

# Landwards

Agriculture • Horticulture • Forestry • Environment • Amenity

# 75

## IAGRE RESPONSE TO FORESIGHT REPORT

Mark Kibblewhite says this crisis will provide a challenge and great opportunity for agricultural engineers



## 2013 LANDWARDS CONFERENCE AND AWARDS

Safety agenda and IAgRE Award winners

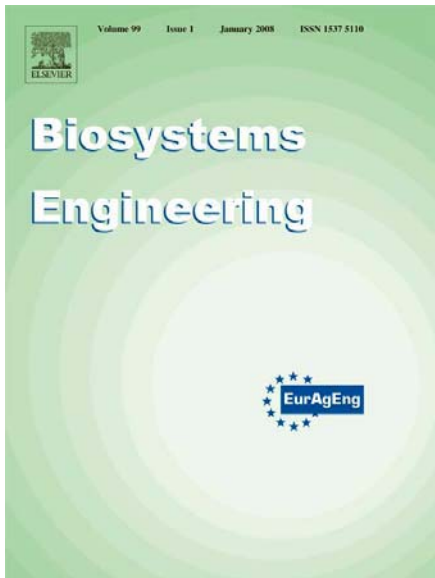
## THANKS CHRIS

Retirement dinner says thanks to retiring CEO



# Biosystems Engineering

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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 114, Issue 2, February 2013, Pages 146-156**

Theoretical analysis and finite element simulation of a rice kernel obliquely impacted by a threshing tooth

**Xu Lizhang, Li Yaoming, Ma Zheng, Zhao Zhan,  
Wang Chenghong**

Jiangsu University, Zhenjiang 212013, China

Impact damage is the main form of rice threshing and it is also a significant cause of rice in-jury. Based on contact mechanics, models of the compressed displacement and the largest pressure distribution were established for the case when the threshing tooth obliquely impacts against the rice kernel. A critical velocity formula for impact damage was developed. A computer-aided design model of a rice kernel comprising of three layered ellipsoids was established. Using LS-DYNA software, the impact between the threshing tooth and the rice kernel was simulated and analysed. The simulation showed that the rice husk was subjected to ten-sile stresses. Tensile stress was a maximum at the front of the contact zone and shifted continuously. The entire kernel rolled during impact. The critical damage velocity for the kernel, corresponding to the critical von Mises stress was 29.5 m s<sup>-1</sup>, which was in agreement with experimental results.

**Volume 114, Issue 3, March 2013, Pages 214-222**

Determination of the influence of size and position of knots on load capacity and stress distribution in timber beams of *Pinus sylvestris* using finite element model

**Vanessa Baño, Francisco Arriaga, Manuel Guaita**

CETEMAS, Forest and Wood Technology Research Centre, 36820 Grado, Asturias, Spain

Technical University of Madrid, Ciudad Universitaria, 28040 Madrid, Spain

University of Santiago de Compostela, 27002 Lugo, Spain

The finite element method was used to investigate the influence of size and position of cylindrical knots on load capacity considering the elastic-plastic constitutive law of Scots pine timber. A finite element model for a four points bending test was generated considering four different knot conditions in the beams: without knot; knot as a hole; live knot and spring contact between the knot and the beam. For knots placed in the compression side, the live-knot model best simulates real behaviour; however, when located in the tension side, the hole-model was most reliable. The bending strength of the beam, including different sizes and positions of knots, were presented in simplified diagrams and compared with clear timber strength. The results showed the influence of knots and their local grain deviation on stress distribution. The model allowed the ranking of bending strength of the beams caused by knots as a combination of three quantified indexes: tension parallel and perpendicular to the grain and shear.

**Volume 114, Issue 4, April 2013, Pages 358-371**

Special Issue: Sensing Technologies for Sustainable Agriculture.

Twenty five years of remote sensing in precision agriculture: Key advances and remaining knowledge gaps

**David J. Mulla**

Dept. Soil, Water and Climate, University of Minnesota, USA

Remote sensing applications in precision agriculture began with sensors for soil organic matter, and have quickly diversified to include satellite, aerial, and hand held or tractor mounted sensors. Wavelengths of electromagnetic radiation initially focused on a few key visible or near infrared bands. Electromagnetic wavelengths in use range from the ultraviolet to micro-wave portions of the spectrum, enabling advanced applications such as light detection and ranging (LiDAR), fluorescence spectroscopy, and thermal spectroscopy, along with more traditional applications in the visible and near infrared portions of the spectrum. Spectral band-width has decreased dramatically with the advent of hyperspectral remote sensing, allowing improved analysis of specific compounds, molecular interactions, crop stress, and crop bio-physical or biochemical characteristics. A variety of spectral indices now exist for various precision agriculture applications. Spatial resolution of aerial and satellite remote sensing imagery has improved from 100's of m to sub-metre accuracy, allowing evaluation of soil and crop properties at fine spatial resolution at the expense of increased data storage and processing requirements. Temporal frequency of remote sensing imagery has also improved dramatically. There is considerable interest in collecting remote sensing data at multiple times in order to conduct near real time soil, crop and pest management.



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**Landwards**  
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**Can we be the Mouse That Roared?**

I AM sure that it is not a unique slogan, but there is (or was) a car dealership with premises near the Twickenham rugby stadium with the slogan writ large "Nice people to do business with".

It is unarguably much more pleasurable to do business with those with whom you can have a satisfying rapport - even though they may be fleecing you left, right and centre with a smile on their face!

Our has often been dubbed 'the friendly industry' - and that was evident throughout the splendid dinner held at Cranfield last month to mark Chris Whetnall's near-retirement.

Smiles abounded, bonhomie laced the air, everyone knew everyone else - and there was a warm glow of camaraderie.

But, I do wonder sometimes whether we are 'too nice' for our own good?

Far be it for me to suggest a measure of smugness, but the fact remains that we play an enormous and vital role in whole swathes of British society from food production to the upkeep of open spaces and forests.

Yet we lack identity.

The Foresight report ignored the role of agricultural engineering in its initial publication and we had to scabble for that to be put right by publishing our own addendum.

A recent Parliamentary committee set up to consider food security and future food production failed to include anyone from the engineering section on its advisory board.

And yet, skilled people throughout the industry are undergoing incredible research working towards maximising the output of food from a diminishing land-bank.

Major supermarkets cannot get fresh food in such timely manner every day to meet the needs of their millions of consumers without sophisticated, reliable and cutting-edge machinery.

Ours is problem of size. 25,000 to 30,000 people are employed in the land-based engineering sector - that's just a third of one of our most successful retail companies (John Lewis who employee 76,500 people).

Perhaps we need to make more noise - and perhaps take our inspiration from that Peter Sellers classic The Mouse That Roared - not by threatening to invade the US - but certainly Whitehall for a start.



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*The views expressed in Landwards editorial are those of the Editor, and do not necessarily reflect those of the Institution*



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## NEWSUPDATE

### IAGrE Chief Executive

**FOLLOWING** the decision of IAGrE Chief Executive, Chris Whetnall, to retire during 2013, the Institution appointed Ian Adams as CEO Designate last February.

The plan was that he would work in tandem with Chris Whetnall for three or four months before fully taking over the post.

However, in April, Mr Adams decided for personal and family reasons that he was unable to take up the post and tendered his resignation.

The IAGrE Executive is therefore re-opening the application process to appoint its new Chief Executive - and in the meanwhile, Chris Whetnall has agreed to stay on until his replacement has been appointed.

To assist him during this extended tenure, and to stand-in where necessary, he will be supported in his role by Peter Leech.

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### New President and Chairman of the Farm Equipment Council

## AEA elect senior representatives

AT the recent Agricultural Engineers Association (AEA) Conference Joe Bell, Managing Director of Kverneland Group UK Ltd, was elected as President, whilst Richard Fox-Marrs was elected as Chairman of their Farm Equipment Council.

Joe Bell has been a member of the Farm Equipment Council for the last 4 years and Chairman for the last two, and a member of the AEA Board for 5 years contributing to the policy direction for the organisation.

Joe started his career in the agricultural industry in 1984 with Ferrag Ltd and was part of a management buyout team in 1992. In 1998 Ferrag was bought by Kverneland AS. Joe was appointed MD of Kverneland Group UK Ltd in March 2004.

Joe lives in Wilmslow, Cheshire and is married to Carolyn, together they have 4



L-R: Joe Bell, AEA President and Richard Fox-Marrs, Chairman, Farm Equipment Council

children. His outside interests include long distance running and, having been born in Liverpool, he supports the team that plays at Goodison Park.

Richard joined JCB in 1991 after a short period with Standen Engineering.

Having worked in numerous agricultural sales and marketing roles at JCB, Richard relocated to the USA in 2001 to establish JCB Agriculture in North America in the position of General Manager. In 2004 he

returned to the UK to take up the position of Managing Director of the Loadall Business Unit. Following on from that, Richard took up the position of Managing Director of JCB Agriculture in 2009, being responsible for Agricultural sales worldwide, along with the Fastrac Business Unit.

Richard also serves as an AEA board member and represents the UK on the CEMA Board.

## Peter Leech retires after 42 years with John Deere

PETER Leech, Immediate Past President of IAGrE, has retired from John Deere, after a distinguished career with the company spanning nearly 42 years.

Peter joined John Deere Limited at Langar, Nottingham in 1971, straight from Kesteven Agricultural College, where he studied agricultural engineering. At this time the company was less than six years old and held a three per cent market share. Following initial employment as a service trainee and area service manager covering the East Midlands and Republic of Ireland, he moved to the company's Mannheim tractor factory in Germany as senior service engineer, responsible for the Americas and the UK, where he was deeply involved in the 40 Series tractor launch.

He then returned to the UK branch, initially as division service manager, then branch service manager and branch

customer support manager for the UK and Ireland, with increasing responsibilities for service, parts, aftermarket marketing and training. During this time a new training centre was established at Bingham and subsequently at the newly designed Langar headquarters, and the award-winning Ag Tech apprentice service technician training programme was launched, while parts sales grew at a double digit rate.

Peter's other notable achievements during this time included the development of the service evaluation process, which was the forerunner of many of John Deere's dealer development activities, and the UK PowerGard equipment maintenance and repair programme. He was also responsible for student and graduate trainee hiring in the UK and Ireland for many years.

Since 2010, Peter has led Deere & Company's training

delivery organisation as regional training manager for Region 2 (Europe, Africa, Near & Middle East and the CIS), delivering training programmes to Deere's 26,000 dealer employees across the region through an organisation of seven training centres and a large team of instructors. He also successfully launched the new Region 2 management trainee programme in 2012.

As chairman of the AEA's training & education committee, Peter was instrumental in leading industry colleagues in the development of the Landbased Technician Accreditation scheme (LTA). For many years, he also actively participated in IAGrE, and served as its president from 2010 to 2012. His many contributions to IAGrE were recognised in 2005 by the Award of Merit and in 2013 by an Honorary Fellowship,



which was presented at the Institution's annual conference at Harper Adams University in March.

Although he has now left John Deere (on May 3rd), Peter Leech plans to continue doing consultancy work and other projects within the land-based engineering sector.

# Harper Adams welcomes first director of Soil & Water Management Centre

## Professor Shane Ward takes up role

BIOSYSTEMS engineer, Professor Shane Ward, has been appointed as the first Director of the Soil and Water Management Centre at Harper Adams University.

Professor Ward, who specialises in integrating engineering with life sciences, will also take up the newly-created role of Professor of Soil and Water at the university in Shropshire.

Having developed collaborative research programmes with industry and led several national and EU-funded projects, Professor Ward is well established within research and innovation.

He has been responsible for developing a number of centres of excellence at University College Dublin, including the Peat Technology Centre, the Bioresources Research Centre and BioE - which brings innovative new concepts from university research to the market.

Commenting on his new appointment, Professor Ward, previously Head of the School of Agriculture Food Science and Veterinary Medicine at University College Dublin, said: "Soil is the base resource for the agri-food and bioresource sector, and is fundamental to the sustainability of agri-food and bioresource production systems.

"Harper Adams University is ideally positioned to play a leading role in the national effort to address the requirements of modern agricultural production systems in respect to soil and water; and how to manage our soils within the context of ongoing extreme weather events.

"The range of expertise within the university spans the complete spectrum, from soils to farm-gate and beyond; key areas include agricultural engineering, soil and vehicle interaction, soil management, precision agriculture, crop science, bio-energy, animal husbandry, agricultural economics and 'smart system' applied to agri-

food and bioresource production systems.

"The university has a 550 ha production and research farm, which enables it to evaluate and apply research at farm level. The Soil and Water Management Centre will facilitate staff at Harper Adams to undertake world-class research while also interacting with industry and the wider community.

"This is a flagship university-industry collaboration effort providing a national hub for the sector and facilitates the delivery of innovation on a scale necessary to address the national challenges in this domain.

"The UK can become a world leader in soil-water management systems, which is hugely important in the context of the increasing demands for high quality food, recent bad weather events and the need to reduce flooding risk and waterways pollution."

The Soil and Water Management Centre aims to act as a national source of information and expertise, a forum for establishing improvement priorities and a focus for training and applied research.

Announcing the appointment, Professor Peter Mills, Harper Adams Deputy Vice-Chancellor, said, "Better appreciation of and care for our soil and water resources is crucial if we are to secure the sustainable improvements in farming and ecosystem efficiency we so clearly need.

"We are delighted Professor Ward will be leading the national effort to achieve these through our Soil and Water Management Centre. Widely respected, knowledgeable and experienced as he is, he's the ideal person to take on this exciting role."

The Centre was established by Harper Adams University in conjunction with industry partners - Agrii, BASIS, Challenger, The Coop Farms, GrowHow, Interagro, Michelin, NRM, and



“ . . . This is a flagship university / industry collaboration, providing a national hub for the sector ”

Professor Shane Ward

Vaderstad, with support from The Rothschild Foundation.

Welcoming Professor Ward on behalf of the industry partners, Andrew Richards of Agrii, and Chairman of the Soil and Water Management Centre, said: "Since we first came together two years ago, the need for a dedicated centre of applied soil and water management information, expertise and training has become more and more apparent to everyone, including Government.

"Professor Ward's agricultural, biological systems and engineering expertise, his organisational experience and his enthusiasm and drive are just what we need at the sharp end of our work to help farmers across the UK address their current and future soil and water management challenges."

Harper Adams University

## Princess Royal to be first Chancellor

HARPER Adams University has appointed HRH The Princess Royal as its first Chancellor.

The Chancellor is the ceremonial figurehead of the University, and may participate in conferring degrees at graduations as well as acting in an ambassadorial capacity for the institution, nationally and internationally.



The Princess Royal has been an Honorary Fellow of Harper Adams since 2006 and has visited the University on several occasions to formally open a number of new facilities including teaching accommodation and the Regional Food Academy.

During her last visit, in November 2012, The Princess Royal Hall, a new residential block for students, was named in her honour.

Dr David Llewellyn, the University's Vice-Chancellor, said, "We are delighted that The Princess Royal has accepted our invitation to continue her association with Harper Adams by becoming our first ever Chancellor.

"The Princess Royal has been immensely supportive of our work during previous visits and news of her appointment has been warmly welcomed by our staff and students."

A date for the formal installation of the new Chancellor is expected to be set later in 2013.

# First award of Woodland Carbon Code

## Validation for a number of projects

AN important milestone in efforts to promote woodland planting to combat climate change has been reached with the first award of Woodland Carbon Code group scheme validation.

The Woodland Carbon Code is a voluntary United Kingdom standard which helps to ensure that 'carbon forestry' projects really do deliver the carbon benefits which their promoters claim.

And the first award of validation to a number of woodland projects brought together as a group means that potentially significant cost savings will become possible for those who want to plant trees to compensate for their greenhouse gas emissions.

Until now, validation has been open only to single new woodlands, but following the success of the group scheme pilot, group validation will shortly be made available to all applicants. Dr Vicky West, a climate change analyst with the Forestry Commission, which administers the carbon code, explained,

"When we launched the Woodland Carbon Code in 2011 we recognised that the cost of gaining validation might be a limiting factor for some potential applicants, especially those creating small woodlands. We have therefore developed a group validation option whereby a number of woodland projects can be brought together to

apply for validation as a group, with the potential to achieve significant cost savings.

"We expect this will make validation attractive to a greater range of owners of smaller projects.

"The 2009 Read Report on forests and climate change said that if an extra four per cent of the UK's land were planted with new woodland over the next 40 years, it could be locking up 10 per cent of its predicted greenhouse gas emissions by the 2050s.

"We therefore hope this will help to stimulate more woodland planting across the UK, not just for the carbon benefits, but for all the social, economic and environmental benefits they provide."

The group of 11 woodland projects which were awarded Carbon Code validation are all owned by a single owner, Buccleuch Estates, in Dumfries & Galloway, the Scottish Borders and Northants. Jim Colchester, Woodlands Enterprise Manager of Buccleuch Estates, commented, "We were delighted to help develop the group validation scheme by taking part in this pilot. It will help to open Code validation to many participants looking to create smaller carbon woodlands who might otherwise not be able to contribute to combating climate change and improving the environment in this very worthwhile way."

The four other groups of



Validation pilot - Crairieknowe



Validation pilot - Holm of Drumlanrig

projects taking part in the pilot are expected to be awarded validation soon, and Dr West said group validation is expected to be made available to all comers during May.

