as a profession are immense. The unique nature of engineering requires regular breakthroughs and checks to the natural decay of an essentially hostile universe.

As engineers we learn early on that entropy (a.k.a chaos) is our natural enemy. Our profession fights to create order and value out of the materials and resources we have. Being part of the struggle has been important to me.

Maybe Scotty was too pessimistic. Engineers can’t change the laws of physics, but we can for a time at least deny their supremacy.

PROFILE:

Chartered Environmentalist

Dr Clare Butler Ellis is the head of the Silsoe Spray Applications Unit, now part of the NIAB TAG Group.

She has over 25 years of experience in research relating to agricultural engineering, including milking machine systems, pig housing, renewable energy and pesticide application.

Recent work has included the development of a new exposure assessment model for bystanders and residents in rural areas who are potentially exposed to pesticides from agricultural applications.

Name
Dr Clare Butler Ellis, M Inst P, C Phys, M IAgrE, CEnv

Position
Head of Silsoe Spray Applications Unit

Academic Career:
- PhD Theoretical Physics, University of Leeds, 1986
- B.Sc Physics 1st Class Hons, University of Leeds. 1982

Areas of Expertise:
- Research project management
- Spray application technology
- Exposure assessment
- Mathematical modelling

Q&A

Why did you choose to become a Chartered Environmentalist?

When I started out my career as a young physicist, I became a member of the Institute of Physics and I still have chartered physicist status.

But it is difficult to feel part of the physics community, because the work I do is much more practical and perhaps rather prosaic - and highly multidisciplinary - and just didn't seem to fit in with what 'real' physicists do.

When I found out about the possibility of being a Chartered Environmentalist it seemed much more relevant to the work I do, and something I could be proud of!

How do you feel that being professionally registered (*as a Chartered Environmentalist*) helps you in your career?

I am not sure that it has - yet - but it would give me much more confidence if I ever need to change job.

It indicates that I have the capability to tackle a range of environmental issues, broader than my CV would suggest.

What discipline areas have you worked in and which discipline area are you now working in?

- Theoretical physics relating to topology of polymer molecules
- Dairy technology and milking machines
- Renewable energy, particularly biodiesel and biomass
- Farm buildings, e.g. pig housing systems
- Spray application technology

Spray application technology is where I currently work

What makes your work important?

Providing objective information that is used to form government policy - I am not sure that the science is given as high a weight as political issues, and I get frustrated with the slow speed of government responses, but without the work the team at Silsoe have done over the years, there is no doubt that policy relating to agricultural pesticide usage would be much weaker.

Providing information to pesticide users about the best way to spray is also important - regulatory pressures on spray operators is increasing all the time and I believe spray operators in the UK are some of the best there are - those of us who contribute to training and knowledge transfer have a crucial role.

What have been your main achievements?

One of my favourite projects from back in the late 90s involved working with industry to develop an understanding of the way air-induction spray nozzles work. We learned a lot from that project, and we still cite the results, which ultimately contributed to the development of a number of new nozzles, including the Amistar nozzle which we also worked on.

More recently, I have been responsible for updating and further developing the Silsoe spray drift model, and I think we have done a pretty good job with it! It could now be used for a very wide range of applications, and it is currently being considered by the regulatory authorities in the UK for replacing the exposure assessment for residents and bystanders to agricultural pesticides.

How do you see your work developing in the future?

It is an interesting time - government funding is going to be scarce, certainly in the short term, and recent changes in UK funding for crop protection do not appear to have worked in our favour. Since the majority of our research income has always been from UK government, this could be bad news.

On the other hand, industry is becoming more aware of the importance of engineers, chemists and biologists all working together to solve some of the environmental problems that agrochemicals can cause, so perhaps there is still some cause for optimism

Any tips for those newly qualifying?

One of the most rewarding parts of my career has been working with those of very different disciplines.

In my early days in particular, I was a lone physical scientist working with vets, microbiologists, entomologists and animal scientists. You can learn such a lot from other scientists - and hopefully they can learn from you too - so always take the opportunity to collaborate with people outside of your own sphere of expertise.

