Landwards

Agriculture • Horticulture • Forestry • Environment • Amenity

AgEng 2010 CONFERENCE

Report on Clermont-Ferrand event

MECHANISATION IN FRUIT PRODUCTION

Reducing reliance on high levels of labour

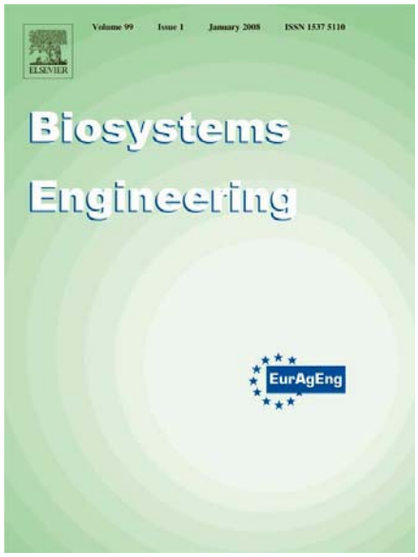
INSIDE: LTA UPDATE

LTA scheme launches in Northern Ireland and qualification extends to aftermarket professionals

IAgrE Professional Journal www.iagre.org Volume 65, Number 4 Winter 2010

Biosystems Engineering

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



Reduced subscriptions are available to members of IAgrE.

To view the full article list of the current edition, visit

www.sciencedirect.com/science/journal/15375110

For further details of the depth and breadth of articles accepted for publication in *Biosystems Engineering*, visit

www.elsevier.com/wps/find/journalbibliographicinfo.cws_home/622795/description#bibliographicinfo

For details of the preferential rates for members for subscriptions to both the paper and electronic versions of *Biosystems Engineering*, visit the IAgrE website at

http://www.iagre.org/bioeng.shtml

IAgrE

EurAgEng

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

Biosystems Engineering

Volume 106, Issue 4, August 2010, Pages 352-366

Local and global sensitivity analysis of a tractor and single axle grain cart dynamic system model

Manoj Karkee, Brian L. Steward

Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, IA 50011, USA

Tractor and towed implement system models have become increasingly important for model-based guidance controller design, virtual prototyping, and operator-and-hardware-in-loop simulation. Various tractor and towed implement models have been proposed which contain uncertain or time-varying parameters. Sensitivity analysis was used to identify the effect of system parameter uncertainty/variation on system responses and to identify the most critical parameters of the lateral dynamics model for a tractor and single axle grain cart system. Both local and global sensitivity analyses were performed with respect to three tyre cornering stiffness parameters, three tyre relaxation length parameters, and two implement inertial parameters. Overall, the system was most sensitive to the tyre cornering stiffness parameters and least sensitive to the implement inertial parameters. In general, the uncertainty in the input parameters and the system output responses were related in a non-linear fashion.

Volume 107, Issue 1, September 2010, Pages 1-9

Application of vapour-phase Fourier transform infrared spectroscopy (FTIR) and statistical feature selection methods for identifying Salmonella contamination in beef

Jayendra K. Amamcharla, Suranjan Panigrahi, Catherine M. Logue, Martin Marchello, Julie S. Sherwood

North Dakota State University, Fargo ND 58108, USA

The application of gas-phase Fourier transform infrared (FTIR) spectroscopy for its ability to discriminate between Salmonella enterica typhimurium (S typhimurium) contaminated packaged beef samples and uncontaminated samples is described. A suitable sampling system was used to deliver the headspace volatiles from the packaged meat to the FTIR gas cell. FTIR spectral signatures collected on headspace volatiles of meat packages were used to classify the meat samples based on their S. typhimurium populations. The most informative features were selected using three univariate and one multivariate feature selection algorithms. These were then used to develop the statistical discriminant models and validated using bootstrapping. It was found that sequential forward selection provided the highest estimated classification accuracy of 99% and mean estimated classification accuracy of 95%. The results support the use of gas phase FTIR to discriminate S. typhimurium contaminated beef samples.

Volume 107, Issue 2, October 2010, Pages 149-154

Modelling the dispersion of volatilised pesticides in air after application for the assessment of resident and bystander exposure

M.C. Butler Ellis, B. Underwood, M.J. Peirce, C.T. Walker, P.C.H

Silsoe Spray Application Unit, The Arable Group, Silsoe, Bedford, MK45 4HP, UK

AEA Technology, Birchwood, Warrington, WA3 7PB, UK

Evaluation of the potential exposure of bystanders and residents to pesticide vapour emitted from treated agricultural fields is an important component of risk assessment in the pesticide approval process. The information available for the development of a revised exposure assessment is reviewed and a new methodology proposed. Dispersion of vapours downwind of the treated field can be successfully modelled using commercially-available software, although there is no agreed method for predicting the emission of pesticide vapours from a treated field. The proposed exposure assessment model separates the emission of pesticide vapour from its downwind dispersion, allowing the latter to be tailored to UK conditions by using representative meteorological data. More work is needed to develop an appropriate model of emissions that can take into account environmental conditions and physico-chemical properties of the formulation.

The Professional Journal for Engineers, Scientists and Technologists in Agriculture, Horticulture, Forestry, Environment and Amenity

Landwards
Agriculture • Horticulture • Forestry • Environment • Amenity

VOLUME 65 Number 4 2010

THIS ISSUE

EDITORIAL

The industry's 'engine-room'

I was talking with the Principal of one of Ireland's long-established and largest dealerships about the impact on his business of the recent bail-out by the EU and IMF.

"We are just having to work smarter," he said. "Our customers are hurting, confidence is low, the banks are a no-go area to provide any further funding - and I am spending all my waking hours trying to find ways in which this business can pass to a third generation".

But he was not saying that business had dried up, far from it. Machinery and equipment was still being purchased and the service and parts departments were busy.

At such times, it is always a temptation to cut down on those areas that do not provide an immediate monetary return.

That means for manufacturers, investment in R & D and product development, and for dealers, in staff training.

All business owners and managers know that planning for the future is as vital as the day-to-day operation of the enterprise.

In the overall scheme of things, recessionary times as experienced in the UK, and more markedly for different reasons in Ireland, are transitory periods. Part of the inevitable ebb and flow of an economic cycle.

Through such times, there is a huge responsibility on the industry's 'engine-room', the colleges, the training providers, the scientists, the academics to find ways to enable the industry to work smarter.