Owners of WCC-validated projects may sell the rights to the carbon expected to be absorbed by their woodlands to investors as a means of compensating for greenhouse gas emissions. They may quote their validation, and use the code logo, as a reassurance to investors that their projects will achieve the carbon benefits

claimed. It is also an assurance that the woodlands will be sustainably managed to the high standards set out in the UK Forestry Standard and its associated Climate Change Guidelines for Forestry.

Further information is available from [www.forestry.gov.uk/carboncode](http://www.forestry.gov.uk/carboncode) by emailing [climatechange@forestry.gsi.gov.uk](mailto:climatechange@forestry.gsi.gov.uk), or from local Forestry Commission woodland creation officers, commercial woodland agents, or carbon companies.

## First day for Ransomes apprentices

FIVE new apprentices have joined the manufacturing team at Ransomes Jacobsen, following the re-introduction of Craft and Technical apprenticeships announced back in September 2012.

The new apprentices - Daniel Phelps, Dean Manning, Alex Rae, Joe Tynan and Louis Barrett - were introduced to their mentors on their first day with the company following the obligatory Health & Safety induction at the company's European headquarters on Ransomes Europark in Ipswich.

The new intake will rotate through the welding, fabrication and machining depart-



ments with their final placement dependant on areas of highest competency or need at the time they complete the programme. They will also have the opportunity to gain a comprehensive insight into the practical aspects of engineering, supported by a firm academic baseline.

They will be expected to complete a minimum of three to five years training achieving an HNC or equivalent qualification in a mechanical or electrical engineering qualification on completion of the apprenticeship.

Day release has been organised through the Colchester Institute.

Stephen Foster, Production Manager, Operations at Ransomes Jacobsen said, "We are delighted to welcome these youngsters into the business and hope that they have a long and worthwhile career with us. As with most Modern Apprenticeships, there will be extensive work-based training with a high level of 'on-the-job' tuition, as well as day release at Colchester Institute. This is an excellent opportunity for these guys and they could forge a very successful career if they show the determination to succeed.

"We are part of the multi-industry US-based company, Textron Inc., which is always searching for new talent, so the possibilities are endless."

# Your Institution is for life

FOR those avid readers of *Landwards*, you may have noticed that I am trying to retire. More about that elsewhere I believe. So I did not expect to have to write another of these columns.

The upshot of this attempt at retirement is that the Secretariat staff organised a retirement dinner. So I must start off by thanking them and all those who contributed to the event either by their presence, presents or good will messages.

Inevitably, I found the opportunity to say a few words in response to the eulogies delivered by some of those present - most of whom I have to admit seemed to be talking about someone else! I would like to take this opportunity to share some of my thoughts with you.

When Geoff Freedman took over the Presidency of IAgRE, one of his key messages was that however many times you may change your job (and even the sector in which you work) your Institution is for life. This has certainly been so in my case. At the retirement dinner, Ray Clay said that he felt that membership of IAgRE was a bit like a cloak of security. I could not have said it better myself.

At the tender age of 16, I started at Rycotewood College (C&G 260 for you aficionados) where many of the staff were members of IAgRE and Branch meetings were held at the college. We were expected to attend these Branch meetings and questions relating to these meetings would be asked during Saturday morning lectures. (Yes you read that right - Saturday morning!). Woe betide you if you failed to attend or demonstrated by your ignorance that you had not been at the Branch

meeting. So I was exposed to the workings of IAgRE at that stage.

When I commenced my apprenticeship, Ron Roberts, the Works Manager where I worked, was an IAgRE member, so more exposure. Ron is still a member to this day and has been a constant support particularly in matters relating to technicians. Then, after completing C&G 261, I applied to do Voluntary Service Overseas (VSO). One of my referees was IAgRE Fellow (and the Principal of Rycotewood) John Turner. Furthermore, I was interviewed by IAgRE member Derek Sutton although I didn't know of his IAgRE connections at the time. More about Derek later.

Following VSO, I returned to Rycotewood to top up to an IEng qualification (C&G 465 III) and applied for a teaching job at Lackham. Yes you've guessed it, reference from John Turner and interview by IAgRE members.

A couple of years later, I was approached out of the blue by the then Ministry of Overseas development and to cut a long story short, ended up in Fiji. Derek Sutton had a hand in that although he always denied it. On leaving for Fiji, I flew from Heathrow and noticed the Hunting horn logo on one of the hangars at the end of the main runway. Knowing that Hunting were also into natural resource consultancy, I determined that I should apply to them for a job on my return.

Towards the end of the Fiji posting, I let IAgRE know that I would soon be available. Apparently this went into the IAgRE Newsletter which was read by IAgRE Member Don Chambers, MD of Hunting Technical Services

## CEO VIEW



(HTS) who were apparently looking for a mechanisation specialist in Iraq. So immediately after my return from Fiji, I was driving out to Baghdad for the start of a career in international consulting. No interview, just "go and get your photo done and we will get the visa application off". Clearly Iraq was not that popular a posting even then!

Twenty years later, and following the takeover of HTS, I joined IAgRE. That I got the job was probably to do with the fact that I was the only applicant! So almost 15 years later here I am trying to retire properly.

It amazes me that there has not been a plethora of applications. IAgRE is a great Institution to be part of and to work for. The Staff and the volunteers could not be more friendly (and patient). I am only sorry that the Secretariat Staff have not got the CEO they so richly deserve . . . younger and with a memory.

And so, social and professional networking is not new. IAgRE has been practising it since its formation. This networking is perhaps, alongside professional recognition, the most important benefit of membership there is. Graduating from a paper based networking system to the LinkedIn and Facebooks of the worldwide web is OK but lacks the personal recognition that IAgRE provides. So if you are still hesitating over renewing your IAgRE membership, get your cheque book out and do it now.

Christopher Whetnall



## Attention all aspiring professionals!



### Professional Registration through IAgRE

Being a member of IAgRE is just part of being a professional. Adding a professional qualification to your name is a further important statement which sets you apart from others.



In addition to administering the Landbased Technician Accreditation schemes (LTA and LTA<sub>MEA</sub>) on behalf of our sector, IAgRE has licences from the Society for the Environment and the Engineering Council to award the following professional qualifications to those who are suitably experienced and/or qualified:

- |                                   |                |
|-----------------------------------|----------------|
| <b>Chartered Environmentalist</b> | <b>CEnv</b>    |
| <b>Engineering Technician</b>     | <b>EngTech</b> |
| <b>Incorporated Engineer</b>      | <b>IEng</b>    |
| <b>Chartered Engineer</b>         | <b>CEng</b>    |

#### One or more of these professional qualifications after your name:

- Establishes proven knowledge, experience and commitment to professional standards, and enhances employability.
- Demonstrates that you have been judged as being competent by your peers
- Establishes that your professional credentials are on a par with other Chartered professionals such as Chartered Scientists and Chartered Accountants
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## NEWSUPDATE

### LETTER to the editor

Dear Chris,

Thank you for your worthy comments on the IMechE Report, 'Global Food, Waste Not, Want Not'. Although you credit Dr. Tim Fox as the author, he was actually the project manager. I'd like to stake my claim as originator and lead author of the report.

I have read the outcomes of a number of conferences and also the Foresight Report, which mainly conclude that the way to provide sufficient food for future generations is merely to produce more food. I've asked, with what? Given that areas of available crop and pasture land are declining, energy supplies are becoming more expensive and less available, and that above all, water resources are already under severe strain, I really doubt that agriculture alone can meet the need.

Many years ago, I worked alongside David Bartlett and others in an EU programme that investigated crop losses in Ukraine. We concluded that grain losses ranged from 25% in a good season to over 60% in a poor season. Since then, I have worked in numerous other less developed countries and have experienced major losses of crops due to lack of infrastructure and storage facilities.

In the UK, I investigate insurance claims and litigation cases involving crop storage systems, where I see large scale crop losses due to poor management and maintenance of equipment. I also see the destruction of crops due to the commercial policies of retailers. In study tours to other developed countries, I have witnessed large scale destruction of food crops due to minor cosmetic blemishes. On top of all this, research has suggested that over 30% of the food purchased by householders ends up in the waste bin.

This led me to suggest that one approach to feeding future populations is to address the problems of food loss in developing countries and food waste in more developed countries.

The IMechE encouraged and supported the production of this report and the response has been amazing. Over 25,000 copies were downloaded in the first week after publication and it has been reviewed world-wide. On the basis of the report, The President of the IMechE, Prof. Isobel Pollard made a presentation at the UN in New York, the production team met a number of MPs and Lords in Westminster, and numerous interviews and presentations have been held and are planned.

The IMechE may have published the report, but there was an Agricultural Engineer at the bottom of it all.

David B Williams  
Chartered Engineer  
Warwick

If you would like to respond to any articles which have been featured in *Landwards* please write to the Editor at:  
[chris.biddle@btinternet.com](mailto:chris.biddle@btinternet.com)

## Irish National Apprentices in Agricultural Mechanics graduate

At the Institute of Technology Tralee, Co. Kerry.

CONGRATULATIONS go to the Agricultural Mechanics that completed their Phase 4 and Phase 6 in their Agricultural Apprenticeship training in the Institute of Technology Tralee (ITT).

These apprentices were the first students to complete their studies in F-gas in mobile air conditioning (MAC) systems.

The ITT is the only third level college in Ireland for these apprentices to complete their Phase 4 and Phase 6 course which consists of two ten week blocks studying at the college. On completion of their apprenticeship they can further their education with a degree in Agricultural Engineering which is the full time course also run in the ITT.

They study in electronics,



hydraulics, pneumatics, farm machinery, power trains, engines and fuel as well as the new A/C training in MAC systems. The apprentices are from all the main manufacturers dealers in Ireland i.e. AGCO, Case New Holland, Claas, John Deere, SDF among others. The students while attending the ITT have an opportunity to obtain their HGV licence, abrasive wheel training and manual handling and many others.

## Discovery Day, 19 June 2013, Cranfield University Future of Food Networks

CRANFIELD University is holding a research-led event on Wednesday June 19th from 9.00am till 4.30pm, entitled 'Future of Food Networks'.

Dr Denyse Julien, Senior Lecturer at Cranfield School of Management, said, "Business as usual will not prepare us to meet and overcome the challenges that the Food sector faces. Innovative approaches and solutions need to be found to challenge the current trends. We may need to change the rules of the game, to allow for the necessary paradigm shift."

"Come and join us at Cranfield to explore some interesting approaches to doing things differently."

Confirmed speakers include:

- **The role of a 3PL as a SC orchestrator**, Roly Taplin - DHL Supply Chain, VP Specialist Networks
- **Managing Water Risks in Food Supply Chains**, Dr. Tim Hess
- **The Dynamics of UK Food Systems - Vulnerability and adaptive capacity**, Kate Bailey
- **Collaboration for Sustainability interactive session**, Dr. Denyse Julien

### Registration details:

Day pass: £60.00 + VAT

To register for the event visit [tinyurl.com/d8obtph](http://tinyurl.com/d8obtph)

For details contact Lynne Wall on [wall@cranfield.co.uk](mailto:wall@cranfield.co.uk), +44 (0)1234 758562





# There and back again . .

**IAgrE President, ANDY NEWBOLD, starts the process of searching for a CEO once again and considers the issues surrounding land drainage**

ONE definition of insanity is to do the same things again, in the hope of a different outcome . .

On this basis we find ourselves as an Institution on the lookout for a new CEO. Imagine your humble correspondent's surprise to receive a phone call, not very many weeks ago, from the then current future CEO of the Institution, to explain that he had other plans.

I allowed myself some under the breath cursing at this point (I hope my mother is not reading this article, some illusions are best maintained).

My first call was to Chris Whetnall, who poured oil over troubled waters with the immortal line, "Don't worry Andy, I'm not going anywhere". Phew. Having pressed the pause button, the selection panel reconvened to consider the options. In the short term Chris, ably assisted by Peter Leech (who coincidentally has just retired from John Deere) is happy to continue.

We are now actively seeking a new CEO and are confident that within the Agricultural Engineering community, or perhaps our wider industry, there is a suitable candidate.

Please can I urge you to consider your own position or perhaps encourage a suitable candidate you know to step forward.

## Back to basics and back in fashion

THE last council meeting and AGM was with Great Plains, formerly Simba International in Sleaford, which together with an excellent series of seminars in the

morning and a factory visit after lunch, made for a most thought provoking day.

The damage wrought by last year's awful weather has not been rectified yet and coupled with a late, wet spring has compounded issues for growers. This has provided a costly reminder for a lot of growers that irrespective of how much horsepower is available, and how you apply that to crop establishment, there just are times when you should not plant. For instance when the field is at field capacity. A lot of poorly established crops have been abandoned and redrilled this spring.

An interesting side effect is that the drainage of much land has been brought into question. As a boy I spent many evenings and Saturdays with Dad down the field (and in the trench) loading, unloading and laying clay tile drains. Then when it rained we had to walk the beck (northern tribal term for stream) sides to check that the drains were running. In fact draining is one of my more enduring childhood memories with Dad, we did that much of it!

My observation from this discussion is that there are some basics around soils management that no amount of GPS, Autosteer and

variable rate will get around. If we forget these we do so at our peril.

In an Agricultural College far, far away I remember standing in a field, and balling some soil, rolling it into a tube and then trying to bend the tube to work out its clay, silt and sand fractions. Followed by water divining with David White, all part of a thoroughly modern B.Eng qualification. In Sleaford last week I was cudgelling my brain back into action about the plasticity and workability of soils to try and remember the basics from that valuable

foundation I was given a mere 23 years ago!

As my Dad would say, "it will come back into fashion again".

Draining that is - but hopefully not my magnificent sideburns, or the tie-dyed Levi's . .



“ . . Please can I urge you to consider your own position or perhaps encourage a suitable candidate to step forward ”

The Douglas Bomford Trust, The Bullock Building, University Way,  
Cranfield, Bedford MK43 0GH  
Telephone: + 44 (0) 1234 750876  
www.dbt.org.uk enquiries@dbt.org.uk  
Secretary: Paul Miller Administrator: Elizabeth Stephens

# Activities of the DOUGLAS BOMFORD TRUST

## An update

### TRUSTEES MEETING - APRIL 2013

DOUGLAS Bomford trustees assembled and were pleased to be hosted by The Royal Agricultural University for a General Management Board meeting on April 9th 2013.

The agenda items for this meeting included:

- A presentation by Professor Toby Mottram who has now taken up the position of Chair in 'Applied Mechanisation and Management' at the University. Toby outlined the progress that had been made in establishing this position, his plans for the future development of activities associated with the Chair and the likely future involvement of The Trust: this includes plans for an inaugural lecture that will be held at The Royal Academy of Engineering in London on 16th October 2013 - further details to be announced later;
- An update on the progress with the construction of the new engineering building at Harper Adams University - it has been agreed that the lecture theatre in the new building will be named to recognise the contribution that The Trust has

made towards funding the building and plans are now being made for The Trust to hold an event in the new building on November 7th 2013 - see separate box as a date for your diary;

- A report on the progress with other project activities funded by The Trust;
- Consideration of new proposals for funding support from a range of applicants
- Administrative matters relating to the financial management and accountability of The Trust.

The trustees are very aware that the demand for funding support always exceeds the amount of money available for making awards and are keen to ensure that the funds that are available are used to make the greatest difference possible while the core investments of The Trust are maintained. Opportunities for growing The Trust need to be exploited whenever and wherever possible and the previous chairman, Prof Dick Godwin, has prepared a letter that can be sent to potential donors who might be considering a donation or legacy to The Trust - further details are available from the secretary.

7TH NOVEMBER 2013 - A DATE FOR YOUR DIARY:

### 'Worldwide opportunities in Engineering for Agriculture'

*Innovation and entrepreneurship to address global food security*

The aims of the event are:

- To present the opportunities, challenges and rewards that will attract motivate and inspire the future generation of professionals to devote their careers to the application of engineering to agriculture and food production;
- To celebrate the new engineering facilities at Harper Adams University and recognise the role that The Trust played in contributing to funding the facility;
- To recognise the 75th anniversary of IAgRE.

The format for the event will involve:

- Introductory presentations from key speakers including Sir John Beddington (former Government Chief Scientist who requested the IAgRE to prepare "Agricultural Engineering; a key discipline enabling agriculture to deliver global food security")
- Panel discussions / conversations with both established professionals and those at the early stages in their career
- Practical demonstrations and displays of equipment and techniques

## Sponsored student project work

WITH joint funding from The Douglas Bomford Trust, a multidisciplinary long-term project was established at Harper Adams University in October 2011 to investigate the interaction between traffic and tillage on soil, crop and energy responses.

The experiment has been set up in a randomised and replicated 3x3 factorial design to determine the effects of Random Traffic Farming, Controlled Traffic Farming (CTF) and Low Ground Pressure (LGP) systems with conventional, minimum and zero tillage. The aim of this study is to determine system-soil-crop interactions to develop an integrated mechanisation system to optimise: 1) soil and water resources; 2) crop growth and yields; 3) system performance and economics in commercial agricultural practice.

The first year (2011-2012) of this research considered the establishment of field uniformity of the proposed experimental area following the installation of field



drainage and subsoil loosening to improve water management and remove underlying compaction. The field was assessed in terms of soil type and structure, water infiltration, crop growth and yield using in-field and remote sensing techniques. The experimental area (4.0ha) was established as a CTF system with four metre wide plots which uniformly yielded 4.2 tonnes per hectare of winter wheat at harvest 2012 based on measurements from a combine yield monitoring system and plot yield weights. This was 10% higher than the surrounding field area (4.5ha) managed as a 'normal' random traffic system.