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MEMBERSHIP MATTERS

BRANCH REPORTS

SOUTH EAST MIDLANDS BRANCH

Visit to G's Marketing - 2-6-10

AROUND 18 SEM and other IAgrE members were treated to an afternoon visit to G's at Barway, near Ely, Cambs.

This is a company with a long history in intensive vegetable production but also one known for its machinery innovation and close attention to detail and safety. One of Europe's leading privately owned farming businesses it has operating bases in Spain and the Czech Republic which entails cross-border transfer of people and equipment.

Our visit concentrated on field production where we saw lettuce being planted and harvested. Both of the rigs used were designed and built in-house and made capable of dismantling and transport over great distances.

The 16 row planter was auto-steered using a furrow set up by the last cultivation pass, itself auto-steered with a Global Navigation Satellite System (GNSS) using a satellite-based correction signal. To spread the load of this 12t planter, it was equipped with six rubber tracks. End turns were accomplished by differential speed control.

G's 16 row lettuce planter with furrow auto-steer system. This machine was designed and built in-house

Although I know this company has strived to improve machinery and working practices to reduce soil compaction, there are some new technologies and ideas that might help them make some further progress towards nurturing and sustaining their fragile peat soils.

Lettuce harvesting relied on manual selection and cutting of appropriately sized heads, which were then conveyed into the mobile pack house. Here they were graded, wrapped and boxed up before being transferred to a towed road trailer ready for immediate transport to a cold store.

The lettuce harvesting rig, showing the pickers at the front, the mobile pack house and the road transport trailer

We also saw a robot pallet stacker on the potato grading line, (the only thing not working up a sweat on a very hot day!) and visited two large workshops where the extensive range of equipment is built and serviced. Work in hand included servicing a unit recently returned from the overwinter cropping programme in Spain.

G's are not one to miss a bargain in terms of workshop equipment either. They had recently installed, with minimum modification, a 4t gantry crane bought on e-bay!

Our hosts, Kevin Bywater and James Stokes were a mine of information and managed to answer questions from all directions - or found the appropriate person to pass them on to! A most enjoyable and interesting visit.

Our thanks go to G's for hosting us and providing us with refreshments at the start of our visit and transport to the field locations

Tim Chamen and Alan Plom

LONG SERVICE CERTIFICATES

Alan J H McKenzie, CEmv, MIAgrE

VERY many thanks for your kind letter and for my 35 years Long Service Certificate. I was most delighted to receive this and also to see the entry in *Landwards*.

Although it must be right, it certainly does not seem so many years ago since I first became a member! What I am most sure of is that membership has added greatly to my career, from supporting my initial application to join the Civil Service in the mid-seventies to being a continuing source of professional information through the various posts I held in that sector over the years.

I remained with the Civil Service and retired from there as Head of Resources and Planning for the Scottish Executive's property portfolio. During my work with

property and involvement with external organisations through benchmarking groups, I found the inclusion of environmental issues in Landwards particularly valuable as the environmental aspect of management played an ever-increasing and vital part of my work, and in which I was further supported through being awarded a CEnv in 2005.

I have always believed that membership of the Institution is essential for anyone working under the core disciplines of agriculture, horticulture, forestry, environment and amenity. I also believe that *Landwards* plays a key role in drawing together the members from across all specialisms, and in tackling the challenging local and global issues around its subject fields.

It also provides a strong and highly readable corporate link especially for those, like myself, who are not too geographically close to the greatest of activity in the larger Branches and Headquarters.

I very much look forward to continuing membership of the Institution

Geoffrey Wakeham, CEng, MIAgrE

AFTER more than fifty years working in and around Agricultural Engineering one might ask what prompted me to choose this career path.

Why didn't I end up in farming where all my roots were firmly planted or in the Merchant Marine, my Father's profession? The first was rejected because cows were smelly and seemed to need attention seven days a week, fifty-two weeks a year.

The Merchant Navy never really entered my mind; I was sea sick if I stepped off solid ground. Also UK commercial shipping was in serious decline when decisions needed to be made about post school plans.