Delivering quality training to the relevant people for instance, quicker and more effectively, particularly in key areas such as electronics and hydraulics.

We've talked about distance learning in the past as some kind of Utopian solution, but today with the advancement in communications and the rise of social networking, the delivery of targeted training is much more achievable.

Over the past two or three years, the LTA Scheme has provided a solid foundation for the advancement of technicians and other professionals in our industry. Now it needs to build on that foundation

In our special supplement with this issue, you can see how the LTA is developing with a launch in Northern Ireland and through initiatives being trialled by Barony College for an innovative and accessible distance learning package.

So plenty of positive news to end the year - and time for me to wish everyone in the IAgrE community a Very Happy Christmas and a Peaceful New Year.

CHRIS BIDDLE
Editor

PRODUCTION TEAM

EDITOR: Chris Biddle
Tel: 44 (0) 1722 429570 (direct line)
chris@nelsonpublishing.co.uk

SUB-EDITOR: Steve Gibbs
Tel: 44 (0) 1722 429573
steve@nelsonpublishing.co.uk

Nelson Publishing Ltd
25A New Street, Salisbury, Wilts SP1 2PH
Tel: 44 (0) 1722 414245
Fax: 44 (0) 1722 414561
www.nelsonpublishing.co.uk

IAgrE
www.iagre.org

Landwards is published quarterly by:
IAgrE
The Bullock Building, University Way,
Cranfield, Bedford MK43 0GH
Telephone: + 44 (0) 1234 750876
Fax: + 44 (0) 1234 751319
E-mail: secretary@iagre.org

President
Peter N Leech IEng, FIAgrE
Chief Executive and Secretary
Christopher R Whetnall CEnv IEng FIAgrE MemASABE

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

High Technology for Agriculture - The next phase

AS part of the '*High Technology for Agriculture – The next Phase*' series of forward looking events, IAgrE are presenting a seminar from Dr Evandro Mantovani at Harper Adams University College on Thursday 10th February 2011 at 2.00pm.

Entitled '*Development of Brazilian Agriculture and Recommendations for Precision Agriculture*' the seminar will consider how over the last three and half decades a new agriculture has been developed in Brazil solving the initial problems of food security and addressing the requirements for a sustainable agriculture, thus making it extremely promising for the 21st century.

Dr Mantovani says, "The high performance of agriculture from the use of new cultivars adapted to the different regions and the improvements on soil management using No Tillage System allowed farmers to produce two or three crops/years with great impact on nitrogen fixation, and biological pest control associated to precision agriculture. As a result of all these technologies the grain production increased by 126% with the planted area increased only by 21%.

"Precision Agriculture is a powerful tool in the decision making in Crop Production Systems Management as it helps farmers to establish good procedures when promoting alternative changes on real time for yield problems."

Another event in this series will take place on Tuesday 1st March 2011 at the East of England Showground, Peterborough, entitled '*Smart sensors in agriculture*'. This is a one day seminar in conjunction with The Precision Farming Event. Further details on this seminar can be found online at *www.farm-smart.co.uk/precision*

For further information on these events, call the Secretariat on 01234 750876 or visit the website at *www.iagre.org*.

Low confidence in UK skills base

Opinion of British businesses revealed in IET annual survey

A survey of 400 businesses has revealed that only 47 per cent believe the UK has the skills base to create a low-carbon economy and re-balance the manufacturing sector.

One in five employers reported that they struggled to recruit new engineering graduates. Looking forward, more engineers will be needed if Britain is to create a green economy with a vibrant manufacturing sector.

The results were presented at the report launch by Paul Davies, head of policy at IET and he was joined on the platform by Chi Onwurah, MP for Newcastle upon Tyne Central, David Bell, chief corporate development officer at JCB and Lynda Armstrong OBE, of Trustee Engineering UK.

Mr Davies said, "There is a significant lack of confidence among engineering employers that the UK can deliver on the government's ambitions to transform our industrial base.

"Two fifths of employers already struggle to recruit senior engineers. This is a stark warning that the UK will find it hard to take advantage of the demand for low-carbon technologies unless we see some big changes and attract a substantial generation of new engineers very soon."

David Bell said that when JCB recruited in the national dailies for engineers recently it received 2000 responses of which 50 per cent were overseas applicants, most had little experience and only 10 per cent were considered suitable for assessment.

The most commonly cited action to address skills shortages was to improve the profile and image of engineering, followed by enhancing engineering and technical degree content and enriching the school curriculum.

Lynda Armstrong said, "Engineering is the key to solving some of the world's greatest problems, nevertheless there is a significant lack of women in the profession which is probably attributable to its old fashioned image. They are twice as likely as men to leave the profession and often felt they were not progressing fast enough."

Paul Davies added, "We need to ensure more training is available so that school leavers can develop the skills they need in a competitive jobs market.

"Over the next five years a significant proportion of employers tell us that they will recruit even more apprentices. Despite the progress, more needs to be done to promote apprenticeships so that they are an appealing training option."

New associates for Engineering council

THE Engineering Council has announced the launch of a new category of adviser. 'Associates of the Engineering Council' are recognised as supporters of the organisation, who provide valuable assistance and support to its work through their knowledge, expertise and personal networks.

After accepting invitations from Professor Kel Fidler, Chairman of the Engineering Council Board, the first 22 Associates have been appointed.

Professor Fidler says, "We are delighted to welcome such an eminent group as our initial Associates of the Engineering Council, and look forward to further building our relationships with them. We are sure that the Engineering Council and its many stakeholders will benefit hugely from the wider range of advice and assistance this scheme will provide in future, as will those taking part."

Keith Marshall OBE, Chief Executive of SummitSkills, is one of the first 22 Associates of the Engineering Council and describes the concept as both innovative and fascinating. He says, "I look forward to the opportunity to work further with, and contribute to, the Engineering Council."

The initial 22 Associates of the Engineering Council are:

- EUR ING Professor David Anderson, FREng, CEng
- Professor Madeleine Atkins
- Dr John Chudley, CEng
- Philip Corp, CB, CEng
- Professor Bob Cryan, CEng
- Professor John Dickens, CEng
- EUR ING Dr Matthew Dixon, CEng
- Professor Richard Dodds, CEng, FREng
- Ken Fulton
- Dr David Grant, CBE, FREng
- Peter Hansford, CEng
- Associate Professor Kamel Hawwash
- Keith Lawrey
- David Long, CEng
- Keith Marshall, OBE
- Professor Rob Massara, CEng
- John Mattick
- Dr Leslie Mustoe
- Professor Sir John O'Reilly, CEng, FREng
- Sara Parkin, OBE
- Dr Anthony Vickers, CEng
- Annette Williams

IAgrE sponsor safety competition at APF Forestry show

IAgrE provided cash prizes and a certificate to the winners of a safety competition held at the APF forestry show at Cannock Chase recently.