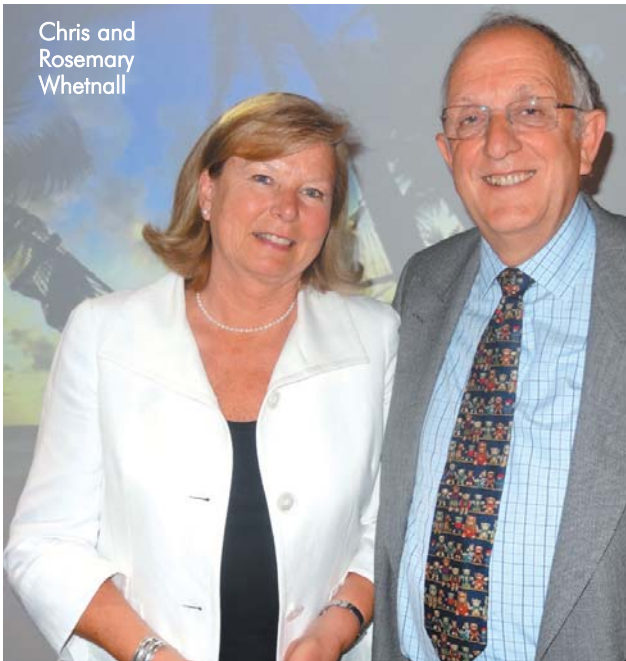
In November 2012 a rubber-tracked Challenger MT765C with a 4.0 m wide Vaderstad 'TopDown' was used to cultivate the plots to a depth of 10cm (shallow tillage) and 22cm (deep tillage). Second winter wheat was drilled to establish treatments for both depths of tillage and the zero tillage plots. Treatments were randomly allocated on plots measuring 4.0m wide and 84m in length and arranged in four blocks. The effect of treatments will be evaluated in a standard crop rotation based on soil and crop proper-



ties including soil structure, water holding capacity, crop emergence and yield. The plot trial will also provide an opportunity to consider the system performance and economics relating to fuel usage and draught force requirements.

During the first year of the project, tests were conducted to determine the most appropriate LGP system to implement into the field trials by evaluating the influence of tyre inflation pressure, LGP technology tyres and rubber tracks on soil pressure in sandy loam soil. Pressure from surface applied loads were measured using ceramic strain gauge pressure transducers buried in the centre of the wheel track at 150, 300 and 450 mm. Further work over the next year will develop the methodology and consider the effect of load on soil pressure using LGP systems.

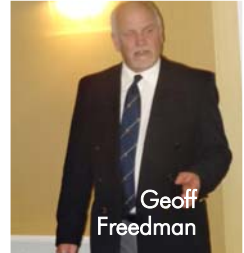




Chris and Rosemary Whetnall

**IAGrE bids a fond goodbye to retiring CEO at 'Inaugural Retirement Dinner'**

**Thank you, Chris**



Geoff Freedman



Richard Trevarthen



Roger Lane Nott



Peter Leech

A special dinner, attended by almost 50 staff, present and former IAGrE officers, fellows and members was held at the Mitchell Hall on the University of Cranfield campus on Thursday 23 May to mark IAGrE CEO Chris Whetnall's 'retirement'.

The date had been chosen to coincide with his last day in office - but recently the newly appointed CEO designate, Ian Adams, decided not to take up the post - so the event was billed as 'Chris Whetnall's Inaugural Retirement Dinner'!

Hosted by current IAGrE President Andy Newbold, the evening was lighted-hearted and included a number of whimsical tributes from the likes of Roger Lane-Nott, Peter Leech, Ray Clay, Richard Trevarthen and Geoff Freedman.

All described the regime at IAGrE during Chris's tenure, as being relaxed with a measure of autocracy!

Some were surprised to find themselves as officers of Institution without quite knowing how or why they got there, but all spoke with affection and gratitude for the advice, guidance and friendship extended by Chris.

Chris himself replied by showing a num-

ber of illustrations of his career starting with his early days as a technician with John Deere dealer Penfolds in Sussex (*below*) his time working in Kenya, Fiji and other overseas locations, candid shots of colleagues at



First job as a mechanic at Sussex John Deere dealer Penfolds

Chris and his wife Rosemary were then presented with a number of dog / puppy related gifts, cut a celebration cake displaying the colours of all the major tractor brands and was even given a John Deere cap from Peter Leech (not forgetting his roots) to wear in his beachside hammock when fully retired.

In turn, Chris presented each of the current staff with bouquets of flowers and paid a special tribute to their support over the years.

It was a special evening, one of laughter and tears with Peter Redman bringing the ultimate gift, a box of Kleenex!



Ray Clay (centre) with Professor Paul Miller and Dr Paula Misiewicz

IAGrE and even a shot of his famous desk with its unique filing system (eg cluttered).

His overall message was that despite the importance of the role that IAGrE played in the land-based sector, that the smiles on the faces of the 'wonderful staff' and all those who worked so tirelessly to promote the work of the Institution meant that, above all, there was a great deal of enjoyment and satisfaction in a job well done.



Chris was presented with a Puppy Voucher towards a canine companion for his retirement



IAGrE President Andy Newbold



FORESIGHT

# Engineering leadership for agricultural innovation

MARK KIBBLEWHITE says that implementation and action called for in IAgRE's response to the Future of Food and Farming foresight report will require sustained effort by the Institution and its allies

THE development of agriculture has shown how mechanisation in all its forms together with the expertise of agricultural engineers is a prime driver for the translation of scientific advances into more productive agriculture.

This is now a critical part of meeting the needs of a growing world population.

It is no exaggeration to say that the fate of millions now depends on the agricultural engineering profession 'stepping up to the plate' and providing leadership in agricultural innovation.

A step-change is required to meet the 21st century challenge of producing much more food with less environmental impacts in the century of climate change.

Today, around 0.8 billion people are short of food while demand for food is increasing rapidly because of population growth and a growing demand for protein in the newly developed countries.

Meanwhile the demand for bio-fuel is continuing to grow, competing for agricultural land and even for food products from agriculture.

On the supply-side, the picture is worrying. New land is being brought in to agriculture but as much or more is being degraded and the area of farmed land is actually declining according to the FAO.

Around 70% of abstracted water is used

for agriculture, but this resource is finite and being degraded by over use; moreover demand for water to support an expanding urban population is also growing fast.

And on top of these problems, the price of energy for agriculture, especially diesel, looks set to rise steeply in the medium term.

Though new and abundant supplies of natural gas should mean that nitrogen fertilisers should remain relatively cheap, the same cannot be said for other nutrients which are dependent on finite and potentially contested mineral resources.

For agricultural engineers, this crisis is both a challenge and a great opportunity to practice and promote our profession and so make a difference for humanity. The future therefore looks exciting for us, particularly because of the possibilities afforded by the application of new information and communication technology to agriculture, as well as more traditional aspects of engineering.

Of course advances in agricultural science are crucial, but innovation based on these advances requires their application to create new tools and systems - and this is the role of engineering. Increasing resource-use efficiency is as much about targeting better deployment of existing materials such as nutrients by applying new tools and processes, as it is about introducing new agrochemicals or improved plant and animal genetics.

And the latter will in any case require engineering for their effective deployment.

Unfortunately the strategic role of engineering for agriculture has not been as well recognised as it should have been.

When the Office of the Government Scientist published its foresight report on the Future of Food and Farming in 2011, it made no significant mention of agricultural engineering, while focusing especially on the potential for genomics in the plant and animal sciences.

This is why in late 2011 senior members of IAgRE, including David Llewellyn from Harper Adams University and Dick Godwin, met with the then Government Chief Scientist, Sir John Beddington, and agreed with him that IAgRE should write a report for his office explaining the strategic role of engineering for agriculture.

The report '**Agricultural Engineering: a key discipline enabling agriculture to deliver global food security**' was edited by Bill Day and published by the Institution in May 2012.

Its key recommendations were that: (1) the contribution of engineering needs to be more widely recognised in meeting societal challenges in global food security and contributing to economic growth; (2) the first challenge is to develop the important opportunities for education, research and training

in engineering for agriculture; (3) a research theme or platform for 'engineering for agriculture' should be established that can compete on equal terms with other research communities and is appropriately managed; and (4) the farming industry and the agricultural engineering business community need to be encouraged to work with the innovators and educators to establish an appropriate focus for innovation that brings together the needs of agriculture, novel engineering and business opportunity.

The IAgrE report has supported a positive shift in focus in Government towards engineering for agriculture.

It was referenced specifically in the Government's rationale for a new UK Agri-Tech Strategy and, based on a consultation briefing by Ministers held in April 2013, it appears that some of the report's recommendations will be being taken forward in the final strategy that is due to be published very soon, hopefully backed up by additional funding.

Another good development in the past year is an £8.75m investment by the Technology Strategy Board (TSB) to help businesses develop innovative measurement technologies for efficient agri-food systems and a similar investment in precision agriculture is anticipated later in 2013.

“ For agricultural engineers, this crisis is both a challenge and a great opportunity to practice and promote our profession . . . and so make a difference for humanity ”

However, further progress towards realising the report recommendations is going to require sustained effort by the Institution, supported wherever possible by allies, including other engineering institutions. Engineering for agriculture is disadvantaged by being somewhere in a gap between the different Research Councils (BBSRC, EPSRC and NERC) and by a lack of Principal Investigators who are able to develop project proposals (ironically, precisely because of a lack of past-funding for them).

Serious lobbying for prioritisation of science, particularly genomics and fine chemicals, is being done by large UK-based com-

panies with strong interests in these sectors and this is not yet matched by promotion of engineering.

So, the challenge for IAgrE is great, since the agenda is central to the Institution and its members but our resources are relatively limited. This means we must work smartly and wherever possible with allies, including those with greater resources.

The Institution's Executive has set up a 'Foresight Working Group' and charged it with advising and leading initiatives to implement the report's recommendations. It has already initiated a constructive dialogue with key movers and shakers in Government and the Research Councils, including making suggestions to the Department for Business and Innovation (BIS) and Defra about priorities for public investment in engineering for agriculture.

Looking ahead, this group intends to help the Institution respond positively to the new national strategy for Agri-Technology; argue the all important case for more investment in the education of agricultural engineers; assist members in industry and the research community to come together and develop new projects for future TSB calls; and continue to help the Institution develop collaborative actions with other Engineering Institutions.

# Soil and Water Management

## Postgraduate Courses

### MSc, Postgraduate Diploma and Postgraduate Certificate

#### Key points:

- Applied programmes to meet the needs of industry on soil and water management including soil irrigation, drainage, tillage, traction, compaction and land conservation
- Short course delivery format of modules supported by directed study
- Delivered by experts in soil and water management
- Underpinned by current research
- Well-equipped facilities including postgraduate centre, modern laboratories and library, indoor soil/machine evaluation area and on-site farm
- Excellent links with industry

For further information, please visit our website: [www.harper.ac.uk/soilwater](http://www.harper.ac.uk/soilwater)  
Contact: Heather Hogan on 01952 815289 or email [hhogan@harper-adams.ac.uk](mailto:hhogan@harper-adams.ac.uk)



Harper Adams University, Newport, Shropshire. TF10 8NB

  
Harper Adams  
University

**COMPETITION**

# Annual IAgRE Young Engineers' Competition

The group at Aston Martin's Newport Pagnell works

**Wednesday March 20th 2013,  
Aston Martin, Newport Pagnell**

56 PEOPLE attended this year's Young Engineers Competition which was held at the superb Aston Martin works, Newport Pagnell, Bucks, courtesy of their Managing Director, Mr. Kingsley Riding-Felce.

Mr. Riding-Felce extended a very warm welcome to all the teams and their staff, Chris Whetnall, CEO IAgRE; Craig Grant from sponsors Rexroth Bosch Group; guests Frank Northcott, IAgRE; Peter Leech, IAgRE Past President (who kindly volunteered his services as competition scorer and recorder) and all members of the competition team.

This year seventeen teams entered from the following colleges / training establishments:

- Babcock International, two teams
- Eastern College, six teams
- Plumpton College, five teams
- Reaseheath, three teams.

The event started as always with close scrutineering by Richard Robinson (Autoguide Equipment) and Craig Grant which led to 13 teams being placed in Class 1 (this means their vehicles were all built within the rules and dimensions) and 4 teams in Class 2 (these were outside the rules and therefore would be excluded from the prizewinners, but had used some imagination and initiative!).

The competition commenced and as in previous years each had three attempts per round to power their vehicle up a specially designed curved ramp with the one going furthest declared the winner.

As the competition progressed it was very interesting to see all the variations in design and control and to note the degrees of time and effort put into the build.

In Class 1 this ranged from a well-engineered substantially built chain driven vehicle to one or two relying on a lot of cable ties. In Class 2 various aids were used, including a retractable powered tape measure designed to pull the vehicle up the ramp.

One thing is certain there was no shortage of enthusiasm and sportsmanship plus imagination in the names some teams gave to their vehicles.

At the conclusion of the rounds the results were verified and following a delicious buffet lunch, the results were announced and presentations made as follows:



ABOVE: Climbing the ramp and RIGHT: Some of the entries



**CLASS 1:**

- 1st  
**Plumpton College** - Peter Hill and Luke Morley with 'Bernard'
- 2nd  
**Babcock International** - Joe Wright and Martyn Rouse with 'Dan's JD People's Front'
- 3rd  
**Plumpton College** - Joe Lower and Chance Barrett-Crosdil with 'Rich Boys'

These all received cordless power tools from our sponsors Rexroth Bosch Group and various mementos including engraved wheel spinners from Aston Martin.

**CLASS 2**

- 1st  
**Eastern College** - Luke Bryant with 'Luke Duke'
- 2nd  
**Eastern College** - Mike Nash with 'Mike's Machine'
- 3rd  
**Reaseheath College** - Sam Done with 'Orange Mayhem'

ALL teams received cash prizes with the amounts depending on their final position, and the winning teams also received some generous gifts from our hosts and sponsors.

Kingsley Riding-Felce thanked all the teams for taking part and added some well-chosen words of encouragement and advice as they start to climb their career ladder.

The afternoon ended with a tour of the pristine Aston Martin facilities including the huge service/repair shop, vehicle restoration area, the spray shop and then on to where the leather seats and interior upholstery is cut and hand sewn. At best this can be summed up as a real centre for excellence.

As we left everyone received a copy of the Aston Martin book *Newport Pagnell - A Celebration*.

In conclusion special thanks go to Kingsley Riding-Felce, Wendy Harrison-Drake and all other Aston Martin staff who worked so hard to make the day such a success; Craig Grant and the sponsors, Rexroth Bosch Group; Richard Robinson, Autoguide Equipment, who is the prime mover and shaker of the competition ably supported by Rob Robinson, Autoguide Equipment and last but by no means least, Sylvia Harris, IAgRE, who does so much behind the scenes to pull the whole thing together. All in all, a brilliant day.



ABOVE: Kingsley Riding-Felce with Richard Robinson  
ABOVE RIGHT: Checking out an Aston Martin  
RIGHT: Making some last minute adjustments



ABOVE: The competition in full swing  
RIGHT: Plumpton Colleges' winning entry, 'Bernard'



**DIARY DATE:**  
IAgrE Young Engineers' Competition, April 9th 2014;  
venue to be notified.

“ It was fascinating to see all the variations in design and control and to note the time and effort put into the vehicle build. We are very grateful to the Douglas Bomford Trust for supporting us this year and Aston Martin for hosting the event. Everyone enjoyed the facility tour which demonstrated the meticulous level of workmanship they bring to a dealership. ”

IAgrE judge and organiser Richard Robinson, Autoguide Equipment



## LANDWARDS CONFERENCE 2013

# Agricultural Engineering and Compliance Thorn in the side or competitive advantage?

AT the IAgRE Annual Conference at Harper Adams on 14th March, HSE's chief agricultural inspector, **Dr Andrew Turner** presented statistics that were depressing and revealing.



After saying that he thought that pretty well everything had been done to ensure that guarding of machinery was to the highest standard, he then revealed figures about the 436 fatalities that had occurred in agriculture over the past 10 years, 39% of

which were machinery related.

Furthermore, categorising fatalities due to 'contact with machinery' (as opposed to machines overturning or being run-over) 25 of the 31 deaths occurred during maintenance or adjustment, and only 6 whilst the machine was actually being used.

**Keith Hawken**, Technical and Standards Director of the Agricultural Engineers Association (AEA) then presented a detailed explanation of the functional development of the regulatory process.

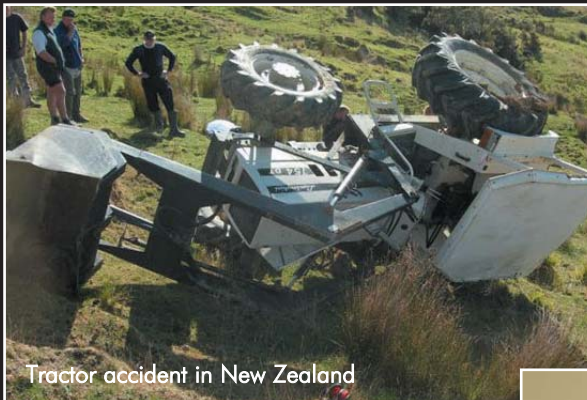


The human-factor is to blame in a very high proportion of accidents, not due to the design nor lack of safety devices. In fact, complacency can set in, according to accident investigator **Dr Mark Cooper**, when the operator feels protected by the



extent of guarding or safety features on a machine.