At an early age I had been fascinated by the enormous flat bed grain drier with its hand fed coal fired furnace and the clouds of billowing steam on a cold September morning. The thrill of sitting on the deck of the farm combine as my Maternal Grandfather blasted over the driver's head at fleeing rabbits built on my excitement; far better than the Wild West and cowboys and Indians. The farm forge, which doubled up as a tractor repair shop, was a warm haven during winter holidays. A Field Marshall piston the size of a small bucket impressed.

As an aside however, I do remember the field behind our house being ploughed with the two remaining draught horses on the farm because it was the only way to pass through the narrow gap in the WWII barbed wire defences surrounding the field.

I still have a 1955 *Farmers and Stockbreeder Diary* with my Paternal Grandfather's name on the front and remember being fascinated by the pages related to farm machinery. No combine details, but a binder could cut a field at 2 acres per hour.

As with many of my generation Meccano helped determine my future direction. It was finally settled when my schools careers master presented me with the chance to take up an apprenticeship at Ransomes, Sims and Jefferies in Ipswich. The fact that the Personnel Manager was ex Merchant Marine meant I had an easy interview.

On the third of September 1956 I started my four year apprenticeship, joining an existing body of some 120 potential fitters and turners, foundry staff and technicians, designers and technical support engineers. Most would have been local boys but some came from around the country or even the dying embers of the Empire; not a girl in sight.

During those four years I spent time gaining practical experience in the Foundry, Forge, Truck, Tractor, Grass Machinery, Harvesting and Tillage Works. Time was spent in Laboratories, Production Planning, Factory Layout and Design Departments.

In total I was supported through seven years of education, spending a year at Writtle Agricultural College in the early sixties followed by two years of Industrial Administration to give me the academic requirements to become a full Member of the Institutions of Mechanical Engineers and Agricultural Engineers in 1968.

During the sixties I spent my time working within the Research, Product Development and Testing area of the company and was involved in work on all the core product ranges. In 1969 I was appointed Chief Development Engineer. Projects within the department included Hydrostatic Transmissions, Ground Effect Machines, and Thyristor DC control systems for fork trucks, Electric cars, high speed lawn mowing, Fertilizer Metering Systems, Grain Drying and high speed cultivation.

We investigated problems due to natural frequency vibration and noise. We carried out High Speed photography and strain gauge testing.

It was not till I started teaching fatigue failure at Harper Adams in the nineties that I realised how close we came to devising systems that could accurately determine product life. Such systems now form the basis of fatigue life predictive software.

I managed to get to combine in the rain in Scotland, disc plough in Mexico and work inside a functioning grain drier in Italy. Exciting times that provided me with a wealth of experience and stories that helped me cope with twenty odd years of teaching at the other end of my full time paid employment.

In 1973 an opportunity to work with Sparex Ltd developed from meeting them at the Smithfield Show. I spent eight years in Devon working with Sparex Ltd and later with Exmouth Garden Products. A very different working environment driven by marketing needs in young dynamic organisations.

With Sparex Ltd, as General Manager, I was responsible for buying, product assembly, warehousing and dispatch departments. As a director, I became closely involved in setting up Spenco Ltd the manufacturing arm of Sparex and devised a costing system that would be recognised today as Activity Based Costing.

We loved Exmouth and Devon but my skills and expertise did not match the demands of organisations driven by marketing rather than technology. As with any work experience, good or bad, one learns a lot about both business and oneself. Once again this came in invaluable when I joined Harper Adams on the 1st April 1981.

During these fifty years I have maintained a close connection with the Institution serving on branch, conference and membership committees.

I continue to help where I can.

Between 2003 and 2009 I acted as a trustee on the Douglas Bomford Trust and found this one of the most rewarding periods of my career.

IS there a sixty year certificate?

If so, in 2020, all being well I will write about my time at Harper Adams. At this point in time sufficient to say, for a period I ended up editing the machinery related pages in the *Farmers Weekly Diary*, an undreamt of achievement when I was sixteen.

I also devised a protocol for students to predict fatigue life in welded joints based on limited assumptions and data sets. A pity this was not available to me some forty years earlier.

Would I recommend Agricultural Engineering to a sixteen year old?

If they enjoy the countryside, are happy to get their hands dirty, revel in the power of maths and science and want to make a real difference to the future world the answer is a very definite yes.