The two overall winners were picked from the best entries amongst nearly 200 who entered over the three days. Competitors had to identify cutting techniques and bad chain saw practice from a range of tree stumps and identify defects in a range of components from machines.

First prize (£100) went to Julian Dormady, a Forestry Commission employee based in Kent. The second prize (£50) was shared between Adrian Armitage and Mark Beaumont, contractors based in Wakefield.

The competition was held in a new Safety Arena, organised by HSE together with a number of industry organisations through AFAG (the national Arboriculture and Forestry Advisory Group).

The competition was run by the Forestry Commission's training department and a large number of prizes were provided by leading chain saw manufacturer, Stihl. These included several sets of helmets/protective equipment awarded each day together with many other useful prizes such as first aid and tool kits.

The aim of the competition and several working demonstrations in the Arena was to highlight the consequences of accidents and promote good practice. This was achieved with a large forestry machine using a full size replica user-operated rail crossing (set up by Network Rail and the Office of Rail Regulation), simulated contacts with overhead power lines (by Central Networks/Eon and EDF) and various other activities, including a seminar on HSE's 'Buy Quiet' initiative, featuring noise reduction in wood chippers.


IAgrE's competition was held in the Safety Arena

IAgrE had a stand in the busy main marquee, where Bruce Hamilton and Chris Whetnall raised awareness of the Forestry Engineering Group and the LTA scheme. Other exhibitors included HSE and the Health and Safety Laboratory (HSL), using their 'vibrating seat' to raise awareness of precautions to prevent damage caused by Whole Body Vibration. Greenmech Ltd also provided a unique 'quietened' wood chipper for display and gave a presentation.

The Forestry Commission have kindly agreed to allow the rail crossing and OHPL to remain as a permanent training facility and to be used at future shows. HSE are keen to use this for Safety Days and other training events which could be run by HSE or other organisations for a wide range of industries, including utilities, construction, emergency services, etc. as well as farming and forestry.

If you have any ideas, please contact Alan Plom on *alan.plom@hse.gsi.gov.uk* .

Decline in UK tractor registrations

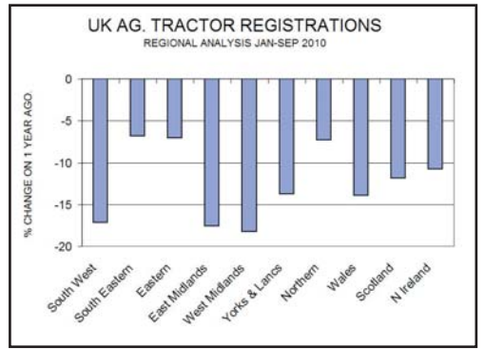
First 9 months of 2010 fall 12.6% on same period last year

UK registrations of agricultural tractors (over 50hp) reached 11,413 units in the first 9 months of 2010, a decline of 12.6% on the same period in the previous year.

No region saw an increase in tractor registrations but the strongest relative performances were in the South East (-6.8%), the East (-7.1%) and the North (-7.3%).

The weakest region was the West Midlands (-18.2%), followed by the East Midlands (-17.6%).

In terms of power analysis, Chris Evans, Economist at the AEA said, "The average power of tractors registered this year has been just over 143hp which is a decline of 1.3% on last year; this ties in with recent verbal reports that smaller tractors have been in demand."



Voluntary Initiative exceeds key targets

THE Voluntary Initiative (VI) Annual Report, published mid-September, confirmed that in its ninth year key VI targets have been met or exceeded.

Established in 2001, the VI promotes responsible pesticide use in UK agriculture and horticulture. Major schemes such as the National Register of Sprayer Operators (NRoSO) and the National Sprayer Testing Scheme (NSTS) and Crop Protection Management Plans (CPMPs) help raise environmental awareness and improve standards of crop protection.

"The continued success of the VI shows what can be achieved by industry working together with stakeholders, government and regulators in a 'Big Society' approach to responsible pesticide use," said Professor Barry Dent, Chairman of the VI Steering Group.

"I am particularly pleased that leading farm assurance schemes serving the livestock sector have recognised that responsible pesticide use applies to scheme members. In the coming years, livestock farmers who use pesticides will face new domestic and EU regulations. These will require them to adopt higher standards. Through the VI, we have established farmer-led schemes that should ensure livestock farmers can meet these new requirements with the minimum of red tape.

"Positive partnerships with the Environment Agency, Natural England and the Campaign for the Farmed Environment have proved very successful and the VI looks forward to building on these partnerships in its tenth year."

Ag Soc building wins international award

BEATING competition from Luxembourg, Belgium and across Britain, Yorkshire's Regional Agricultural Centre (RAC) has been commended in a prestigious international awards ceremony.

The £5.1m RAC, which is the headquarters for the Yorkshire Agricultural Society, was shortlisted in the sustainability section of the 2010 RICS Awards. It is based at the Great Yorkshire Showground, Harrogate.

Simon Pott, Chair of the judging panel, described the building as "remarkable" and a project which "comfortably meets the needs of the local agricultural industry while, fittingly, making the most of its natural surroundings to maximise energy efficiency and pioneer sustainability."

The category recognised sustainability in design and operation, balancing the economic, environmental and social criteria of the project.

Harper student wins NFU award

A POSTGRADUATE student from Harper Adams University College is just one of six agricultural students in the UK selected to receive a new award from the NFU Mutual Charitable Trust.

Beth Cooper (pictured), aged 26, will receive the 'Centenary Award' which was launched by the Mutual to celebrate its 100th birthday this year.

The award will give the selected students an annual bursary to pay for 75per cent of their course fees and is open to students from the UK who have gained, or are expected to gain a 2:1 or above in agriculture, or a closely related degree.

To select the students, the award's judging panel looked for applicants who were not only excellent academic performers, but who were also committed to the future of agriculture.

Farmers looking to invest in storage

Conclusion of market experts at recent UK Grain event

BUOYED by higher prices and strong consumer demand, UK growers are looking to invest in better storage, but at the same time seeking marketing vehicles that minimise the effects of price volatility.