It really is a challenge for engineers to look beyond the technical specifications of machinery when developing safety cri-



Tractor accident in New Zealand

teria. Psychology and often irrational human behaviour plays an enormous role said **Dr Cooper**.

OPENING the afternoon session, **Alan Plom** gave an overview of the world of the Farm Safety Partnership.

He said, "We've had agricultural machinery regulations since the 1950s, but people are still being killed.

"We've come a long way," he added, "but there is plenty of room for improvement still."



**Mike Whiting** of Newmac Ltd presented an informative and entertaining account of some of the case studies.

He said, "As engineers we need to define the fail-

ure, and establish root cause. No matter how good we are, or how good we think we are, unless we establish this our subsequent designs will ultimately be a failure. We will then be left with a bigger mess to sort out, because two teams of designers will have made a \*\*\*\* -up!"

He then quoted **Wilbur Wright** (below)



And in a rather surreal final presentation, risk assessment expert **Paul Reynolds** (NFU Mutual) described the time he was asked to provide a risk assessment for a Claas Dominator combine fitted with a snow plough, high-speed gritting attachment, hot drink maker and flame thrower!

Yes, you're right. The Clarkson, May and Hammond combo were up to their tricks again to prove how a combine could make a very effective snow-clearance unit.

*Top Gear* is one of the world's most popular TV productions, yet you have to wonder at the messages it throws out . .

“ If you are looking for perfect safety, you will do well to sit on a fence and watch the birds; but if you really wish to learn, you must mount a machine and become acquainted with its tricks by actual trial ”

Wilbur Wright, Society of Engineers Chicago 1901



Conference Moderators: Alan Plom (left) and David Leavesley (NFU Mutual)



# 2013 IAgRE Award Winners

## Recognition of outstanding contributions to the landbased sector

MEMBERS of IAgRE received awards in recognition of their contributions to the landbased sector at the Institution's annual conference at Harper Adams University, Shropshire on 14 March 2013.

This year's Honorary Fellowship was presented to **Peter Leech**, Regional Training Manager for Deere & Company. Peter has been actively involved with the Institution for over 21 years. He was IAgRE President in 2010 and also received an Award of Merit in 2005 for his work in connection with young people and training.



Peter Leech

The Award of Merit was bestowed on **Professor Bill Day**. Professor Day has made a tremendous contribution to the agricultural engineering profession and the work of the Institution. Presenting the award Andy Newbold, IAgRE President said, "Professor Bill Day is a very worthy recipient of the IAgRE 'Award of Merit' for his contribution to the landbased sector recognising the considerable input he has made to both the profession and the industry during his career and particularly his recent



ABOVE: Jim Loynes, receives Award from Andy Newbold, as does Tom Robinson (Below left)



work in coordinating a response to the Government's Foresight Report and as Editor in Chief of Biosystems Engineering."

THE Michael Dwyer Memorial Prize, which is presented to a mid-career engineer who has made outstanding progress in the agricultural engineering industry, went to **Shaun Wealleans** of Sumo UK Ltd. Shaun, the son of a farm manager, founded SW Agriservices in 1981 when he rented a farm shed on the farm so he could repair tractors.

Some 20 years later, he created Sumo, which has become a name synonymous with robust and innovative cultivation and tillage equipment within the agricultural engineering industry.

Now known as Sumo UK Ltd, Shaun's company now employs 50 full time staff and has over 2,500 machines working in the field. It is recognised as a forward-thinking, innovative company that, under Shaun's leadership, has identified and satisfied the demands of British agriculture.

AWARDS for Contributions to the Landbased Industries sector were presented to **Jim Loynes** and **Tom Robinson**. Jim is a lecturer at Harper Adams University and Tom works for Syngenta in Cambridge. These awards are made to members who have made sustained contributions to the landbased sector throughout their careers.

Jim, Assistant Head of Engineering at Harper Adams, was rewarded for his hard work supporting agricultural engineering. The citation read: "Without Jim's stewardship Harper Adams and the UK would not be in such a good position to address the future challenges in the sector. He is a worthy nominee for this Award."

Tom Robinson, of Syngenta Crop Protection, has been an enormous influence on spray operators, the agrochemical industry and on the development of nozzle technology over the last 20 years.

On presenting the Award Andy said; "It would be unusual to have never come across a spray operator who hasn't heard of Tom Robinson. Agrochemical companies have shifted their views on application as a result of Syngenta's success. Nozzle manufacturers are also attempting to copy his approach and so his influence has gone well beyond Syngenta and well beyond the UK."

The Douglas Bomford Trust Award, pre-



Shaun Wealleans (left) receives Michael Dwyer Prize from Andy Newbold

sented to the author or authors who demonstrate originality and technical excellence in a scientific paper published in Biosystems Engineering during the previous year went to **John Richards** of Solutions for Research, Silsoe for his contribution to the paper "Development of a device for sampling cattle breath."

Branch Meritorious Service Awards made to members who consistently deliver outstanding service to an IAgRE branch went to **Simon Cooper** of the Wrekin branch and **David Roe** of East Midlands.



ABOVE: John Richards receives Douglas Bomford Award from Professor Paul Miller

BELOW: Branch service award presented to David Roe (right)



## INSIGHT

# Bulk Grain Drying

## The inside story

by David Bartlett

BULK grain drying has been practised on a wide scale in the UK since the early 1960s.

The original designs were based on the needs of small combines and a less quality critical grain trade. Recently, energy costs have become more significant and harvesting rates have far outstripped the intake capacity of older stores. Furthermore, grain quality has become a more significant marketing consideration.

Store designs have to balance capital cost against the need to dry the crop in a wet season. Modern stores need to be able to accept grain at the rate that the combine harvests at and increasing yields have resulted in a need to maximise store capacity by using increasing storage depths.

Traditional bulk grain driers rely on large volumes of drying air that is conditioned to a relative humidity that is in equilibrium with the target grain moisture content. These systems are effective when ambient temperatures are above 18°C and ventilation rates are 0.047 m<sup>3</sup>/s tonne (100 cfm/tonne). At lower temperatures and ventilation rates drying times become excessively long and parts of the bulk are at serious risk of deterioration.

In stores where drying is not completed before the ambient temperature falls below 15°C, it can be a very long process to take out the last 1-2% to bring the crop to a marketable moisture content. Using humidity control to dry under these conditions can use large amounts of energy.

Recent monitoring of the drying process in a number of commercial stores has shown how the drying process actually works and provided an insight into potentially more energy efficient control strategies.

### HUMIDITY CONTROLLED DRYING

Traditional bulk drying is based on humidity control and the concept of equilibrium moisture content.

The principle is simple: Blow air with a relative humidity of 65% through a bulk of wheat and eventually the bulk moisture content will be 14.5%. Drying times are dependent on the ambient weather conditions and the volume of air used. In the drier parts of the country the process is successful with small quantities of heat and lower air volumes. In cooler, wetter areas more heat and more air is needed to complete the drying before mould development damages grain quality. Capital and operating costs have driven down the size of the installed fan and heater capacity to the point where some stores can't dry the crop safely in a wet season using humidity control.

During harvests 2010-12 a group of farmers sponsored a monitoring exercise to discover how they could better use the drying resources that they had. A number of bulk drying processes were instrumented so that the drying rate of the bulk could be continuously measured.

The results from a humidity controlled bulk drier show that near ambient drying is not a steady state process. *Fig. 1* shows how the temperature of the grain bed is cycled up and down following the diurnal temperature change. This chart also shows how the drying rate varies over the diurnal cycle.

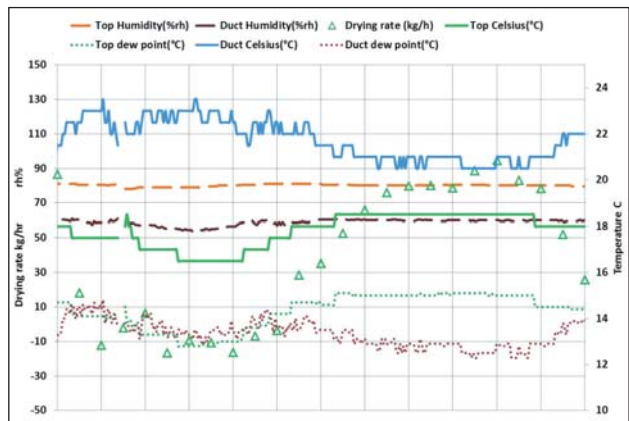


Fig 1: Temperatures and Drying rate changes during a 24 hour period

During drying the moisture balance for the grain bulk depends on the difference between the moisture content of the air entering and leaving the bulk. The condition of the air leaving depends on the temperature and moisture content of the surface layer and that entering is controlled by the weather.

During the day the ambient air is warmer than the grain. Grain takes heat from the ventilating air and because the air is cooled its relative humidity rises towards equilibrium with the local grain; little or no moisture is transferred to the air.

This heating front moves up through the grain bed during the day at a rate dependent on the air speed. At 50 mm/s and for a grain depth of three metres the heating front will take between 8 to 10 hours to reach the top surface.

By this time the ambient air temperature is falling and is now cooler than the grain so the grain warms the air and lowers its relative humidity, some moisture is lost from the grain into the air. The overall moisture balance is still controlled by the condition of the grain in the top layer. This is still warm from the heat added during the day and the air leaving humidity is in equilibrium with this warm wet grain. The ambient air entering the bulk during the evening and night still has the same (or lower) moisture content so this is when moisture is removed from the bulk. By the end of the night the cooling front will be approaching the grain surface so the drying rate will decrease and may become negative as the grain starts to re-wet.

Constant humidity control is achieved by adding heat to the drying air when the ambient relative humidity is too high, resulting in most heat being added at night. Monitoring results show that this tends to restrict the drying rate and can result in moisture being added to the bulk under some weather conditions.

**Table 1** shows the daily drying performance of a 500 tonne bulk store using 50cfm/tonne at a constant 65% relative humidity over a week. The average evaporative capacity of a constant humidity bulk drier is 64 kg/day per m<sup>3</sup>/s of drying fan capacity.

#### TEMPERATURE CONTROLLED DRYING

The drying capacity of a bulk store increases dramatically if the drying air is heated.

Air temperatures up to 55°C can be used and can result in drying times of between 2 and 5 days depending on how much moisture must be removed. Modern grain handling methods make it relatively easy to use a bulk store as a batch drier. Grain can be quickly loaded in, dried and then trans-

**Table 1**  
Measured daily drying performance from a Humidity Controlled Bulk Drier

Date	Daily Evaporation kg	Moisture reduction % / day
17/09/2010	1042	0.18
18/09/2010	-221	-0.04
19/09/2010	85	0.01
20/09/2010	1711	0.29
21/09/2010	901	0.15
22/09/2010	455	0.08
23/09/2010	1874	0.32

ferred to long term storage where it can be cooled using low volume ventilation. This strategy also makes drying more reliable because it is largely independent of ambient weather conditions.

The monitoring process was applied to bulks where this regime was used. By integrating the drying rate it was possible to estimate the drying time needed to reach the required final bulk moisture content. A

considerable fraction of the drying has been shown to take place during cooling. The heating needs to stop before the target moisture reduction is reached or the bulk will be over-dried when it has been cooled. Depending on the ambient conditions, up to 1% moisture reduction may take place during cooling.

Monitoring results showed that using air at 43°C resulted in an evaporative capacity of 31 kg/hour per m<sup>3</sup>/s of fan capacity. At an air temperature of 54°C the typical evaporative capacity increases to 50 kg/hour per m<sup>3</sup>/s.

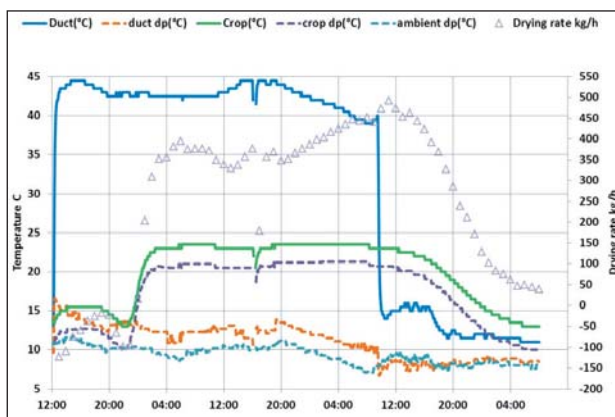
Using this information, the initial and final moisture content of the bulk and the tonnage to be dried the drying time can be estimated. For example drying a 500 tonne batch from 18% to 14.5% requires the evaporation of approximately 20,500kg of water. Assuming a 0.8% moisture reduction will occur during cooling so the drying process needs to evaporate 15,800kg of water.

This size of drier might be expected to be fitted with a 12 m<sup>3</sup>/s fan so the installation would have an evaporative capacity of ~370 kg/h. A typical heating up time for the bulk will be 14 hours during which time little drying will take place. Heating would need to continue for approximately 43 hours more. Cooling would take a further 22 hours giving a total drying time of 79 hours. Allowing for loading out, the batch could be dried in 4 days.

This drying strategy results in steep moisture gradients from bottom to top of the bulk. When drying is com-

*continues over*

**Fig 2.**  
Drying rate for a Temperature Controlled Batch drier



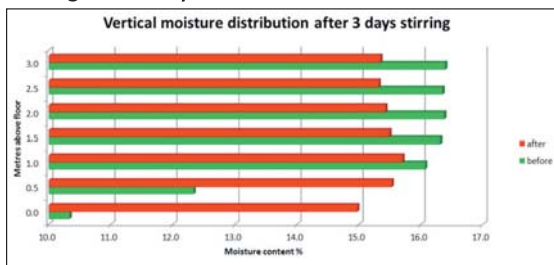
**... The drying capacity of a bulk store increases dramatically if the drying air is heated**

**INSIGHT**

pleted, some of the surface grain may still be at the same moisture content as when it was loaded. When the batch is transferred to long term storage this wet grain will be mixed with the over-dried grain at floor level so the bulk moisture content will be substantially uniform.

Alternatively, if stirring facilities are available, then the dried batch can be mixed before out-loading. Tests show that 750 tonnes stirred with 4 augers took 48 hours for the variation in moisture content to become less than 1%. The ability to stir means that the final batch can remain in long term storage in the drier.

**Fig 3. Moisture profile after drying and after stirring for 3 days**



Stirring during the heating up phase of the drying process improves the speed and uniformity of heating. Warm moist grain is carried up to the top of the bulk and cool grain flows downward towards the heating air.

Once the surface grain temperature has stabilised the continued use of the stirrers will tend to reduce the evaporative capacity because the warm dry grain that is delivered to the surface will not be able to fully saturate the air as it leaves the bulk.

**MINIMISING ENERGY INPUT TO THE NEAR AMBIENT BULK DRIER**

Experience over many years has shown that in a good season grain can be dried by ventilating the bulk with unheated ambient air.

Drying becomes more difficult when the available ventilation rate is low and weather conditions are less favourable. Under these conditions it is necessary to use some heat to dry the crop before mould development affects grain quality. Evidence from the monitoring suggests that drying rate can be increased by adding extra heat during the day and cooling the bulk by night. In this way maximum advantage is taken of the heat available from the atmosphere.

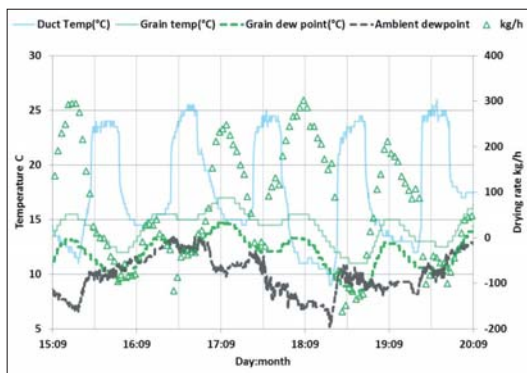
Using heat in this way increases the swing in grain temperature during a 24 hour cycle. Ventilation rates need to be sufficient to move the heating and cooling front through the bulk during the 24 hour cycle. For a 3.0 metre deep bulk an air speed of 50mm/s (10 ft/min, equivalent to 46 cfm/tonne) is enough. The speed of drying will depend on how much extra heat is used. More heat results in a larger temperature swing and higher drying rates.

Where limited heat is available the air volume can be restricted to achieve an ade-

quate temperature rise but this may limit the floor area that can be blown to maintain an adequate air speed through the crop. If weather conditions become unfavourable then ventilation should stop, preferably when the bulk is cool, until they improve.

This process results in the grain near the floor being repeatedly over-dried and re-wetted while the top of the bulk is alternately heated and cooled. The average wet grain temperature is likely to be lower and at less risk of mould development than when humidity controlled drying is used. When very small amounts of extra heat are used the drying process may extend over several weeks. In these situations it will reduce the risk of spoilage to regularly stir the bulk to maintain uniform air distribution.