Membership changes

Admissions

A warm welcome to the following new members:

Member

Ardolino M (Hants)

Associate Member

Ashby M C (Norfolk)
Bartle D (Notts
Brown J A (East Yorks)
Debenham P (Norfolk)
Grey C J (Cornwall)
Halliday D (Lincolnshire)
Marriott D (Norfolk)
Martin R A (Cornwall)
Payn A (IoW)
Pinfold A (Oxon)
Plewes J M (Lincolnshire)
Richings J S (Berkshire)
Skipper M S (Norfolk)
Webb A P (Norfolk)

Student

Reaseheath College

Baron D

Re-admissions

May P E (Lincolnshire)
Smith J R (Norfolk)
Pengelly D P (Cornwall)
Dodsworth A K (East Yorkshire)
Petts R C (Surrey)

Deaths

Wilson T J (East Yorks)
Jack R G F (Peebleshire)

Transfers

Member

Dodsworth A K (East Yorkshire)

Associate Member

Morris B A (Yorkshire)

Associate

Walsh M (Ireland)

Engineering Council

Congratulations to the following members who have qualified as Engineering Technician, entitling them to use the desig-natory letters EngTech after their names.

Registrations

Ashby M C (Norfolk)
Ardolino M (Hants)
Bartle D (Nottinghamshire)
Brown J A (East Yorkshire)
Debenham P (Norfolk)
Grey C J (Cornwall)
Halliday D (Lincolnshire)
Marriott D (Norfolk)
Martin R A (Cornwall)
Payn A (IoW)
Pinfold A (Oxfordshire)
Plewes J M (Lincolnshire)
Richings J S (Berkshire)
Skipper M S (Norfolk)
Webb A P (Norfolk)

Academic members

Askham Bryan College
Askham Bryan
York
YO23 3FR

Barony College
Parkgate
Dumfries, DG1 3NE

Bicton College
East Budleigh
Budleigh Salterton
Devon
EX9 7BY

Brooksby Melton College
Asfordby Road
Melton Mowbray
Leics
LE13 0HJ

Coleg sir Gar
Pibwrlwyd Campus
Pibwrlwyd
Carmarthen
SA31 2NH

Cranfield University
Cranfield
Bedfordshire
MK43 0AL

Easton College
Easton
Norwich
Norfolk
NR9 5DX

Greenmount Campus
CAFRE
22 Greenmount Road
Antrim
Northern Ireland
BT41 4PU

Harper Adams University College
Newport
Shropshire
TF10 8NB

Institute of Technology Tralee
Clash
Tralee
Co Kerry
Ireland

Myerscough College
Myerscough Hall
Bilsborrow
Preston
Lancashire PR7 0RY

Oatridge Agricultural College
Ecclesmachan
Broxburn
West Lothian
EH52 6NH

Pallaskenry Agricultural College
Co Limerick
Ireland

Plumpton College
Ditchling Road
Lewes
East Sussex
BN7 3AE

Reaseheath College
Reaseheath
Nantwich
Cheshire
CW5 6DF

Royal Agricultural College
Cirencester
Gloucester
GL7 6JS

Scottish Agricultural College
SAC Ayr Campus
Auchincruive Estate
Ayr
KA6 5HW

Sparsholt College
Sparsholt
Winchester
Hampshire
SO21 2NF

Willowdene Training Ltd
Chorley
Bridgnorth
Shropshire
WV16 6PP

Wiltshire College - Lackham
Lacock
Chippenham
Wiltshire
SN15 2NY

Commercial members

Agricultural Engineers Association (AEA)
Samuelson House,
62 Fodder Way, Hampton
Peterborough,
PE7 8JB

British Agricultural & Garden Machinery Association (BAGMA)
Entrance B, Level B
Salamander Quay West,
Park Lane, Harefield
Middlesex,
UB9 6NZ

Alvan Blanch Development Co Ltd
Chelworth
Malmesbury
Wiltshire
SN16 9SG

Autoguide Equipment Ltd
Stockley Road
Heddington
Calne, Wiltshire
SN11 0PS

Bomford Turner Limited
Salford Priors
Evesham
Worcestershire
WR11 5SW

David Ritchie (Implements) Ltd
Carseview Road
Suttieside
Forfar, Angus,
DD8 3EE

Douglas Bomford Trust
Barton Road
Silsoe, Bedford
MK45 4FH

FEC Services
Stoneleigh Park
Kenilworth Warwickshire CV8 2LS

Garford Farm Machinery Ltd
Hards Lane
Frognall
Deeping St James
Peterborough
PE6 8RR