That's the conclusion of market experts manning the GrainStorm discussion area at November's UK Grain Event held at Peterborough.

According to Jack Watts, senior analyst at the HGCA, growers were keen to get a handle on the factors influencing prices and the prospects going forward.

"Most had a really good handle on benchmark profits for their operations, but now, in reaction to a couple of volatile seasons, were looking at the best strategies to maximise returns.

"If anything, the trend was that a move away from spot sales towards pools and tactical marketing packages that sold grain based on trigger prices and options.

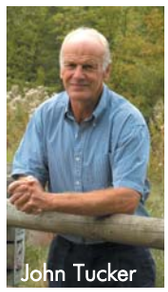
"Some were looking to long term contracts as a way of minimising risks, particularly in the malting barley and milling wheat sector.

Jack Watts, HGCA

"Growers also recognised that they needed to spend more time on marketing and pricing their grain, tracking developments and making themselves more aware of market drivers," confirmed Mr Watts.

New Trust director aims to re-kindle 'lost woodland culture'

WOODLAND charity the Woodland Trust has appointed one of its top woodland specialists to head its drive to inspire and help private landowners to plant native trees and woodland.



John Tucker

John Tucker, former England Director, is now Director of Woodland Creation for the whole of the UK.

His aim is to re-kindle what he calls a 'lost woodland culture'. The new role will involve promoting woodland creation, developing mechanisms and partnerships to make it happen and coordinating and promoting a range of new tree planting mechanisms available from the Trust.

Major partnerships are in the pipeline, a successful MOREwoods planting programme is approaching its second winter of planting and a new team of woodland creation specialists has been created to take the initiative forward.

"We have lost our woodland culture. We must re-kindle that and remind ourselves of all the good things that trees and woodland deliver, from the commercial to the cultural, from wildlife to wood fuel," said John.

"More and more people are waking up to the realisation that trees really can pay their way in the widest sense and we are here to help them.

"The message is simple, if you own land we can help you plant trees."

CFE campaign coordinator steps up to the mark

ONE of the Yorkshire coordinators of the Campaign for the Farmed Environment (CFE) is leading the way on his own farm when it comes to Campaign voluntary measures and key target options in Entry Level Stewardship (ELS).

Fraser Hugill has just taken over the 120 hectare farm in north Yorkshire from his father and has recently renewed the ELS agreement, as well as adding some Campaign voluntary measures earlier this year including 3.5 ha of game cover for the shoot on the farm.

He said, "The reality is that using ELS makes participating in the Campaign easy. When entering ELS the thought of taking areas out of production was painful, however the reality is that it has made the farm easier to manage and it makes economic sense.

"If we all take part in the CFE the real benefit will be to us as farmers in that we avoid more regulation and are ultimately seen by the general public, our customers, to be doing the right thing for the environment."

The ELS agreement on Fraser's farm includes buffers along watercourses (0.47ha), wild bird mix (1ha), undersown spring cereals (4ha) and over wintered stubbles (4ha). As well as the game cover, Fraser has also added an additional 0.2 ha of wild bird mix and 8ha of over-wintered stubble.

The Campaign gives farmers the flexibility to decide which areas of land they want to dedicate to environmental management and to choose what management will deliver the best results for the environment on their farm.

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

Christmas edition

CEO VIEW

Searching for a secretary

WHEN I worked for my last employer, it was not unusual to see a group of three people talking together who, between them, had over one hundred cumulative years of service within that company. And it was not always the same group of three! These were the people who knew where the bodies were buried and where the skeletons could be found, what worked and didn't work and where to find that important document.

Well, we can't quite manage that here at IAgrE but we do pretty well. A quick poll around the office gets us a total of 42 years. We could probably get to 50 years if we added in Mike Hurst who never really left at all. In fact our staff turnover has been remarkably low. With the exception of one of our number who was lured away by Stelios Haji Ionnaou (I think it was the lure of the orange uniform rather than his charms) the only staff changes in my time here have been due to retirements.

Indeed, one of the things the Engineering Council (and I guess, the Society for the Environment) look at in their five year re-licensing audits is staff turnover. They are perhaps as keenly aware as anyone how important continuity is when it comes to dealing with the complexities of such things as SARTOR (R.I.P.), UKSpec and the EngC Licensing and Regulations for Registration Manuals.

And now we have to start looking forward (unfortunate choice of words) to the retirement of our stalwart Membership Secretary - Wendy Hickman. Wendy has dealt with just about everything we have thrown at her including the LTA scheme administration . . . all with her usual cheerful disposition and always (well mostly anyway) with a chuckle.

Wendy has kindly (or otherwise) given us notice that she wishes to retire in August 2011. And so the search begins for her replacement.

To be fair to any replacement, we would like there to be an overlap of some 2 - 3 months, a luxury not awarded to Wendy due to the circumstances at the time. The main requirement is a sense of humour. Of course organisational and interpersonal skills are also important. In return, we offer a happy working environment and access to all the facilities that an office of this size affords - unlimited parking space (if you can find one), a choice of many food outlets for that hurried lunch, a choice of flying schools (if you wish to learn to fly) not to mention a choice of cash machines (to pay for it all).

Seriously though, the search is now on. If any one has any ideas, we will be pleased to listen.

In the meantime, we at the Secretariat send all of you our Best Wishes for the Festive Season.

Christopher Whetnall

Successful AgEng2010 Conference

Latest in the series of events saw 385 scientific papers presented to the delegates

CLERMONT-Ferrand, France welcomed over 450 delegates from 34 different countries around the world to AgEng2010.

They enjoyed an interesting and lively conference in the volcanic Auvergne region of France. In total 385 scientific papers were presented (241 oral and 144 posters) in 49 sessions. There were wide ranging presentations on 14 different topics. Power and Machinery, Soil and Water and Animal Production Technology attracted the largest numbers of participants but Information Technology, Crop Protection and Fertilization were also well supported.

Two symposia on Ecotechs and Robotics preceded the conference with practical workshops and demonstrations at Montoldre, CEMAGREF's experimental station. Both attracted over 70 participants, many of whom continued to share their experiences at AgEng2010.