**Fig 4. Cyclic heating and cooling**



The rate of change of moisture content at the end of drying is very slow and sampling and moisture measurement errors make it difficult to know when drying is complete. Cyclic heating and cooling may leave some moisture gradients in the bulk making it even more difficult to determine the endpoint. The drying rate monitor was used to log the quantity of moisture removed during each daily cycle. The average daily drying capacity in one test was 72.6 kg/day per m<sup>3</sup>/s of fan capacity. Given the tonnage, the initial and target moisture contents and the average daily extraction then the number of drying cycles to reach the target can be estimated.

For example, 500 tonnes, dried from 17% to 14.5% moisture content requires 14,600kg of water to be removed. A fan



capacity of 12 m<sup>3</sup>/s will produce an average drying rate of ~870 kg/day. The drying process will take 17 cycles (17 days) to complete.

**USING HEAT TO REMOVE THE LAST 1 - 2% FROM A BULK LATE IN THE SEASON**

It is sometimes necessary to take one or two percent moisture content out of a bulk during the winter to avoid incurring moisture penalty charges when the grain is sold. One or two heating and cooling cycles can remove the surplus moisture.

**Fig 5** shows the temperatures and drying rate results from applying a single heating cycle to a 700 tonne batch of grain with an initial moisture content of 16%.

Approximately 900 litres of gas was used to evaporate 7.3 tonnes of water over a period of 36 hours. This represents a moisture reduction of 1%.

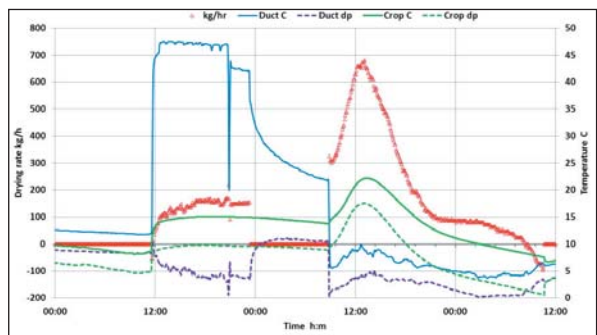
**FUTURE DEVELOPMENTS**

The traditional control strategy based on equilibrium humidity makes for a simple easily understood method of controlling the bulk drying process. Unfortunately, this is not the most energy efficient solution.

Cyclic heating and cooling, sometimes coupled with stirring can provide a more energy efficient drying but, because the process is not simple, a more complex control strategy is needed.

Further analysis of the drying data already collected and the use of simulation modelling should lead to an alternative bulk drying controller that can minimise operating costs whilst maintaining crop quality.

**Fig 5 A single heating/drying cycle.**





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# UPDATE

SUMMER 2013

LATEST NEWS AND INFORMATION ON THE LAND BASED  
TECHNICIAN ACCREDITATION SCHEME (LTA)

## Independence Day arrives

### Training to be provided by Barony College

SKILLED technicians are the backbone of every service industry - none more so than in the land-based engineering sector.

Making sure that tractors run efficiently, combines work effectively, fine turf mowers cut perfectly and chainsaws run safely are all in a day's work for technicians working in an industry that extends from farms to large estates, golf courses to forests, lawns to sportsgrounds.

Faced with such diversity, the industry itself launched the ground-breaking Landbased Technicians Accreditation (LTA) scheme in December 2007. Its aim is to establish a clear career path for technicians through the achievement of four qualification levels, Entry (LTA1), Standard (LTA2), Advanced (LTA3) and Master (LTA4)

To date, dealership technicians achieving LTA qualifications have done so by participation in the training provided by their main tractor and machinery franchises, and over 2,500 technicians have gained LTA status.

But there are many sales and service dealerships in the UK who are not aligned to a major machinery franchise to whom manufacturer sponsored training has simply not been available.

Following many months of planning and preparation, the LTA scheme has been extended so that qualifications will be now be accessible to technicians whose dealership does not hold one of the major franchises

The Independent LTA Career Pathway

has been developed and will be delivered by the appointed LTA Assessment Centre at Scotland's Rural College (SRUC Barony) near Dumfries utilising distance learning modules developed uniquely for the LTA scheme by the college engineering team lead by section head, Drew Easton.

The new Independent scheme launched formally on 15 April 2013, when SRUC Barony started processing the first applications from dealership technicians.

David Kirschner, LTA manager and coordinator says, "Technicians are the 'engine-room' of every dealership, and as an industry we have to ensure that we provide them with a recognisable career pathway to the benefit of their employers, customers - and of course



SRUC BARONY CAMPUS

On October 1st 2012, Barony College merged with Oatridge and Elmwood Colleges and the Scottish Agricultural College to become SRUC, Scotland's Rural College

“ . . Technicians are the 'engine-room' of every dealership, and we must provide them a recognisable career pathway ”

themselves. In doing so it will make the industry more attractive to new recruits and help dealers retain their highly valued technicians.”

The LTA scheme is regulated and administered by the Institution of Agricultural Engineers (IAgrE), a licenced body of the Engineering Council UK, and has the support of the AEA and BAGMA.

#### FURTHER INFORMATION

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### Appentices celebrate graduation

A TOTAL of 28 young service technicians recently graduated from the John Deere Ag Tech and Turf Tech advanced apprenticeship programmes, run by national training provider Babcock.

The group of third year students, just over a quarter of the total of 102 apprentices now undergoing training with John Deere and Babcock, received their certificates during a specially arranged visit to the company's Mannheim and Bruchsal facilities. This included the John Deere tractor and cab factories, the European Parts Distribution Centre (EPDC) and a graduation dinner with John Deere management.

The presentations were made at the John Deere Forum visitor centre by John Deere's regional training delivery manager Peter Leech, John Deere Limited training manager Chris Wiltshire and Babcock programme manager John Chambers.

Philip Elliston of East Sussex dealer Burden Bros Agri Ltd at Framfield was named apprentice of the year and presented with a crystal plaque, an additional certificate and vouchers for workshop tools worth £300.

The apprentices can go on to complete their education for a fourth year to gain the John Deere Diploma and register at LTA2 level in the industry's Landbased Technician Accreditation scheme, while starting their adult training within the John Deere University.

Now in its 21st year, Ag Tech was the first such scheme to be introduced in the UK and won a National Training Award at the end of 1997, the only one ever made to an agricultural machinery apprenticeship programme. Since the first programme started in 1992, more than 525 apprentices have graduated through all three John Deere schemes (Ag Tech, Parts Tech and Turf Tech) and are now working in the company's nationwide dealer network.



John Deere Ag & Turf Tech graduation group

# FEEDBACK

## Towards sustainable land management

### A few thoughts on Bob Evans' article

BOB Evans raises many important points in his article 'Towards sustainable land management in Britain' (*Landwards*, Spring 2013) and gives a list of 12 points to be addressed.

Few people who have any working relationship with the land will disagree with him. It is a very different matter however to put together a coherent strategy that can be translated into positive action by the many agencies and users who have either a statutory or functional say in what happens on the land these days.

I started out on my agricultural career in Devon (1950s) working and living on small farms with small fields many of which were pretty steep. Many of these fields due to the desperate need for food during WW2 had been cultivated. Steep land, often with poor soils, was ploughed at great cost - needs must when the devil drives.

Sadly after the war this misuse continued but now as political belief. The drive for so called 'farm efficiency'; financed and driven by crop production subsidies, by The State for 'Cheap' food distorted the true sustainable land value.

This in turn brought in to being the hedge removal / bigger machine concept of land management. A key element of this drive was the massive blanket use of agricultural pesticides without any associated pest assessment plan (IPM) along with heavy blanket applications of NPK without the balancing application of large amounts of organic matter. The removal of the subsidy on agricultural lime did not help.

This cascade of actions was, in many cases, extremely damaging to the soil structure as long slopes on poorer soils were opened up to increased in-profile water movement causing a process of slow soil particle differentiation, separation and subsequent movement down the slope.

The effect of this is easily noticed these days during periods of drought when the upper portion or a raised portion of a field dries out more rapidly than the rest with the associated poor growth or plant death. Under UK's past climate these effects were slow and thus took time to be noticed. I would suggest that climate change is accelerating this problem.

To really see this happening speeded up one only needs to spend some time in sub-Saharan Africa.

Having taken an NDA at Seale-Hayne I went to Tanzania (1964-69) and saw erosion taking place on a considerable scale particularly after logging on steep slopes but generally everywhere where mechanisation was effectively increasing the size of areas under cultivation. On to Ethiopia (1969-73) and Iran (1973-78) on large scale irrigation projects where water control is

naturally essential but the key is the quality of the drainage. Soil particle differentiation and movement is easily caused if the quality of the irrigation system is poor, particularly if there has been significant mechanical soil movement to provide the slope required to irrigate significant areas. And poor drainage just builds up salts.

I came back to UK (Scotland) and consolidated my field knowledge with an MSc in Natural Resource assessment for Development Planning at UEA (1983) and then out to Nigeria. I worked for both the private and the public sectors all over Nigeria for 18 years - a very big country and due to its range of climates and soils can demonstrate just about any soil condition and all sorts of human damage. The biggest single factor in Nigeria to preventing erosion is ground cover and soil organic matter. This principle would appear to hold good pretty much wherever in the world you are farming.

Like Bob, I too have done soil sampling in East Anglia but also in Fife in Scotland. As part of my dissertation I looked at aspects of wind-blown soils on light sand soils in East Fife.

During this time I noticed that gully erosion was common and not only on the light soils. The main cause seemed to be heavy cultivation in larger fields with a substantial slope with a greatly reduced application of organic matter - few straw choppers on combines and straw burning everywhere. The pressure to get the land turned round and the crop in is more of a driver than any concern over short term damage to the soil. However the key factors of soil structure, soil organic matter and moisture retention capacity are still there and are now starting to show.

Land users face a series of dilemmas, but the main driver is still the need to meet the climatic window of opportunity for planting / harvesting whilst being driven increasingly by the range of pressures best referred to collectively as financial but increasingly these days statutory; e.g. nitrogen and now phosphate levels in surface and ground water. To help deal with this 'window of opportunity' problem fields have been made even larger, power units more powerful and machines larger (heavier) and / or wider.

We need to step back a little and look again at our field / drainage layout.

The present field and hedge structure and in-field drainage layout is no longer fit for purpose, if it truly ever was. It came



about not by careful analysis but by the limitations of first, man-power, then the ox / horse cart and then aspects of land ownership. In more recent times with the advent of power tools and small farms, consolidation hedges have been removed, as have drains, with no thought to in-farm or off-farm drainage and soil damage nor are the changes designed to deal with long term, cost effective, land management needs. This is especially true if the present trends to a more erratic weather pattern become the norm.

The above situation, as discrete pieces of land have over a long period of time joined up to form the present day field pattern we all see, has exacerbated issues of appropriate land cultivation and the sustainability of the overall drainage system as well as seriously damaging the balance of the natural flora and fauna both in the soil and on and around the soil.

Is this process really sustainable in either cost effectiveness or long term yields?

Indeed: if the soil condition and land use approach has to change, it also begs the question as to just what direction plant breeders and seed producers should go.

Based on my brief synopsis above I would suggest the following strategy - 'pie in the sky' it might be and without doubt imperfect - but there is a need to start to do something, and very soon, if soil quality is to be regained and long term yields sustained:

- 1 A field and drain layout is required that will allow the efficient use of all the land all of the time i.e. it must provide a sound financial return on investment to the farmer whilst feeding the people and maintaining or enhancing the natural resource base (Do no harm). This means that all the plants - both annuals and perennials must be able to make a contribution to the wellbeing of the farm as well as provide income over both the short and long term.
- 2 Trees of all sorts must be incorporated in

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Or the IAgRE Communications Officer, Marion King on [pressroom@iagre.org](mailto:pressroom@iagre.org)

to the cropping system and they must be laid out in such a way that they can be managed to the best advantage whilst contributing to the drainage system and the annual cropping system.

- 3 As the slope, or more accurately the degree of slope, along with the associated soil type, aspect and altitude are key to the drainage characteristics and thus the farmability. The use of the natural slope (contours) presents itself as a starting point for a more sustainable land management system.
- 4 Various perennial plants - fruit trees, fruit bushes, quality timber, bio-mass plants etc. - can be incorporated into a carefully laid out on-the-contour strip system that both provides control and direction for accumulating down slope drainage. The permanent ground cover associated with perennial cropping carefully managed provides, along with many of the longer lived perennials, and shorter term meadows, a sound wildlife habitat. Ground too steep for any sort of annual or short term cropping can be put into a long term mixed forest and / or coppicing programme, but it must produce a contribution to the farm income.
- 5 The width of the annually cultivatable strips sandwiched between the perennial strips; the new hedge and drain line effectively, is determined by the erosivity of the soil, mainly its structure and the degree of slope - the steeper the slope the closer the strips. With carefully surveyed work, and some soft engineering, a rationalised contour layout can be achieved whereby the ends of the strips feed the drainage into permanently covered shrub / bush or grazing areas. These feed into the permanent water ways. Farmers should be allowed - indeed required - to store water on-farm in a series of cascade mini-dams. These are held by a simple sluice gate at 50% capacity for farm use but can - by control of the sluice gate - hold twice that amount. This acts as a manageable flood limitation system slowing down local floods thereby keeping levels lower down the catchment area. A simple mobile phone call out to the relevant farmers from the Water authority would close or open sluices.
- 6 The arable strips are by design as near as possible to parallel and a few degrees off level to assist the drainage and, allowing for general terrain features, should be as long as possible. This provides good machine efficiency - long working runs and few short rigs. The ends allow machines to turn easily and quickly into either the working strip on shallow slopes and / or on steeper land into the next strip. The steeper the slope the closer the strips until it is too steep for annual cropping and is then best suited to perennial cropping. On-farm roads are built into the strip lay-out.

- 7 Massive machinery is not needed for day-to-day farming especially if no till or limited till systems are applied. Cross-slope deep ripping will however be required from time to time. This should be determined by compaction / density measurement as some soils and slopes will need more frequent treatment than others and compaction can be caused by a number of other factors other than just the passage of a heavy machine.
- 8 All the arable strips will need land-planing over a fairly long period of years. This is a simple mechanical process carried out, time and ground conditions allowing, annually, that slowly smoothens out the surface and fills in local low areas and cuts away local high spots. Not only does this smooth finish allow very accurate seeding giving optimum plant populations, it helps to prevent areas of poor drainage or excessive drying out where pests and diseases can get a hold.
- 9 The regular application of organic matter along with agricultural lime - particularly on the more erosive soils (high sand fraction) - is essential to regulate the pH, improve general soil structure and soil moisture / nutrient retention which in turn enhances the wellbeing of the soil flora and fauna. The system easily accommodates livestock particularly livestock that can build up useful quantities of organic matter - in shed. Much more however must be done with sewage and other green waste along with the in-shed dung / straw to accelerate soil improvement. If passed through a bio-digester on-farm energy in the form of methane can be produced, the digestate is much more manageable and the nutrient content monitored.
- 10 As long as the agricultural community has reasonably priced access to satellite navigation - the Galileo set of satellites should be a great help - there will be a reduced need for in-field man-power. The present progress with robotics will very soon put all in-field machines under the control of a 'robot' and may well reduce the size of the machine footprint. Along with permanently 'marked' strip layouts precision machine work can be managed by a large number of rela-

tively small tractor / power units.

- 11 The use of radio controlled small aircraft with real time cameras will bring the accurate application of nutrients and pesticides under a much tighter regime allowing only those areas - no matter how small - to be treated. As the actual amount of material that has to be transported is significantly reduced, very light vehicles can be used and compaction at critical periods can be avoided. Smaller smarter machines are the way forward.
- 12 Farmers need to look in great detail at on-farm energy production. This may well need the combination of farmer cooperation and the setting up of energy farms that are owned and managed by the farmers. There is great potential in the production of oils from screw presses with cake as a livestock feed, sugar-beet to methanol and cattle feed, gas from bio-digesters with organic digestate, small hydro-electrical systems and small wind-turbines. These can have other uses other than direct electricity production. They can also be used for the production of hydrogen as a direct fuel or for fuel cells.

Just about everything I have mentioned above can be found in practice somewhere in the global farming community - there is nothing new here at all. It just needs to be pulled together.

It is very interesting to note just who Bob quoted as saying "pie in the sky". Not dismissing but apparently inferring 'it can't be done' which at the end of the day is the real problem. Whatever is to happen the face of rural UK will have to change to meet the challenges that are inevitable - if for no other reason than to protect the heavily urbanised flood plains and low areas as storm intensity increases.

The future for The Land is far from clear but whatever happens it will not be to the liking of traditionalists, NIMBYs, extreme environmentalists, long established institutions such as ENH and some elements of the Establishment.

Many Land-owners / farmers and water managers along with engineers and researchers however will see that some aspects of it make sense and will adopt some if not all of the concepts. The present farmed landscape is the result of more than 2,000 years of agriculture. It will have to change radically to get where we need to be in the future.

Whatever it is it will have to take into account the hard fact that Great Britain is a group of relatively small islands with a very variable climate and an awful lot of people in a world that is no more stable now than it has ever been.

**... We need to  
step back and  
look again at  
our field /  
drainage layout**

Timothy Havard,  
MSc NDA, EngTech, CEnv, MIAgrE  
Fife

# FEEDBACK

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Or the IAgRE Communications Officer, Marion King on [pressroom@iagre.org](mailto:pressroom@iagre.org)

## Sustainable land management in Britain

I NOTE the invitation to respond at the foot of Bob Evans' article (*'Towards sustainable land management in Britain'*, *Landwards* Spring 2013), and so here are some thoughts.