Huntaway Consulting
Ivy Cottage
Torlundy
Fort William
Inverness-shire
PH33 6SW

John Deere Ltd
Harby Road
Langar
Nottinghamshire NG13 9HT

Shelbourne Reynolds
Shepherds Grove Ind. Est.
Stanton
Bury St Edmunds
Suffolk
IP31 2AR

SSAB Swedish Steel Ltd
De Salis Court
De Salis Drive
Hampton Lovett
Droitwich
Worcestershire
WR9 0QE

White Horse Contractors Ltd
Lodge Hill
Abingdon
Oxfordshire
OX14 2JD

Landwards
Agriculture • Horticulture • Forestry • Environment • Amenity

We want to hear from members.
Send branch reports or correspondence to:

The Editor
25A New Street, Salisbury, Wiltshire,
SP1 2PH.

Email:
chris@nelsonpublishing.co.uk

Or the IAgrE Communications Officer Marion King on *comms@iagre.org*

Long service certificates

Name	*Grade*	*Date of anniversay*
60 years		
Roy Hewitt **Davies**	CEng, FIAgrE	29 Sep 20100
35 years		
Irenaeus Leo A **Ysselmuiden**	FIAgrE	10 Jul 2010
John Terence **Chambers**	MIAgre	9 Sep 2010
Clive Leonard Thomas **Bound**	AMIAgrE	9 Sep 2010
Jeffrey John **Sanderson**	IEng, MIAgrE	9 Sep 2010
25 years		
Clive Andrew **Morse**	CEng, MIAgrE	12 Jul 2010
Simon John **Bamford**	CEng, MIAgrE	24 Jul 2010
Cyril Arthur **Dyke**	FIAgrE	1 Aug 2010
Stephen John **Scoones**	MIAgrE	8 Aug 2010
Roger Matthew **Hay**	CEng, HonFIAgrE	26 Sep 2010

EVENTS

IAgrE Branch Meetings and Events

Scottish Branch
Wednesday 22 September 2010 - tbc
MICRO AND PUMP STORAGE HYDRO
Venue: Cruachan and SAC Crianlarich
For further information contact Branch Secretary David Blackburn
Tel: 01975 563168 Email: dblackburn62@hotmail.com

Western Branch
Wednesday 29 September 2010 starting 7pm
JCB POWER SYSTEMS - THE DESIGN AND DEVELOPMENT OF THE JCB 444 DIESELMAX ENGINE
Speaker: Bob Womersley, Chief Engineer, JCB Power Systems
Venue: Lackham College, Chippenham, SN15 2NY
The talk will cover the design, development and evolution of the JCB Dieselmax engine from a clean sheet of paper and towards the latest Tier 4i Ecomax derivative. Outlining the specific design challenges for a power unit optimised for JCB machinery, plus other equipment from the wider mobile market, with reference to the various technologies used to give high performance, refinement, durability, fuel efficiency and low emissions. For further information please contact the Branch Secretary, Rupert Caplat, or Chairman, Nick Handy.
Tel: 01235 522828 Email: rupert.caplat@lindehydraulics.co.uk

South East Midlands Branch
Monday 11 October 2010, 19:30
ROBOTICS
Speaker: Simon Blackmore, Agribots Ltd
Venue: Maulden Church Hall, Maulden, Beds
The speaker will update us on automation technologies that are being developed worldwide to improve the efficiency of field practices. These have unearthed new opportunities to service agronomic requirements and are using technological developments such as SSMs. For further information contact Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

West Midlands Branch
Tuesday 12 October 2010, 7.30pm
VISIT TO RASE LIBRARY
Venue: RASE, Stoneleigh Park, CV8 2LZ, Warwickshire
This facility contains artefacts and archive material relating to most Land Based Industries. It also includes historic paintings and prints. There is a collection of Implement and Machinery Review (1876–1956). Apart from general interest, this Library is most useful for people carrying out specialist historical research work and is only open by appointment.
For further information contact: William Waddilove
Tel: 02476 544255 Email: william@waddilove.co.uk