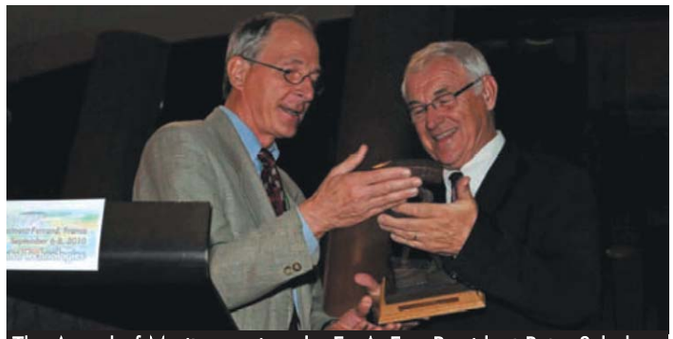
The Conference was organised on behalf of the European Society of Agricultural Engineers (EurAgEng), and the French Society of Engineers and Technicians in Mechanization and Agricultural Engineering (SitmAFGR), by CEMAGREF from 6-8th September 2010. CEMAGREF is the public environmental science and technology research institute of France.

There were three plenary sessions with keynote speakers from industry and policy makers discussing future demands on agricultural engineering both within Europe and the wider world.

The Conference Dinner, a gastronomic experience held at Vulcania, up in the mountains surrounding Clermont-Ferrand, was the occasion chosen by EurAgEng to honour its prize winners for 2010.

The prestigious Award of Merit went to M Jacques Burel, President of Sulky-Burel, one of the leading manufacturers of large width fertiliser spreaders, and based in France. Once again this Award has been given to an engineer who is incredibly enthusiastic about his work and an inspiration to all agricultural engineers.

The Innovation and Development Award, for a presentation on an innovative development and which must include commercial partners, went to E Piron, D Miclet, L Leveillé, D Clochard and S Villette for their work on '*Mineral spreader eco-design: method and real application examples*'.



The Award of Merit was given by EurAgEng President Peter Schulze Lammers to M Jacques Burel

Three teams of authors collected an Outstanding Paper Award, sponsored by IAgrE, from the editors of *Biosystems Engineering*, the EurAgEng Official Scientific Journal. They were chosen by the Editorial Board from a shortlist of ten papers submitted to *Biosystems Engineering* over the last two years. Congratulations went to T Grift and C Crespi, F. Dabbene, P Gay and N. Sacco and E S. Nadimi, H.T. Søgaard and T. Bak.

Prof Aad Jongebreur from The Netherlands, Prof George Papadakis from Greece, Prof Hermann Auernhammer from Germany and the organiser of the French conference, Emmanuel Hugo, were all honoured with the Society's Recognition Award for their efforts in leading and promoting EurAgEng.

Sincere thanks from EurAgEng members and others attending the conference, go to the organising team from CEMAGREF, who have worked so hard to achieve another memorable conference.

TOP: Plenary Session in Main Hall of the Polydome
BOTTOM: Past President Florentino Juste receiving the Recognition Award from President Peter Schulze Lammers on behalf of the family of Francis Sévila

TOP: Outstanding Paper Award sponsored by IAgrE, given by Biosystems Editor, Bill Day to Tony Grift
BOTTOM: Off-road robot at Robotics symposium

All pics © Marie Louise Degaudez

Professionalism and CPD move membership forward

IAgrE President, PETER LEECH is encouraged by a thriving Institution membership and urges members to complete the CPD survey

IN these austere times it is good to see that your Institution thrives with increasing membership and ever increasing focus on professionalism.

This is witnessed by the extension of the LTA scheme to include a separate accreditation route for Service Managers, Parts Managers and Aftermarket Managers. Read more about this in the LTA supplement. The institution has recently joined the Engineering Council's (EngC) online CPD Scheme to enable us all to have access to a simple and sure way of recording CPD, a subject which is becoming ever more important in maintaining our individual professional status.

Enclosed in this edition of *Landwards* you will find a questionnaire on this important subject (CPD) and I would encourage all recipients to complete it and return regardless of your grade or professional registration.

TALKING of austere times brings me to consider the recent round of government spending cuts and measures. I find it interesting that a whole raft of quangos and other non departmental public bodies are being disbanded but the SSCs, and in our case Lantra, have survived seemingly unscathed.

Clearly the government believe they provide value to the industries they serve. It is frustrating that several eminent figures in our industry spent a considerable amount of time and effort over the last couple of years writing and updating the National Occupational Standards (NOS) for our industry which then led to an updating and rewrite of the technical qualification.

All this work was then adjusted and modified to fit the Colleges' ability and resources to deliver it rendering little improvement to the outdated qualifications it was intended to replace. Lantra tell us "industry gets the qualification, industry deserves". I think this should read "industry gets the qualifications the government can afford and Lantra decide".

I believe this sorry state of affairs supports the conclusions drawn from the Colleges Day conference, reported in the previous *Landwards*, where one of the outcomes was the call for a reduction in the number of Colleges offering technical qualifications to a small number of well equipped, well funded centres of excellence.

THE industry is gearing itself up for the introduction of the Stage 111B (interim Tier 4) exhaust emission regulations which come into effect on 1st January 2011.

As an institution we are very aware of the major impact of this legislation and are busy organising our May 2011 Conference on the subject, it is entitled '*Diesel Engines, the Final Frontier*' - more details on the back page of this edition of *Landwards*. Put the date in your diary and make sure to tell others who may be interested or impacted by these changes.

SINCE the last edition of *Landwards* and my first *President's Musings*, I have received several emails with comments concerning recruitment and training of practical engineers with a 'can do' attitude.

I will expand on these in future musings but thank those who have taken the trouble to write and encourage others who have a view on any subject to make it known.

Finally I would like to wish everyone connected with IAgrE, their families and colleagues a very merry Christmas and a happy, healthy and prosperous 2011.

Presentation support

The Douglas Bomford Trust assisted an engineering student presenting a paper at The International Society for Terrain-Vehicle Systems annual conference in Japan

NOEL Hathorn, who is carrying out doctoral research at Cranfield in the field of off-road vehicles, recently presented a paper on his research at the ISTVS Conference in Japan. His attendance was supported by the Douglas Bomford Trust.

The conference covered a wide area of research, from the practical implementation of new vehicle concepts and control of vehicles in real-environments, to the fundamental science behind wheel-terrain interaction. Noel's research is about the relationship between longitudinal wheel slip ratio and wheel sinkage.