My own experience leans more towards smallholder agriculture in developing countries, but I maintain an inquisitive interest in farming in the UK and visit farms as frequently as I can. As a result some of Bob's comments resonated with some of my own observations and concerns.

Here are just a few of them.

Removing hedges has had a really negative impact on wildlife (especially bees) and wildlife corridors. At the same time as being reservoirs of biodiversity, hedges have the capacity to reduce slope length ('L' in the Universal Soil Loss Equation) and so the severity of sheet erosion is reduced as soil accumulates against the barrier (*Figure 1*).



**Figure 1.** An ancient hedge has protected this hillside by retaining sheet erosion from upslope. Removing the hedge, an erstwhile common practice in the UK, will precipitate soil erosion both from wind and water, and impoverish biodiversity.

Soil degradation through excessive tillage results in compaction, less soil porosity, reduced water infiltration and increased runoff with its concomitant soil erosion (*Figure 2*).

Experimental work in Africa and Latin America has shown that no-tillage can increase water infiltration rates by up to 50%. (Is this the kind of research that we should be doing more of in the UK, given that climate change may well subject us to more severe weather patterns in the future?).



**Figure 2.** Tilled soil loses porosity and can have compacted strata in the profile. The result is reduced rainfall infiltration, increased runoff and soil erosion.

Organic matter (OM) is the life-blood of a soil, is the source of natural fertility and the creator of good soil structure; Bob recommends greater applications of OM.

Higher OM levels can also be achieved by crop rotations and, indeed, cover crops which maintain ground cover after the main crop harvest and, after management with knife rollers and/or herbicides, will form the high OM substrate for the following crop (*Figure 3*). Of course if the cover crop is a legume then there is the added bonus of increased N supply to the following crop.



**Figure 3.** Legumes are a good choice for cover crops as they improve soil organic matter and supply nitrogen to the following crop. A cover crop like red clover can also be harvested for seed.

The time has come for us to undo some of the environmental damage that we have caused. Humankind has, to date, destroyed 50% of the planet's 16 million km<sup>2</sup> of forest and, at current rates, we are on track to clobber 80% by 2030. Incorporating trees into agricultural systems (agroforestry - *Figure 4*) to protect vulnerable slopes, act as windbreaks or hedgerows or simply as associated cash crops is common sense in many parts of the world and it would be reassuring to see more applied research in the UK.



**Figure 4.** Trees incorporated into an arable cropping system to act as a shelter belt and wildlife habitat.

Eliminating ploughing and other soil movement means that the power requirement for crop production is dramatically reduced ? typically by up to 50%.

Crop establishment is achieved with specialized no-till planters which cut through the surface mulch and deposit seed and fertilizer at the required depths (*Figure 5*).

Biodiversity, soil health and environmental protection can be achieved without compromising crop yields by switching to conservation agriculture (CA).

CA combines no-till with permanent soil

**Figure 5.** A low-cost no-till planter from Brazil (Knapik). The front vertical disc cuts through the mulch and is followed by a chisel-tined fertilizer applicator and a twin offset disc seed slot opener. Offset discs are generally preferred in high residue situations (>4 t/ha).



cover and rotations to create resilient and sustainable cropping systems that conserve natural resources and biodiversity. It has been pleasing to see oil seed rape sown directly onto cereal stubble in the UK (*Figure 6*) - a good start which makes economic sense to farmers.



**Figure 6.** Oil seed rape broadcast onto wheat stubble with no tillage.

I fully appreciate that commerce and conservation are not always compatible companions - farmers the world over farm to make a living. The CAP has great potential to reward conservation-conscious farmers in Europe; but, in my humble opinion, it falls far short of exploiting that potential to promote greener, environmentally sensitive agricultural production.

Fortunately we do have pioneer CA farmers in the UK (*Figure 7*) who have realized that conservation and profit can go hand-in-hand when the right combination of actions is taken.



**Figure 7.** A proud CA farmer in the UK shows an earthworm tunnel in his structurally improved soils under a no-till CA regime.

Brian Sims

[www.engineering4development.co.uk](http://www.engineering4development.co.uk)



# Looking Landwards

COMMEMORATING IAgRE's 75th Anniversary, the *Looking Landwards* sci-fi short story competition, held in association with NewCon Press, continues this issue with the second placed entry.

## Landward by Den Patrick

Life As A Landward Captain  
25 July 2019  
Darren Kane  
[www.DailyHerald.Co.Uk/tech/farming](http://www.DailyHerald.Co.Uk/tech/farming)

"It gets a bit windy, mind" he says, typical English understatement beneath the Cornish accent. We are currently five thousand feet up, looking across six acres of wheat, swaying in the breeze. I clamp a hand down over my hat. The sky is clear but it's far from warm.

"You can avoid the worst of it. That and the rain. You can take a Landward anywhere. Almost."

He flashes a grin, weather-beaten face deeply lined. There's plenty to be cheerful about. Being able to transport a crop field and 'chase the sun' is a unique and startling feature of the Landward. The idea of creating a free-floating substructure was purely the domain of science fiction; the invention of a 'mobile farm' unthinkable. Mass and by extension gravity has become a less trifling concern since the Higgs breakthrough.

"I sometimes think it's like being an oil tanker captain," he adds, "Except we grow crops. And we're in the sky. Obviously."

It hasn't all been plain sailing. The ill-fated Faun was the first of the Landward platforms to suffer massive engine failure.

"Aye, the Faun event was bad. Even watching the footage it's difficult to imagine."

All Landward Captains know the event inside out. Six acres of mobile farmland plunging straight down. The resulting impact was felt across the UK. The town below never stood a chance.

"That can't happen now," he says, sensing my unease, "the back-up Gennies have back-ups. The chances of having triple engine failure are unthinkable. There's multiple SUNN fields in the newer models."

He's stopped sounding like himself, reciting the company manual by rote.

The SUNN field alters the structure, taking the Landward into the sky by means of negative mass. Since the Faun event the crews are under strict orders to stay over international waters. There are as many meteorologists aboard as there are engineers, as many navigators as there are farm hands.

"Aye, everyone mucks in though."

The truth is that a single Landward, whilst autonomous, is a large automated

affair. The crops are brought in with harvester drones. Weather fronts, commercial air traffic, even the oil tankers below, all register on the Landward's Central Systems. Huge antennae extend from the front and rear, cat's whiskers sensing trouble.

"Course, everyone hated them at first. Said it was unnatural. Having so much air traffic was bound to come to no good. They got quiet when the price of bread come down, mind."

I look over my shoulder and see another five Landward platforms in loose procession. Each behemoth is identical to its kin; a farmstead at the centre surrounded by fields. Warning lights blink from their undersides, red and blue. It's not uncommon to find the Captain (and more to the point, their Central Systems) all chasing the same weather patterns.

"It's nice when you meet up," he says, nodding at the convoy. "Farming up here is just the same as farming down there; it's the isolation that gets you."

An independent study recently showed that suicide rates among Landward farmers equalled their land-bound equivalents.

"There's counselling and that," he drawls, quieter now, "And the horizon has a proximity detector, but some still take the quick way down." He turns and walks back to the cottage, hands thrust deep into pockets, head down. The horizon he speaks

The SUNN field alters the structure, taking the Landward into the sky by means of negative mass

of is the edge of the Landward. The end of Terra Aeris to the crews who work them. The quick way down is the

Landward farmer's preferred method of suicide. Standing at the edge it's hard to imagine stepping off. I follow the Captain, who is already inside his cottage and brewing tea when I enter.

The dwelling could be anywhere in the South West of England. The thatched roof seems a liability considering the high winds.

"It's not real," says the Captain, "just a little bit of home comfort from the Company. They say it's important we have something familiar, still feel like we're part of the world. Not farting about on some agricultural space ship."

The cottage features a sheep dog, despite the lack of sheep, and a selection of collectible plates, all beaming smiles of the Royal family. The Captain shrugs when he notices me looking at them.

"They were Mum's. She loved the Royals. And farming. Not sure what she'd make of this up here though."

The cottage bears all the features of modern living. The only thing lacking is a woman's touch, conspicuous only by its absence.

"Sometimes the helicopter pilots are women. That perks everyone up, I can tell you. Even Old Kip takes a bath when the choppers come in."

Not too many women are keen to leave their lives on the ground to be a Landward farmer's wife. Old Kip, it turns out, is a veteran of the Landward project, one of the first crew and the oldest skyfaring Captain. His odour is put down to 'eccentricity'.

"Most retire young. Hope to get back home so they can find a woman. And with the supermarkets paying less and less each year . . ." he grimaces. "That business with the dairy farmers is all wrong. Still, they can't get the cows up here. Yet." The Captain nurses his mug of tea to his chest, staring through the window at crops five thousand feet above the Earth.



Looking Landwards anthology publication to be released by NewCon Press later in the year

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Issue 68 Number 2 Summer 2013

**MEMBERSHIP MATTERS****BRANCH REPORTS****NORTHERN IRELAND BRANCH****Modern grassland machinery from Krone**

A WELL attended meeting of Northern Ireland Branch IAgrE members and guests recently enjoyed an illustrated talk by Mr Henrik Feldman, Division Sales Manager for Krone's Export Department.

The venue was the College of Agriculture, Food and Rural Enterprise's (CAFRE) Greenmount Campus, Antrim where, following the talk, an impressive display of Krone machinery was staged undercover by Farmhand Ltd. The Dublin based company has been exclusive Krone importers to Ireland for 50 years.

**The speaker**

Henrik Feldman grew up on a farm in Germany. He worked for an agricultural contractor there whilst completing his studies and going on to start his career with Krone. He spoke with enthusiasm about the company, its history and its products.

**Krone origins**

Bernard Krone first set up a blacksmith business in 1906 and his wife Anna ran a restaurant / hotel. The company is still in the hotel business and the following is a summary of how the engineering side has been developed.

Krone is still a family business based at Spelle in NW Germany and its present head is the fourth Bernard Krone to occupy that position.

As well as producing its now well known range of agricultural machinery it also manufactures around 30,000 artic-trailers and chassis each year for the road haulage industry. The company also runs the largest John Deere dealership in Germany.

Krone produced agricultural trailers until the 1980s and other machines such as cultivation equipment and the Krone Optimat rear discharge manure spreader. The slatted floor conveyor from the spreader was the basis for Krone's first enclosed chamber round baler during the 1970s.

Now Krone agricultural machinery production now concentrates on its forage harvest range of mowers, tedders, rotary rakes, self-loading forage wagons, round balers, high-density big square balers and high capacity self propelled forage harvesters.

**Design**

There is strong emphasis on research and development with the technical innovation in



L - R: Henrik Feldman (Krone Export Department Division Sales Manager and guest speaker); David Borland (Farmhand Ltd Sales Director); George Wallace (AgrE branch chairman) in front of a Krone Big X Harvester

each product range being subject to a structured process of customer /dealer consultation to evaluate markets, needs and trends.

The company has 130 development engineers and 40 test staff. They build prototypes and pre-production machines to be evaluated for world markets. As expected, not every prototype makes it to full production. The factory, at Spelle, occupies 150 acres and has its own field and indoor test facilities. 3000 people use the training centre there each year.

**World markets**

Krone has 60 main market outlets with the following main markets. As well as its own strong home market, it exports machines to other countries of Europe, Eastern Europe, the US, NZ, China, South America and Asia.

**Krone in Ireland**

Krone has been represented in Ireland by Farmhand Ltd, Dublin, since 1962 when the company was set up by Denis Scrivener and Bernard Krone. Scrivener family members are still involved in the company which has also imported the Amazone and Alo Quicke brands since then.

An example of Krone Dealership coopera-

tion is evident by some mowers, such as the EasyCut 3200 Cri, having an 'i' (for 'Ireland') in the model description for a specification developed to handle high grass yields in wet conditions.

**THE KRONE RANGE****Mowers**

All Krone mowers are now disc type and most use the EasyCut fully welded wedge shaped cutter bars with quick-change blades.

They range from the rear linkage mounted 2.0m (AM 200S) to a 4.0m offset trailed unit with a mid mounted drawbar. This is instantly adjustable to permit starting at one side of a field and mowing up and down in either direction. For special markets there is an even wider 6.2m model consisting of 2 mower conditioners carried in a single machine frame and towed end-on for road travel.

The options of various combinations of front-mounted, rear-mounted or a trailed mower on the same tractor make cutting width combinations of up to 10.1m (33') possible. A typical arrangement can be a spring suspension 3.14m mower carried on the front linkage and a 'butterfly-wing' set of two folding offset mowers on the rear link-

age. The features on these mowers are the result of design work to achieve 3D ground contour following and damage protection.

Most of the Krone mowers have the SafeCut disc protection system. If a rotating disc strikes a rock a tension roll pin breaks allowing the disc to spin, 15mm up on the threaded drive shaft, out of the way of the adjacent discs

There are 2 types of conditioning unit on mower-conditioner versions. The mounted types use 'V' type steel tines and trailed versions may use these or the optional profiled roller types. An hydraulically driven cross conveyor is also available to offset or place several swathes together.

Krone finds that the mower market varies between countries and regions depending on their climates, grass yields, harvest growth stages, farming practices and the prevalence or otherwise of contractor services. The widest are likely to go to places like the large fields of Eastern Europe. It may surprise some to know that contractors working in areas with small irregular shaped fields (including parts of Ireland) prefer the large self-propelled Big M mower because of its manoeuvrability and ease of operation.

### The Big M

The Big M, introduced in 1996 as Krone's first self-propelled mower, is now well known across the world.

The Big M 420 is powered by a 6 cylinder MAN 423hp engine and its combination of 3 mowers (1 front plus 1 mid mounted on each side) cuts 9.0m or 9.7m in each pass depending on which type of conditioner is fitted.



Its transport width is 3.2m and it can travel at 40kph on the road. It can work at up to 20 kph in the field and 4 wheel steering gives it a tight turning circle.

There is also a Big M 500 with 510hp and a cutting width of up to 13.2m which is the world's most powerful specialist mower.

### Tedders and rakes

Krone have a wide range of tedders available from the smallest 4.6m 4 rotor mounted machine to the huge 19.6m 18 rotor model. In spite of its width, the latter can be folded automatically within 30 - 40 seconds

for towing on the road.

The range of Swadro rotary rakes includes single-rotor rakes from 3.5m to 4.6m and higher capacity twin-rotor rakes between 6.2m to 9.7m. There is also the range of centre delivery rakes of which the 2 rotor versions gather up to 10 metres, 4 rotors to 13.5m and the huge 6 rotor version to 19.0m.

All the designs are easily folded and transport heights are kept to less than 4m and the frames are suitable for road travel at up to 40 kph.

### Balers

The balers also use camless pick-ups and are available as basic 1.25m or 1.55 fixed chamber or 1.0m to 1.5m variable versions with a feed rotor and a multi-cut chopping system with up to 17 knives.

There are also combined baler / plastic film wrapping versions. The Comprima version uses patented endless rubber treaded fabric belts, with cross slats, running at high pressure to increase bale density.

The Ultima is said to be the world's first baler / wrapper which can continue taking in crop (by using a pre-compression chamber) when the finished bale is being transferred by gravity to the wrapping unit. This system is claimed to achieve up to 50 more bales per hour than a standard round baler. The Tractor Implement Management system is an example of how electronics, sensing the load in the baler, can work together with an autochange transmission to control the tractor's ground speed and maintain an even feed for better bales.

Krone also make high density 'big square' balers. The BigPack range, depending on model size, produces bales of 0.8 x 0.9, 1.2m x 0.7m, 1.2m x 0.9m or 1.2m x 1.3m. The X-Cut (XC) versions have 16 or 26 knives and an intake rotor. The 1290 HDP version makes 1.2 x 0.9m bales and or sub-divides the bale (in the MultiBale system) by separately tying up to 9 separate bales in a single pack. The on-board weighing system can record both weights and moisture contents.

### The Big X

The Big X is Krone's self propelled forage harvester. It was the first to offer a machine with over 1000hp (for very high outputs of fine chopped material to supply biogas digesters) This was first achieved using 2 engines but the current 1078 hp version is powered by single a MAN 24.24litre V 12 engine.

This machine operates at full power when needed but reduces power by 38% when working in a lighter crop or during road travel. If necessary, the driver can return to full power by flicking a button. There are also 510hp and 775hp versions of the Big X. The 0.8m diameter chopping cylinder can carry up to 28 knives (or 40 for very fine chop requirements) and is fed by 6 pre-compression rollers.



L-R: George Wallace (IAgrE branch chairman); David Borland (Farmhand Ltd Sales Director); Henrik Feldman (Krone Export Department Division Sales Manager and guest speaker); Terence Chambers (IAgrE branch vice-chairman)

The Krone Vari Stream crop flow system uses spring loading in the floor beneath the chopping cylinder and the plate behind the crop accelerator to ease blockages and maintain smooth operation even when the incoming crop flow is variable. The AutoScan system provides automatic dry matter detection linked with chop length adjustment.

The Big X can travel up to 22kph in work and 40kph on the road. Four wheel drive is standard. Front end intake options include a 3m pick up, a 6.2m direct-cut disc header and a range of maize headers up to 10.5m. The larger versions incorporate a new intake with an endless collection conveyor to feed in the crop stems-first

### Machine display

The evening finished with a comprehensive display of actual Krone machines kindly arranged by Farmhand Ltd. This was an excellent opportunity to view and discuss them in detail as well as appreciating the size and sophistication of what had been described earlier.