Ireland Branch
Thursday 14 October 2010, 8pm
Venue: Farm Tractor and Machinery Trade Association headquarters, Unit 3, Road D, Toughers Business Park, Newhall, Nass, Co. Kildare
For further details please contact the Branch Secretary Michael Ryan
Tel: 00 353 61 393 100 Email: pallaskenryengineering@eircom.net

East Anglia Branch
Tuesday 26 October 2010 starting 1900
NH2 AND ENERGY INDEPENDENT FARMING
Speaker: Mark Howell, New Holland
Venue: Diss Golf CLub, Stuston Common, Diss, Norfolk IP21 4AA
Mark Howell is Harvest Marketing Support Specialist for Forage Harvesters, Balers and NH2, New Holland. The Energy independent farm concept, presented by New Holland at the beginning of 2009, aims to make farms free of external energy suppliers. It involves the farmer producing his own supply of compressed hydrogen. This is used to produce electricity to pwer the New Holland NH2 tractor using fuel cells. For further information please contact the Branch Secretary: Michael Bennett
Tel: 01760 725990 Email: mike@bennettcropstorage.co.uk

South East Midlands Branch
Thursday 04 November 2010 starting 7pm
NH2 AND ENERGY INDEPENDENT FARMING
Speaker: Mark Howell, New Holland
Venue: The Forest Centre, Station Road, Marston Moretaine, Bedford MK43 0PR
As per East Anglia meeting above. For further details contact the Branch Secretary John Stafford
Tel:01525 402229 Email: john.stafford@silsoe-solutions.co.uk

East Midlands Branch
Thursday 4 November 2010, 19:00
GARFORD FARM MACHINERY LTD
Venue: Garford Farm Machinery, Frognall, Deeping St James, Peterborough PE6 8RR
Specialising in row crop equipment Barford are well known for their unique range of Victor sugar beet harvesters and in recent times the Robocrop Precision Guided Hoe, a product which has for many revolutionised crop production techniques. For further information contact David Wilkinson.
Tel: 01205 480431 Email: debbiewilkinson60@btinternet.com

West Midlands Branch
Tuesday 9 November 2010, 7.30pm
VISIT TO BOMFORD TURNER
Venue: Salford Priors, near Evesham, WR11 8SW
It is hoped that Geoff Davies, Managing Director, will be present to outline and update members on the current product range.
Bomford Turner is part of the larger Alamo Group, which includes McConnell, Spearhead and Twose in the UK.
Pre-booking for this visit is necessary.
For further information and to book a place please contact Branch Secretary: Michael Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

Scottish Branch
Wednesday 10 November 10 - tbc
PELAMIS AND COCKENZIE POWER STATION
Venue: Commercial St, Leith and Cockenzie
For further information contact Branch Secretary David Blackburn
Tel: 01975 563168 Email: dblackburn62@hotmail.com

Northern Ireland Branch
Thursday 18 November 2010
LTA
Speaker: John Palmer (Claas), Chris Whetnall (IAgrE)
Venue: tbc

The date of this meeting and the speakers are confirmed. Other details to be confirmed. For further details contact the Branch Secretary Ian Duff
Tel: 028 8673 6944 Email: duffi@iagre.biz

West Midlands Branch
Tuesday 7 December 2010, 7.30pm
BIOCHAR
Venue: The Friends Meeting House, 37 Maidenhead Road, Stratford-upon-Avon, CV37 6XT
Dr. Sakrabani from Cranfield University will outline the research work he is carrying out on Biochar. This research is supported by the Douglas Bomford Trust. Put simply, Biochar is a means of carbon capture into charcoal and inactivation. It can be used as a means of improving soil fertility and, at the same time, improving the atmosphere and possibly reducing global warming.
For further information please contact Branch Secretary: Michael Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

South East Midlands Branch
Monday 13 December 10, 19:30
REDUCING DECIBELS FROM MACHINES AND MAKING A NOISE ABOUT AG ENG
Speaker: Tony Turner, GreenMech Ltd
Venue: Maulden Church Hall, Maulden, Beds
For further information contact Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