Historically research has been dominated by military and agricultural needs; however the majority of the research presented at this year's conference was based on mars / lunar rovers, which reflects the current state of funding. Of particular interest to Noel's research was an investigation into kinematic discrepancy (energy loss through wheel slip during cornering), a study aimed at characterising and modelling of off-road tyres and a tyre model development for predicting contact forces on dry sand.

"A number of studies addressing similar topics were also presented, however the structure of my research was clearly different. The facilities available at Cranfield University are certainly among the best in the world, and I believe that the University has a lot to offer to others interested in similar research," said Noel

"Many of the studies appear to have been influenced by the quality and versatility of the test equipment, and it is my belief that many critical mechanisms within the tests have not been observed by other researchers due to the failings of their equipment."

Prior to attending the conference Noel

The Douglas Bomford Trust

THE Douglas Bomford Trust is the only UK charity that has the specific objective of supporting the application of engineering to agriculture. The emphasis is on enabling individuals to improve their knowledge, capability and professionalism whilst at the same time taking the industry forward.

The Trust was founded in 1972 at the instigation of Mrs M.E.F. Bomford in lasting memory of her husband Douglas Bomford a Past President and Honourary Fellow of the Institution of Agricultural Engineers. After active service in World War I he went on to follow the family tradition of farming and agricultural contracting in Worcestershire. He was an innovative and entrepreneurial engineer who was in the vanguard of a number of far sighted industry initiatives.

Further timely and significant contributions to Trust funds have been received from the Howard Trust that originated from the Howard Rotovator Company and most recently due to the closure of the British Society for Research in Agricultural Engineering.

Trust funds available for dispersal arise from the investment of these legacies using the guidance of professional investment managers.

The Trust is governed by a Board of trustees that represent a cross- section of experience, expertise and interests that are relevant to the Trust's objectives. Professor Dick Godwin is the current Chairman; John Fox is Vice Chairman and Company Representative; Paul Miller has recently taken over from Peter Redman as Secretary. The Trust is run with the unstinting administrative support of the team at the IAgrE office at Cranfield University and greatly benefits from these connections.

SO how does the Trust go about meeting its objectives?

A substantial proportion of funds are used to contribute to post graduate studies. This is an area where funding can be difficult but trustees believe that the investment in developing the research and intellectual capability of individuals whilst at the same time advancing knowledge is essential to underpin the advancement of the industry over the long term.

Funding is also offered to enable relevant study tours and the attendance at conferences where this extends experience and creates professional networks.

Trustees are equally keen to engender enthusiasm for and commitment to UK agricultural engineering amongst both Higher and Further Education students by supporting group visits to technical events and manufacturers and by offering awards to meet clearly defined needs or projects.

Because they appreciate that the benefits of belonging to a life long community, professional qualifications and a professional approach to life can all arise from membership of the IAgrE funds have been made available to encourage membership and involvement with the Institution from the onset of a career.

Further information on the processes for applying for these funds can be found on *www.dbt.org.uk*

Needless to say there is a strong demand for the limited funds available. Applicants are encouraged to put forward carefully reasoned cases that relate strongly to the Trust's objectives and importantly highlight the benefits that will result from a successful award both in terms of personal development and the potential contribution to UK agriculture and engineering.

In these days of increasing costs and pressures on all forms funding streams applicants are advised to seek complementary funding for inclusion in their proposals. The web site *www.afcp.co.uk* is a useful source of such information.

The Douglas Bomford Trust is a unique resource that plays an important role in fostering new knowledge and expertise that is of increasing relevance to many of the challenges arising from the pressures on global capacity in the decades ahead.

Trustees always welcome the opportunity to discuss the prospect of adding to the Trust's funding base.

Anyone interested in making a contribution should contact the Secretary Professor Paul Miller *enquiries@dbt.org.uk* or telephone 01234 750876 in the first instance.

(Charity Number: 1121785; Company limited by guarantee in England & Wales: 06355202)

said he felt his research was relatively unique and felt that, other than the support offered by his department, he was fairly isolated. At the conference Noel was able to make several contacts with researchers specialising in wheel and tyre research on deformable terrains and he now intends to review their work to establish whether it can be of use in his project.

"My attendance at the conference has certainly refocused my attention in the context of my doctoral project. Prior to the conference my attention had been very much focused on the holistic development of a test rig which is new and novel but for which there is not necessarily a significant academic contribution.

"Through preparation of the paper and through my interactions at the conference I became increasingly aware of the importance of the academic element of my doctorate and how the research fits in with both the test rig development and the bigger picture. Consequently my focus has moved to ensure that my investigations into tyre dynamics on deformable terrain are as thorough as possible in order that I can develop a robust tyre sinkage and force prediction model.

"I would like to offer my thanks to the Douglas Bomford Trust, for their kind contribution towards costs. Without their assistance my attendance at the ISTVS conference would not have been possible," added Noel.

> **"My attendance at the conference has certainly refocused my attention in the context of my doctoral project"**

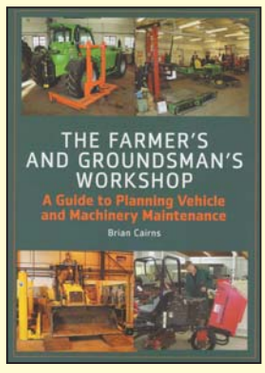
Noel Hathorn, Cranfield University

BOOKREVIEW

The Farmer's and Groundsman's Workshop -

A guide to Planning Vehicle and Machinery Maintenance

by BRIAN CAIRNS



EVERY day thousands of vehicles and machines are in operation which help to produce our food, construct our buildings and keep our sports pitches, parks and green spaces in good order so that we can enjoy our sport and leisure activities.

The people who own and operate these machines, whether they be in the public or the private sector, spend large sums of money purchasing, running and maintaining them.

This well illustrated book by Brian Cairns is essential reading for those in charge of a workshop and those in the agricultural, groundscare and construction sectors.

Those who have well-organised workshops with properly planned maintenance programmes can reduce their costs substantially. Accordingly, this comprehensive book explores in considerable detail how to plan and organise the maintenance of a fleet of vehicles and associated machinery.

The book:

- Discusses what maintenance is, why it is so important and what is required in order to administer an efficient maintenance programme.
- Examines what is needed in a workshop and how it should be maintained and organised, paying particular attention to health and safety issues.
- Discusses machinery dealerships, the historical development of machinery, and machinery maintenance schedules.
- Considers diesel and small petrol engines, transmission systems and the elements of power transmission, tyres, tracks and steering, vehicle electrics and hydraulics.
- Guides the reader through all aspects of metalwork, fabrication and welding.