Sincere thanks are due to Farmhand Ltd and Krone for providing such an informative, enjoyable evening and to Greenmount Campus for use of their facilities.

### Further information

Farmhand Ltd (Tel (01) 812 9700) are exclusive Krone importers for all of Ireland and they service 42 area dealers. All the technical information and brochures, videos and operator instruction manuals can be viewed on their website at [www.farmhand.ie](http://www.farmhand.ie) Area dealers also can provide more information and machine brochures.

Terence Chambers



## WESTERN BRANCH

### LECTURE REPORT:

*'The Origins and Objectives of the Douglas Bomford Trust'*, John V Fox  
Hon FIAgrE, Royal Agricultural College,  
6th March 2013.

THE lecture took place after the Western Branch AGM and was given by John Fox of the Douglas Bomford Trust. John is a past president of the Institution and worked for many years at Bomfords.

The lecture was given in two parts - the first a history of the Bomford company from its very beginnings in the 19th century through various incarnations up to today. This formed the 'Origins' section of the lecture. The second 'Objectives' part of the lecture outlined the work of the Douglas Bomford Trust and the opportunities it can offer those in the field of Agricultural Engineering.

John started by showing some interesting photographs of the first machinery used by Benjamin Bomford from 1860 and later by his sons Raymond and Benjamin Junior who founded R&B Bomford at Pitchill, Evesham in 1880. Originally the company carried out contracting work such as cultivation and watercourse dredging / clearing using their own patented 'Bomford Reversible Scoop' which was pulled between two Fowler steam ploughing engines. Other activities included maintaining the local roads in winter.

Hand in hand with their contracting business was their engineering side which maintained their equipment and designed their own bespoke machinery. In 1893 Harry Evershed joined the brothers from Fowlers in Leeds and between them they formed Bomford & Evershed. The company grew from there, carrying out contracting work over an ever expanding area.

Upon the demise of the nearby Humphries & Co who made threshing equipment and steam engines, the company saw this as their chance to purchase the Humphries business and their Atlas works at Pershore. At this point the company became Bomford & Evershed Ltd on 19th February 1904 with Harry Evershed as Managing Director and Raymond Bomford as Chairman.

Unfortunately the acquisition didn't go well and the Atlas works had to be sold with the company moving back to their original home, albeit temporarily, at Pitchill in 1907. Two years later the company moved into new premises at Salford Priors in which they have remained until today.

Four of Raymond Bomford's sons enlisted to fight in the First World War. Sadly, the eldest, Benjamin, was killed and therefore his second son, Douglas, became next in line to take over the companies of both R&B Bomford (later to become Bomford Bros. Ltd) and Bomford & Evershed. Douglas originally intended to enter the medical profession and before the war was a medical stu-

dent. After the war his profession turned to that of an engineer until his death in 1969.

The inter-war years saw the development of steam cultivation and the mechanisation of vegetable production. Development of off-road traction vehicles was also carried out in conjunction with the Sentinel company of Shrewsbury.

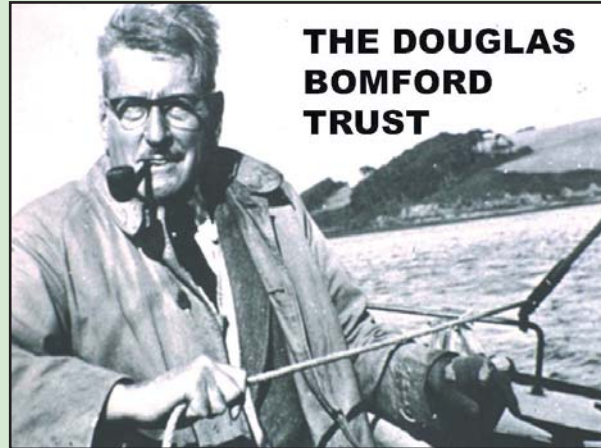
The outbreak of the Second World War in 1939 saw the contracting side of the business move into airfield clearance and construction along with the engineering side developing new machinery for the war effort including the Sapper Major and other dozer attachments for both tracked and wheeled tractors. After the war the availability of surplus equipment presented many opportunities including the conversion of Huber and Marshall road rollers fitted with petrol engines, to diesel power.

In the 1950s the business started to suffer from reduced profitability to the point where it made significant losses so the decision was made to sell the dredging side and concentrate on the more profitable manufacturing side from which the proceeds of the sale could be invested in. At this time Douglas was also President of the Institution of Agricultural Engineers and had been involved in the inaugural National Diploma in Agricultural Engineering. John Fox was a graduate of the 1954/55 course and was noticed by Douglas as a possible recruit to the business. However, first John had to carry out his National service and served with REME in Cyprus. Upon his release in 1957 he started full time as Technical and Production Manager at Bomford & Evershed.

One of John's first major achievements was the change from relying on sub-contractors to manufacture the high volume dozer and ditcher attachments to producing more in-house. Previously the overheads of the factory were not met by the small volume one-off jobs being built there whilst the majority of the sales volume was produced externally. John set about introducing a modern, streamlined production facility within the Bomford works.

Products produced around this time included the 'Superflow' rigid tined cultivator and the 'Turbotiller' secondary cultivator. Other products included the 'Flexitine' and 'Powertrak' which were marketed by Massey Ferguson.

The acquisition in 1967 by Bomford & Evershed of Bomford Bros Ltd led to the move into hedge and roadside maintenance equipment such as the 'Highwayman' arm flail mower which used hydraulic drive instead of belt drive. The 'Bushwacker' used forged flails mounted such that they could spin through 360degrees and prevent damage if anything hard was struck. The advan-



**THE DOUGLAS  
BOMFORD  
TRUST**

tages of a flail rotor as opposed to a reciprocating cutterbar are mechanical reliability and that no swath is left which would then need to be cleared up.

In the late 1980s Bomford & Evershed Ltd became Bomford Turner Ltd. This came about when B&E offered to buy out flail manufacturer and competitor Turner Engineering from the Elswick Group. This then got turned on its head when the Elswick Group offered to take over B&E and hence Bomford Turner Ltd was formed.

The Douglas Bomford Trust is the only UK charity focused on Agricultural Engineering.

Founded in 1972 in the name of Douglas Bomford, who had since died in 1969, its aim was to support and advance agricultural engineering by funding Post-Graduate study, Engineering Doctorate students and Scholarships. Therefore it is closely involved with the IAgrE with its Trustees mainly coming from the Institution. Capital investments provide it with an annual income in the region of £100k. It contributed to the Institution's contribution to the Foresight report and funds free Student membership of IAgrE as well as study tours worldwide.

The Trust is currently funding low ground pressure tillage and traffic experiments at Harper Adams University College along with a PhD at Harper in conjunction with Massey Ferguson (Agco) into optimisation of tractor control. High speed weeding and controlled application of spray chemicals are also examples of past and current academic work being carried out at various establishments helped by funding from the Trust.

Harper Adams will have a Douglas Bomford Lecture Theatre within its new engineering block and an inaugural Douglas Bomford Lecture is being planned, to take place there later this year.

Much more information about the Douglas Bomford Trust is to be found on its website: [www.dbt.org.uk](http://www.dbt.org.uk). The email address is [enquiries@dbt.org.uk](mailto:enquiries@dbt.org.uk).

In summary IAgrE Western Branch would like to thank John Fox for his interesting and informative lecture.

Rupert Caplat

## HORTICULTURE BRANCH

### Visit to BSC Wissington and Cornerways Nursery - 21st March 2013

WE were delighted to have the opportunity of a technical visit to British Sugar's Wissington factory. Although our particular interest was in its Cornerways glasshouse project there was also much of interest for us in their range of materials recycling and energy conservation activities taking place at the main factory site. Because of its strong message of sustainability for our protected-cropping industry we had also invited interested members from the E and SE Branches of the Institute of Horticulture to join us.

Our visit commenced at the main factory site where our host Andrew Dear, Agricultural Field Staff Manager and Tony Leigh, Technical Manager gave us an in-depth review of all the various industrial activities currently taking place at Wissington - one of four British Sugar factories, all located in the Eastern Counties.

It was clear that both economic and environmental pressures had played a significant part in influencing British Sugar's investment decisions for improving its capability and scope of dealing with raw materials at the Wissington refinery. Handling around three million tonnes of sugar beet annually, Wissington is one of Europe's most efficient factories of its type. Apart from an annual production of 420,000 tonnes of sugar it recovers a range of products either directly or indirectly from the actual sugar extraction and processing systems, the principal ones, with approximate annual tonnages, being listed as follows.

- **Soil** (58,000 tonnes) and stones (600 tonnes) from the initial beet washings and sold to the horticultural/landscaping and construction industries.
- **Dried animal feed** (over 140,000 tonnes) produced from the remaining beet fibre following sugar removal.
- **Lime** (120,000 tonnes) as a residue from the sugar purification process. Sold under the brand name of LimeX.
- **Bioethanol fuel** (up to 55,000 tonnes) resulting from a fermentation process with residues.

The other products, separated from the residual syrup, are a series of resins - 'extract', betaine (11,000 tonnes) and raffinate (76,000 tonnes). All three are used as animal feed supplements but betaine also has a place in healthcare. Up to 3,500 tonnes of CO<sub>2</sub> is recovered and liquefied annually from the fermentation process in the Bioethanol plant.

The success of Wissington's resource conservation strategy is equally matched by its energy management programme.

The various operations on the factory site have a high combined power / heating

requirement and it was realised that the best way of satisfying this while minimising overall energy demand was by the use of Combined Heat and Power (CHP) electricity generation. The CHP gas turbine generating plant, rated at an output of 320 MW, has the capability of meeting their maximum electricity demand while supplying sufficient 'reject' heat in the form of steam to meet the requirements for evaporation, sugar juice heating, glasshouse space heating at Cornerways and various other on-site requirements at a series of different temperatures. Electricity generated in excess of Wissington's requirement can also be exported directly into the local electricity supply grid system.

Wissington is supplied by approximately 1,200 growers who deliver their harvested crops, totalling an annual 3 million tonnes, by road over a period starting in September and finishing in the following February / March each year.



The final part of our morning's visit was a guided tour of their extensive reception facility for handling the incoming harvested sugar beet crop. Each incoming vehicle first crosses a weighbridge and then passes below a mechanical sampling device which collects sufficient material from its load for the laboratory to assess the proportions of waste material (soil and stones) but most importantly its beet sugar content.

British Sugar also provides further information to the grower regarding their delivery, such as the level of Nitrogen in the sample - this helps with soil / crop management of the farm.

From there it proceeds to the storage area where it unloads its sugar beet cargo. From the store the beet then goes through a plant that removes loose soil and stones followed

by washing prior to slicing, in readiness for the hot water diffusion process which extracts the sugar ready for purification and crystallisation.

It was a short journey for our afternoon visit to Cornerways which is located approximately 200m from the main factory site.

The original glasshouse, opened in 2001, covered an area of 5ha. Following further expansions, to 11ha in 2007 and 18ha in 2011, it is now the UK's largest glasshouse. In our tour of the glasshouse cropping area Robert Farthing, Cornerways Growing Manager, described their horticultural business of producing approximately 140 million tomatoes (10 percent of the current UK tomato production) from a quarter of a million tomato plants in a long-season crop harvested between February and November.

He pointed out that, while growing methods were largely conventional, their glasshouse and its sophisticated environ-

mental control system ensure they derive maximum advantage from Cornerways' resource conservation policy. This purpose-designed Venlo-type glasshouse, manufactured and erected by CambridgeHOK, allows adequate headroom for the crop while accommodating a full thermal screen system. The tomato plants are grown hydroponically in mineral wool modules. Its heating system is of the standard pipeline circulating type supplied by hot water via a pipeline from the factory boiler house; its proximity to the factory site is obviously of particular advantage here. It is also equipped with a one-million litre backup hot water store.

There is nothing new in the use of surplus heat from industrial processes, particularly from CHP systems, for glasshouse heating.

*continues over*



## IAgrE MEMBERSHIP MATTERS

In helping to cut production costs it has been used by a number of the UK's commercial glasshouse producers for some years. Apart from its scale, however, what is singularly significant about the Cornerways project is the fact that, together with the sugar separation process, its heating demand is shared with those of the other co-product preparation units; this can only be satisfactorily achieved with a fully integrated control system.

Other aspects of Cornerways' sustainability programme are its atmospheric CO<sup>2</sup>

enrichment to 1000 ppm using flue gas from the factory boiler and its rainwater harvesting system which captures an estimated annual 115 million litres from the glasshouse roof to be used for crop irrigation. Also of interest is its use of bumble bees (8,500 living in 170 hives) for assuring crop pollination and an integrated pest management programme which has been successful in eliminating spider mite, leaf hopper and russet mite infestations.

At the conclusion of this fascinating day's visit it was clear to us that British Sugar's ini-

tiative and astute lateral thinking in creating an integrated group of enterprises to successfully achieve conservation targets also provides the opportunity of reducing production costs throughout their range of products.

For all this we sincerely thank Andrew, Tony and Robert our guides and British Sugar in providing us with a most welcome buffet lunch.

John Weir



## WESTERN BRANCH

### Visit to John Deere, Germany May 2013

THIS trip was organised by Peter Anstee, who used to be a member, and who worked for John Deere in England, Australia and Germany, where he now lives.

Our first factory visit was to the Combine / Forage Harvester plant at Zweibrücken, where after a very warm welcome we toured the facility. Most of the sheet metal parts are made on site in modest batches, using a combination of old and very modern equipment - significantly most of the new machines are identical to those used in other JD plants around the World, so that work can be easily passed around and manufacturing information is common.

We inspected the impressive paint facility - most parts are dipped in massive tanks for pre treatment - and noted that painting is easier when everything is green!

Engines come from the JD range, except for the largest Forage Harvesters which use Cummins power. The pursuit of ever higher emissions standards is evident everywhere, with many engines using tandem turbochargers and we wondered at the amount of engineering resource no longer available for development in other, possibly more rewarding areas.

It is clear that JD do still have some budget left for combine development as a new design of single rotor system is now on offer. On the line we saw conventional straw

walker machines (still with some wooden bearings!) and inspected the new rotors with completely different design philosophy.

Subsequent conversations with Richard Vaughn (ex Harper Adams) gave us an insight into this development and renewed enthusiasm for the rotary separation system in the UK - good straw quality being one of its strengths. Combines now feature a substantial towing hook at the rear trunnion point as a sensible reaction to last year's weather!

Whilst combines are produced in the USA as well, forage harvesters are produced nowhere else and we could see the continuous development going into the versions to suit different markets.

Once we completed the tour we sat down with engineering and marketing personnel to discuss a range of questions we had prepared earlier - ranging in scope from emissions through telehandler production to graduate recruitment and the JD philosophy for product development in a World Wide market.

The discussions were very interesting and will be covered in a later article for *Landwards*, but it was significant that during the course of our trip we met six present or past IAgrE members working for JD.

As these discussions were very taxing we embarked on a tour of the local vineyards and then attended a local wine producer for more wine tasting - purely to widen our knowledge of this important facet of our industry.

Fully rested, we now travelled to the Carl Benz Auto Museum in Mannheim - actually

the factory opened in 1904 and is responsible for producing many significant advances in vehicle development. Particularly interesting items included original drawings and the opportunity to visit this privately owned restoration workshop.

We next arrived at the Mannheim tractor factory, originally the home of Lanz and which keeps the memory of Heinrich Lanz alive, both with his statue and a museum containing a number of his renowned Bulldog tractors.

Mannheim produces tractors up to 210 HP with engines from the Saran factory in France. Some of these feature two turbochargers and all have the JD 'Diesel Only' philosophy, relying on EGR to meet emission regulations.

The factory machines most of the transmission components in house, and we were shown many details of the 'Direct Drive' gearbox recently introduced - understandably we were not allowed inside the assembly area for this unit.

Gears are shifted using electromagnets as hydraulics react too slowly, the system being a more rugged version of the DSG gearbox used in cars. We were particularly pleased that all JD tractors have a common control layout to reduce driver training time and avoid accidents.

The machine shop used castings and forgings mainly sourced locally and we saw some CNC machines of a complexity not seen anywhere else in the world.

The pursuit of quality was evident everywhere but we were astonished by the use of

a Robot assembly solution for the tractor frame.

The ancillary tooling required to sort the necessary bolts into the correct attitude for assembly was fascinating and one has to bear in mind the huge variety of tractors assembled in this factory. The 'Just in time' lesson is ingrained in the production process, with cabs arriving no more than 3 hours before being fitted to the tractor!

At the conclusion of the tour we sat down to a further Question and Answer session with amongst others Dennis Muszalski the Factory manager. We explored a number of Tractor related subjects, including fuel consumption issues, ongoing tractor complexity and their impact on farm productivity.

Our abiding impression is one of pride in JD working towards feeding the world's population and commitment to making the investments necessary to make that happen.

Taking a break from EGR, we accompanied Dr Martin Kremmer to the Museum where he introduced us to his passion for the Lanz Bulldog and showed us how to get one started (surely a must for any factory tour?) - significantly the best Bulldog engines show excellent fuel economy, but possibly not complying with the latest emission standards! There is an obvious pride at Mannheim in the Lanz legacy which runs

parallel with the 176 year JD history and running this old tractor emphasised the solid historical foundation on which this business is based.