Other Events:

12 October 2010 to 14 October 2010
Energy Institute
ENERGY IN TRANSITION
Venue: London
A series of events to explore the way in which we define and meet future energy demands. Events looking at business models, energy storage, the cummunity approach, fixing fuel proverty, smart homes for the future and meeting 2020 targets. It will bring together industry, government and academia to debate the key issues and solutions and provide opportunities to share knowledge and good practice. Visit website for further information.
Tel: 0207 467 7174 Email: events@energyinst.org
Web: www.energyinst.org

Wednesday 20 October 2010
Cranfield University
UK FOOD PRODUCTION SYMPOSIUM 2010 - BUILDING ROBUST SUPPLY NETWORKS
Speaker: Sir Donald Curry, Katrina Williams, Caroline Willetts
Venue: Cranfield University
The stability of food supply can have long term impacts on food security. Disruption of supply through price fluctuations or changing environmental constraints can have an impact on producers and consumers through poor investment strategies in terms of domestic production and food imports. This conference will discuss how food supply networks can develop better long-term strategies to improve productivity through more effective operations management. To book please call or register on line
Tel: 01234 754176 Web: www.cranfield.ac.uk/sas/foodsupply

Tuesday 26 October 2010
PCSA International
RENEWABLE ENERGY IN THE PUBLIC SECTOR - LEADING THE WAY TO ZERO CARBON
Venue: The Barbican, London
The new coalition government intends to implement measures for a low carbon and eco-friendly economy. Renewables are key to the strategy to tackle climate change and deploy cleaner sources of energy, and individuals and communities must be encouraged to generate their own energy locally, through renewable energy resources such as solar panels and wind turbines. This conference presents an ideal opportunity for delegates from both public and private sectors to learn how to achieve targets, save and make money with renewables. To attend, register on-line. Enquires to Mark Almond.
Tel: 0161 8327387 Email: malmond@publicservice-delegates.co.uk
Web: www.publicserviceevents.co.uk/event/programme.asp?ID=150

Tuesday 26 October 2010
Environmental Sustainability KTN and Society for the Environment
INNOVATING FOR A SUSTAINABLE FUTURE - INNOVATION, PROFESSIONALISM AND SUSTAINABLE GROWTH
Venue: WWT London Wetlands Centre, Queen Elizabeth's Walk, London SW13 9WT
This workshop, organised by the Environmental Sustainability KTN and the Society for the Environment, will explore opportunities created by combining innovate thinking practices with environmental professionalism to deliver sustainable value to business. It is designed for environmental practitioners and others seeking to acquire knowledge and tools to be better equipped to succeed in the low carbon economy.
For further information and to register visit the website.
Web: http://esktnsocenv.eventbrite.com

Wednesday 24 November 10 starting 7.30pm
EMESP
23RD ANNUAL JOINT INSTITUTIONS PRESTIGE LECTURE: BLOODHOUND SSC - THE ULTIMATE ENGINEERING CHALLENGE
Speaker: Richard Noble (Project Director), Dave Rowley (Education Programme Director)
Venue: The Albert Hall Conference Centre, North Circus Street, Nottingham NG1 5AA
The Bloodhound SSC engineering team is endeavouring to raise the world land speed record by a staggering 30% to 1050 mph and at the same time inspire the next generation of scientists and engineergs in schools and colleges throughout the UK. The presentation will include all aspects of the research, design and build of the car, plus the search for a suitable run location. This year's lead sponsor is the Institute of Measurement and Control. Applications forms will be included in Branch Members copies of Landwards in September. Alternatively see EMESP website.
Web: www.emesp.org.uk

Wednesday 19 January 2011 to 20 January 2011
Lincolnshire Agricultural Machinery Manufacturers Association
LAMMA SHOW 2011
Venue: Newark & Nottingham Showground, NG24 2NY .
Web: www.lammashow.co.uk

If anyone is interested in car sharing to any of these events you can liaise with fellow members by using the discussion forum in the Members Only section of the IAgrE website - www.iagre.org/memaccess.php

Full details of forthcoming events can be found on www.iagre.org/eventselect.php

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