About the author

Brian Cairns started his working life as an apprentice agricultural engineer in 1977 and obtained a degree in agricultural engineering at Writtle College where he later taught.

He maintained a keen interest in engineering and machinery and was involved in partnerships with the machinery manufacturers and dealerships, and their technician apprenticeship schemes.

Currently employed as Director for Sustainable Built Environment and Land-based Industries at MOVE Life Long Learning Network in the East of England, Brian works with industry and universities to develop new courses for people who are employed in his areas of responsibility.

The Farmer's And Groundsman's Workshop
The Crowood Press
208 pages
450 colour photographs
ISBN - 9781847971104
Hardback £25.00
www.crowood.com

review of mechanisation in fruit production

A Study Co-Funded by
The Worshipful Company of Fruiterers
and
The Horticultural Development Company

Produced by CHRIS ROSE - Chris Rose Associates

INTRODUCTION AND SCOPE OF REVIEW

THE drive to mechanisation is not new, however the need to reduce reliance on high levels of labour in horticultural production is greater than ever. Commercial horticulture is the last labour intensive industry in Western Europe and fruit production is at the top of the list in terms of labour costs as a percentage of total production costs.

There are three significant factors influencing the need to mechanise:

- **Increasing cost of labour**
- **Shortage of skilled and trained labour**
- **Future shortage of unskilled seasonal labour**

This review has been co-funded by the HDC and the Worshipful Company of Fruiterers, with a view to identifying the range of mechanisation currently employed in the fruit industry and any new mechanisation in development. From this it was hoped to identify further studies that the Worshipful Company of Fruiterers might fund in future on mechanisation.

This review focuses mostly on mechanisation in husbandry and covers outdoor production of tree and soft fruit. Each section contains information on mechanisation currently being used in the UK, currently being used outside the UK and currently being developed worldwide.

The fruit sector has traditionally had to appropriate innovative ideas, products and machinery from other sectors that have found solutions to similar problems. This review continues this tradition with reference to machinery developed for other crops such as peach trees and vines.

The review highlighted that research on the internet finds a number of older references to mechanisation. Whilst there have been massive improvements in varieties and growing techniques, in many cases mechanisation has lagged behind. The following is an example from 1963:

"*One group of talks which seemed especially timely was on labour-saving machinery. Among these one discussion concerned a runner-cutting machine which has been developed by a grower in Connecticut. This is a rather large machine and is drawn behind a tractor and operated from the power take-off. This machine appears quite promising.*"

In the 1970s mechanical planting and runner control of strawberries were commonplace. The move to plastic mulches was not accompanied by a concomitant development of labour saving machinery. To this day hand planting and runner cutting are the norm.

Mechanisation in U.K. fruit production has tended to be somewhat piecemeal. Whilst all growers would like to reduce labour costs, their focus is on high yields of high quality fruit. When this is achieved the high labour cost per unit area can be accommodated through higher gross income. Growers in the main do not have the time or capital to develop machinery. Machinery manufacturers do not see the sector as large enough to justify significant R&D expenditure.

When new systems of production are developed, mechanisation tends to be low on the priority list. The move to table-top production of strawberries is a case in point.

1. TREE FRUIT

1.1 PLANTING

In the UK

The current trend in orchard design is moving away from individual stakes to post and wire systems supporting closely planted trees to form a hedgerow. The method leading UK growers are using is:

- Work the ground to a firm, level, tilth
- Mark out the rows
- Plough a 20 - 30 cm furrow the length of each row
- Install the posts and wires
- Mark planting positions
- Place each tree centrally in the bottom of the furrow
- Tie the trees securely to the wires
- Plough the furrow back in
- Firm the soil around each tree

Worldwide

Similar techniques are being used elsewhere in the world. According to a press article in 2004, in Kerman, California, global positioning systems (GPS) are being used to mark out rows including micro-adjustments for irregular shaped fields. For instance, 10 centimetres of convergence across 100 rows allows a 10 metre difference in field width without part rows.

Tree stations are also marked out by driving perpendicular to the rows, again using GPS. Mechanical tree planters are also used, towed by tractors that are automatically steered with GPS sensors enabling accurate tree spacing. The post and wire system is put in place after planting.

Further reading:
http://westernfarmpress.com/news/GPS-mechanical-planter/

In development

There are currently research projects in the U.S.A. focussing on utilising GPS systems as part of greater automation of tree fruit production. Citrus growers in Florida are using auto-steering technology and the University of Florida are demonstrating its use for tree planting.

Further reading:
http://citrusmh.ifas.ufl.edu/pdf/db/Ehsani2010CIVol90No11.pdf

1.2 TREE TRAINING

In the UK

Modern intensive orchards do not require training.

Apple trees are left un-pruned for the first 3 years and weight of fruit brings the branches down to horizontal. Pear trees are pruned to develop upright branches. Trees do require support and whether individual stakes or a post and wire system are used,

the trees need tying to the support at planting. This job is done by hand.

However there are tools that can speed up the process. The max HR-F twine tyer (*Figure 1*) uses staples and rolls of twine or plastic tree ties up to 4mm in diameter. It enables cutting and stapling in one action and is claimed to be 3 times faster than hand tying.


Fig. 1: Max HR-F Twine Tyer

The cost of tree tying with a hand tool is not enough to justify developing any fully mechanised system.

Worldwide

The same tool and other similar tools are used elsewhere in the world.

In development

A team at Washington State University has developed a robot that can apply a band to a grape vine (for pest control). This could potentially be adapted to apply a tie to a stake and tree.

Further reading:
http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=4803971

1.3 TREE PRUNING

In the UK

Tree pruning is one of the major costs in fruit production. Winter pruning in particular requires a relatively skilled labour force. Many growers are struggling to replace skilled labour as older staff and contractors retire. This together with rising labour costs makes the prospect of mechanising the operation increasingly attractive.

To date the main form of mechanisation has been the use of pneumatic pruners. Whilst these reduce the physical effort of cutting and can reduce saw work, they are unwieldy compared with hand secateurs and the airlines can get in the way and become entangled in branches.

Some growers with older pear orchards use a horizontal hedge-cutter to trim the top of the trees. Whilst this is undoubtedly much faster and cheaper than hand pruning, it leads to over complicated spur systems and ultimately reduced yields.