Richard Vaughn joined us for an initially open air dinner by the river, along which tractors head on barges to end up in England, and contributed to further spirited discussions covering his varied experiences at JD.

Our last day was spent at the Museum in Sinsheim which features both a Concorde and 'Concordski' in take off attitude on the roof - you can go inside both! The collection is very varied, with all exhibits in excellent condition and is a Petrol/Dieselhead's dream! See [sinsheim.technik-museum.de/en](http://sinsheim.technik-museum.de/en) for more information.

Our most sincere thanks must go to Nigel Anstee for getting his brother to arrange the



Now that's a Maize Header!

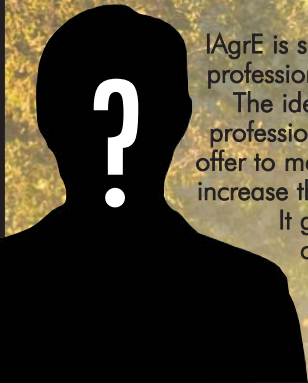
trip, Fraus Loughlan and Nagler for organisation at the factories and all the staff at John Deere for their unwavering enthusiasm and patience with us.

One need have no doubt that JD has a great team of hard working people in every department - to witness the calm way trucks were unloaded with parts and others loaded with complete machines was an eye opening experience (I bet it's not like that all the time!)

Richard Robinson

## Your Institution needs you

Someone out there is destined to be IAgRE's new CEO, could it be you?



IAgRE is searching for an enthusiastic and committed professional to replace its CEO, Chris Whetnall.

The ideal candidate will be passionate promoting professionalism, developing and expanding what's on offer to members and possess the skills and talent to increase the Institution's public profile and influence.

It goes without saying that they will need to be commercially astute and possess excellent communication and interpersonal skills. But it's also a chance to contribute to Society by helping the profession play a major part in the movement that is working towards easing the impact of climate change, global food security and underpin new economies in the UK and beyond.

The role will give you the chance to work with people who are motivated to achieve the same goals as yourself. It will never be dull as you constantly get to grips with a continual stream of new opportunities and challenges. Importantly, you will not be alone but will have the support of an enthusiastic back-up team, eager to help you achieve new milestones for the Institution.

There will be plenty of challenges to overcome: striking a balance between motivating volunteer resources with a business-like approach to efficiency, choosing the best ways to realise opportunities and most importantly promoting a profession that is not well understood or perhaps even fully valued by government and Society.

And perhaps above everything else will be the satisfaction and inspiration the role can bring in the knowledge that you have played a part in continuing the work of creating a life-long network of support, information and stimulation.

If you feel inspired or interested in finding out more, or if you know someone who fits the bill, have a conversation with them, bring this opportunity to their attention and more importantly get in touch.

More information about the role can be found at [www.iagre.org](http://www.iagre.org)





## Membership changes

### Admissions

A warm welcome to the following new members:

#### Member

Simmons R (Bedfordshire)  
Pearson N (Lancashire)  
Wiltshire C (Nottingham)  
Zvirime Mike (Zimbabwe)

#### Associate Member

Band R J (Perthshire)  
Cranny J (Ireland)  
Emslie K C (Aberdeenshire)  
Galligan K (Ireland)  
Harley A (Fife)  
Kamisan R (Malaysia)  
McIlroy B A (Northern Ireland)  
Mallon A L (Northern Ireland)  
Naylor A (Aberdeenshire)  
O'Brien K (Ireland)  
Ryan G (Ireland)  
Scott G A (Perthshire)  
Starkie L (Lancashire)

#### Associate

Chadzima A T (Zimbabwe)  
Fowler I (Lincs)  
Fretwell J (Lincs)  
Harron F A (Scotland)  
Phillips D J (Scotland)

#### Student

*Cranfield University*  
Ayuba K  
Jimenez-Donaire V

*Harper Adams University*  
Graham S  
Thomas R

*Plumpton College*  
Anderson B  
Barrett-Crosdil C  
Belsey P  
Brooks L  
Clifton L R  
Hayes I

Holmes J  
Jarman S  
Mitchell S  
Russell C

*Institute of Technology, Tralee*  
Kelleher K

*Wiltshire College, Lackham*  
Wallace G

### Deaths

We have recently learned of the death of the following member and we send our condolences to their family and friends:

**Mr John Linwood Page** (IEng  
MIAgrE)(Yorkshire) - a member since 1977

### Transfers

#### Hon Fellow

Leech P N (Lincs)

#### Member

Antille D L (Ireland)  
Bell J (Northern Ireland)

#### Associate member

Ray T (Leicestershire)  
Worsley C R  
(Nottingham)

#### Associate

Mill-Irving T  
(Cheshire)

### Engineering Council

*Congratulations to the following members who have qualified as Chartered Engineers, Incorporated Engineers and*

*Engineering Technicians entitling them to use the designatory letters CEng, IEng, and EngTech after their names.*

#### Registrations

##### CEng

J McMorran (Scotland)

##### IEng

Antille D L (Ireland)

##### EngTech

Cranny J (Ireland)  
Galligan K (Ireland)  
Mallon A L (Northern Ireland)  
Ryan G (Ireland)

### Society for the Environment

#### Registrations

Antille D L (Ireland)

## Long service certificates

Name	Grade	Date of anniversary
<b>60 years</b>		
G F Webb	AIAGrE	01 May 2013
<b>35 years</b>		
Edward John Thomas	AMIAGrE	06 Jun 2013
Jean Mary Churchward	IEng CEnv MIAgrE	07 Jun 2013
Peter John Loveridge	AIAGrE	08 Jun 2013
<b>25 years</b>		
Alan Drake	IEng MIAgrE	21 Apr 2013
Nicholas Charles Portch	CEng MIAgrE	21 Apr 2013
Alistair Lance Richard House	MIAgrE	25 Apr 2013
David Alan Cotterell	CEng MIAgrE	28 Apr 2013
Umar Buba Bindir	CEng MIAgrE	01 Jun 2013
Jonathan Clive Lace	AMIAGrE	08 Jun 2013

**We want to hear from members**

Send branch reports or correspondence to:

The Editor, Chris Biddle  
Email: [chris.biddle@btinternet.com](mailto:chris.biddle@btinternet.com)

Or the IAgrE Communications Officer, Marion King on  
[pressroom@iagre.org](mailto:pressroom@iagre.org)





## Academic members

Askham Bryan College  
Askham Bryan  
York  
YO23 3FR

SRUC- Barony Campus  
Parkgate  
Dumfries, DG1 3NE

Bicton College  
East Budleigh  
Budleigh Salterton  
Devon  
EX9 7BY

Bishop Burton College  
York Road  
Bishop Burton  
Beverley  
HU17 8QG

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  
Newport  
Shropshire,  
TF10 8NB

Institute of Technology Tralee  
Clash, Tralee  
Co Kerry, Ireland

Myerscough College  
Myerscough Hall  
Bilsborrow  
Preston  
Lancashire PR7 0RY

SRUC - Oatridge Campus  
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

Riseholme College  
Riseholme Park  
Lincoln  
LN2 2LG

SRUC - Auchincruive  
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

AGCO Ltd  
Stoneleigh, Abbey Park,  
Kenilworth,  
Warwickshire,  
CV8 2TQ

BAGMA  
Middleton House,  
2 Main Road,  
Middleton Cheney,  
Banbury,  
Oxon,  
OX17 2TN

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  
The Bullock Building  
University Way  
Cranfield  
Bedford MK43 0GH

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





## EVENTS

### IAgrE Branch Meetings and Events

#### Wrekin Branch

Sat 6 July 2013, 11am

SUMMER VISIT TO DANIELS MILL, BRIDGENORTH

Venue: Daniels Mill, Bridgenorth

A guided tour of the largest water wheel powered working mill in England.

Entrance: £5 adult, £12 family, light refreshments or lunch available by arrangement. Please contact Simon Cooper by 1st July to reserve a place. We hope to get a group rate.

For further information please contact Simon Cooper.

Tel: 01952 815261

Email: secooper@harper-adams.ac.uk

Web: www.danielsmill.co.uk

### Other Events:

Saturday 22 June 2013

Pioneering Technology Specialist Group (PTSP)

PTSG SUMMER VISIT - SWALCLIFFE BARN OXFORD AND HOOK

NORTON BREWERY

Venue: Swalcliffe Barn and Hook Norton Brewery

Download document below for further details together with maps/directions and websites.

Booking is essential so if you are interested please contact William Waddilove or Stuart Martin ASAP via [ptsg@iagre.biz](mailto:ptsg@iagre.biz)

Email: [ptsg@iagre.biz](mailto:ptsg@iagre.biz)

Wednesday 26 June 2013

EUROPEAN INDUSTRIAL BIOENERGY INITIATIVE (EIBI) CONFERENCE 2013

Venue: Van Maerlant Conference Room (VM1), Committee of the Regions, rue van Maerlant 2, Brussels

Part of European Sustainable Energy Week

Web: <http://www.biofuelstp.eu/eibi.html>

Wednesday 26 & Thursday 27 June 13

CWA

WETLANDS FOR WATER MANAGEMENT - CONSTRUCTED WETLANDS ASSOCIATION (CWA) ANNUAL CONFERENCE & AGM

Venue: Cardiff University

Themes: Wetlands delivering catchment management for objectives; Constructed wetlands - the latest developments and innovations; Operations, maintenance and life cycle of wetlands systems.

Email: [sarahhickinson@aquaenviro.co.uk](mailto:sarahhickinson@aquaenviro.co.uk)

Web: <http://www.aquaenviro.co.uk/view-product/Wetlands-for-Water-Management--CWA-Annual-Conference-and-AGM>

Thurs 4 July 2013

Harper Adams University

PRECISION FARMING CHALLENGES IN THE 21ST CENTURY

Venue: Harper Adams University, Newport, Shropshire TF10 8NB

Harper Adams University is hosting this conference to stimulate the research, application and innovation of Precision Farming technologies, by agricultural engineers, farmers, land owners, academics and policy makers. For detailed information and to register, please visit the website. Conference fee: £70.

Web: [www.harper-adams.ac.uk/events/claas100/](http://www.harper-adams.ac.uk/events/claas100/)

Monday 2 to Thursday 5 Sept 2013

Cranfield University

VI INTERNATIONAL CONFERENCE ON MANAGING QUALITY IN CHAINS

Venue: Cranfield University

Web:

[www.cranfield.ac.uk/health/researchareas/foodquality/mquic2013/mquic%20hi-res%20new%20leaflet.pdf](http://www.cranfield.ac.uk/health/researchareas/foodquality/mquic2013/mquic%20hi-res%20new%20leaflet.pdf)

Thursday, 5th September 2013, 0900

FEG

RESILIENT FORESTRY - ROADS TO MARKET

Speaker: Various TBC

Venue: Newton Rigg Campus

Annual FEG Symposium 2013. Please put this date in your diary NOW! Resilient Forestry - Roads to Market is the working Title. Early Bird prices will be available.

Tel: 07900607785 Email: [bruce.hamilton@forestry.gsi.gov.uk](mailto:bruce.hamilton@forestry.gsi.gov.uk)

Thursday 12 - Friday 13 September 2013

Confor

CONFOR WOODLAND SHOW 2013

Venue: Longleat Estate

Previously known as the South West Woodland Show, this is now a 2-day biennial event.

Web: <http://www.confor.org.uk/NewsAndEvents/Default.aspx?pid=174>

Monday 14 - Tuesday 15 October 2013

EWWM and Aqua Enviro

7TH EUROPEAN WASTE WATER MANAGEMENT CONFERENCE & EXHIBITION

Venue: The Point, Lancashire County Cricket Club, Manchester

Email: [sarahhickinson@aquaenviro.co.uk](mailto:sarahhickinson@aquaenviro.co.uk)

Web: [www.ewwmconference.com](http://www.ewwmconference.com)

Wednesday 30 - Thursday 31 October 2013

Briefing Media

CROPTEC

Venue: East of England Showground, Peterborough

Friday 8 - Saturday 9 November 2013

VDI-MEG and EurAgEng

LAND TECHNIK - AG ENG 2013

The 71st Conference LAND TECHNIK - AgEng 2013 is arranged prior to the world's leading fair on agricultural machinery, the AGRITECHNICA in Hannover, which will start on November 10.

Web: [www.vdi-wissensforum.de/en/nc/german-events/detail-seite/event/12TA001013/](http://www.vdi-wissensforum.de/en/nc/german-events/detail-seite/event/12TA001013/)

06 July 2014 to 10 July 2014

EurAgEng

AGENG 2014 - ENGINEERING FOR IMPROVING RESOURCE EFFICIENCY

Venue: Zurich

A conference focusing on the latest research and development in the whole field of agricultural engineering.

Deadlines: Submission of abstracts: 1 November 2013 Submission of Full Papers: 1 May 2014

Contact Robert Kaufman

Email: [AgEng2014@art.admin.ch](mailto:AgEng2014@art.admin.ch) Web: [www.AgEng2014.ch](http://www.AgEng2014.ch)

Full details of forthcoming events can be found on [www.iagre.org/events](http://www.iagre.org/events)

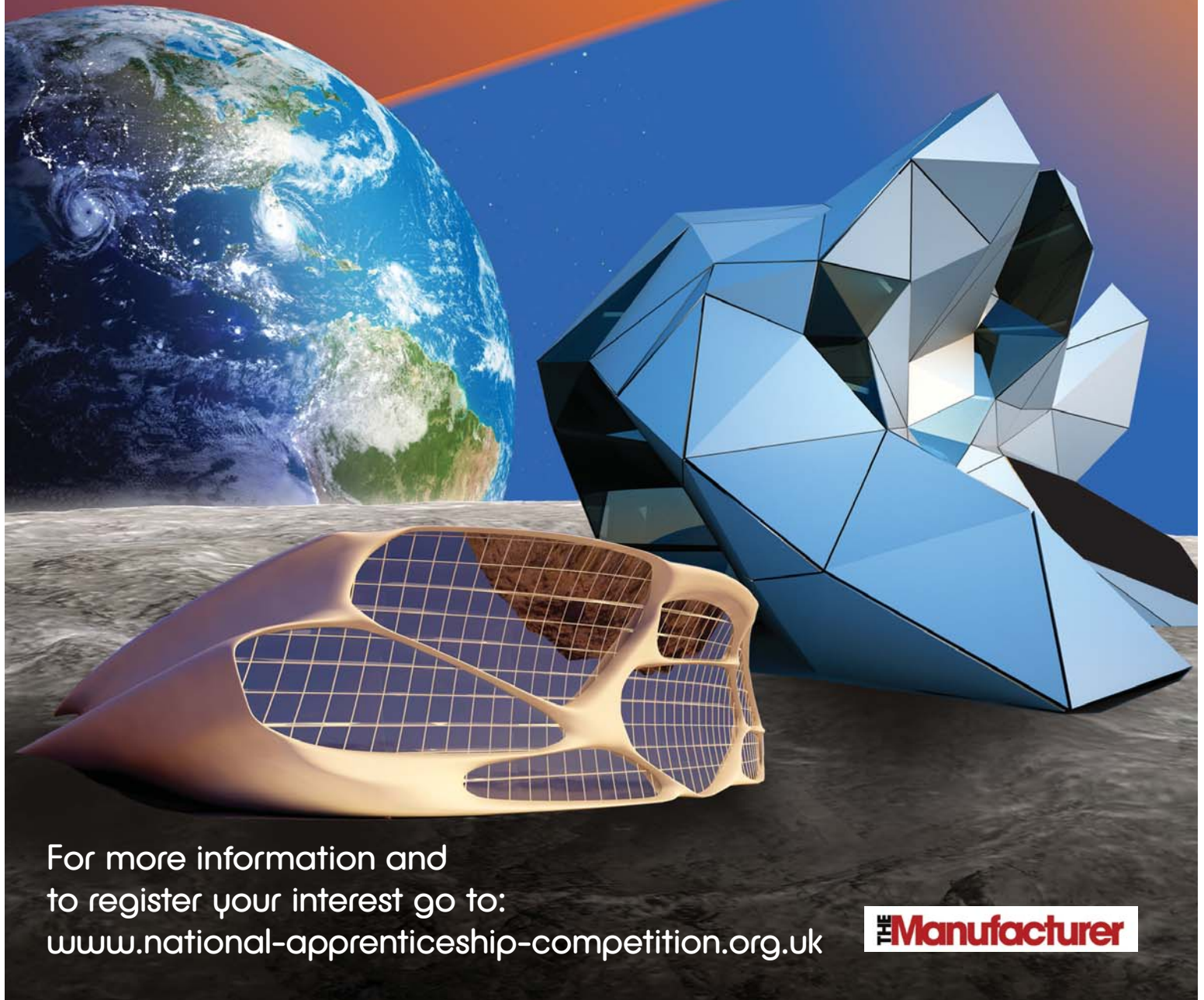
# National Apprenticeship Competition

*Cranfield*  
UNIVERSITY

## Manufacturing on the Moon

20th May 2014

Apprentices from all years are invited to work in teams from their institution and build models to demonstrate their imagination and present at the competition site at Cranfield. A team of national judges will select the winner.



For more information and  
to register your interest go to:  
[www.national-apprenticeship-competition.org.uk](http://www.national-apprenticeship-competition.org.uk)

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