Worldwide

The fruit wall system was developed in France over 20 years ago following a survey of management systems with the aim of cutting fruit growing costs.

The survey and the system were initiated by the 'Centre Technique Interprofessionel les Fruits et Legumes' (CTIFL) and is continued by them to this day. There is renewed and increasing interest in this system in the U.K. as it lends itself to other mechanisation. The main commercial varieties of apples grown in the world today are suitable for the fruit wall system. The fruit wall is a maximum of 80cm wide at the base of the tree and 60cm wide at the top.

Mechanical pruning each year, conducted six to seven weeks after bloom (sometimes earlier - see *Figure 2*), maintains the thickness of the wall. Additional minimal pruning is undertaken in winter (one to two branches per tree). To produce yields comparable to a central leader system, the production area of the fruit wall orchard per hectare must range from 13,000 to 17,000 square metres.


Fig. 2: Mechanical pruner in use at late bloom

The average number of fruit per square metre per side is 25, plus or minus three. The establishment cost is often higher than a central leader system because it requires more extensive trellising.

In development

This study was not able to find any other innovations. As is so often the case with radical ideas, there is still much debating of the advantages and shortcomings of mechanical pruning, much of it around the lack of selectivity. It was interesting to find an article dating back to 1972 describing a successful 3 year trial of mechanical pruning of hedgerow plantations.

Further reading: *http://www.nysaes.cornell.edu/pubs/fls/OCRPDF/FLS-015.pdf*

Development in the U.K. and worldwide consists of designing orchard systems that lend themselves to mechanisation and moving the mindset of growers to accept that non-selective pruning can deliver results without compromising fruit and tree quality.

The more precocious modern varieties grown on dwarfing rootstocks produce a tree that does not need excessive pruning. If summer pruning is required, the tree is too vigorous.

1.4 REMOVAL OF PRUNINGS / DEBRIS

In the UK

In the majority of UK orchards, prunings are thrown down into the alley where they are pulverised. Some growers still collect up prunings with a buck-rake and burn them.

There is an increasing focus on orchard hygiene. Single row orchards allow smaller prunings and other orchard debris to be swept from the tree row into the alleys using rotating brushes (*Figure 3*). As they are front-mounted a pulverisor can be mounted on the rear of the tractor to achieve a one pass operation.


Fig. 3: Rotating brushes used to sweep debris into the alley

Worldwide / In development

Pulverising prunings improves orchard hygiene and the soil and as such is likely to remain the standard approach. A vineyard in New Zealand has adapted a tractor to run on vine prunings and this could potentially work for orchard prunings.

Further reading:
http://www.eeca.govt.nz/node/8471

1.5 THINNING

In the UK

Hand thinning is one of the most expensive tasks in top fruit production. Some growers use the foliar feed Ammonium thio-sulphate as a blossom thinner. However many growers are nervous about thinning at this stage whilst there is still a frost risk.

It is anticipated that an effective 12-15mm stage thinning chemical will be approved in the near future. Mechanical thinning has not been widely adopted to date.

Worldwide

The Darwin Fruit thinner (*Figure 4*) was developed in the Bodensee region of Germany for thinning at blossom. It is now available in the UK from NP Seymour and is suitable for blossom thinning.

Further reading:
http://www.fruit-tec.com/


Fig.4: Darwin Mechanical Fruit Thinner

In development

Mechanical thinners have been developed (*Figure 5*) that are reasonably effective, particularly on the fruit wall system (see section 2.3). There have been trials in peach and apple orchards which are promising.


Fig. 5: Drum shaker thinner

continues over

Further reading: *http://horttech.ashspublications.org/cgi/content/abstract/18/4/660 http://www.slideshare.net/CASCrop/innovative-thinkingprogress-with-two-mechanical-fruitthinners*

In the U.S.A. there is a 5 year $2million multi-state mechanical thinning project underway. This includes research into more sophisticated devices, as well as a hand-held thinner that a worker on a platform could use to cut blooms off 'harder-to-reach' branches.

Further reading: *http://www.thenewstribune.com/2010/03/27/1125469/the-darwin-helpsgrowers-thin.html#ixzz0jPyFSbA0*

1.6 MOBILE PLATFORMS

In the UK

Mobile platforms have been around for many years having been first developed for continental European orchards in the 1960s. The pluk-o-truk for harvesting first appeared 30 years ago, although it was not suitable for either multi-row orchards or semi-intensive orchards.

There is currently little use of mobile platforms for harvesting or husbandry work such as pruning.

Worldwide

The modern intensive single-row orchards that are grown up to 3.5 metres lend themselves to mobile platforms. The pluk-o-truk has been updated and the new version, the Tecno Fruit CF110 doubles up as a mobile platform.

Further reading: *http://www.fruitharvesters.eu/index.php?id=24*

In development

In the U.S.A. a multi-state project headed by Penn State University is looking at a blueprint for an automated orchard of the future and have carried out trials with a selfdrive mobile platform (see Figure 6).

Further reading: *http://www.younggrowers.org/Docs/AgInnovations.pdf*

Figure 6: Self-drive mobile platform

1.7 HARVESTING

In the UK

The major change in top fruit harvesting in recent years has been the introduction and widespread uptake of picking trains (see HDC project TF 171 - Improving Harvest Productivity in Top Fruit).

Worldwide / In development

Comprehensive Automation for Speciality Crops (CASC) is a multi-institutional initiative led by Carnegie Mellon Robotics Institute, to comprehensively address the needs of specialty agriculture focusing on apples and horticultural stock.

A robotic automated harvester is the grail of mechanisation. Vision Robotics, partners in CASC, are developing such a tool with industry funding.

Further reading: *http://visionrobotics.com/vrc/index.php?option=com_zoom&Itemid=26&catid=5*

A similar project is underway in Denmark.

Further reading: *http://www.robocluster.dk/english/uk_projects*

In both the above projects, information available is limited.

Another approach within the CASC initiative has been to research potential ways of augmenting hand picking of fruit. The comprehensive report comes up with a number of ideas that are yet to be developed and trialled. *Fig. 7* (left) shows a prototype design for a chest mounted picking bucket that it is claimed would enable faster picking speeds. *Fig. 8* (below) shows a system designed to enable a picker to keep picking without the need to carry and empty a bucket.

Fig.7: Energy absorbing flaps for increasing picking speeds without bruising fruit

Further reading: *http://www.ri.cmu.edu/pub_files/2009/6/20090601.CMU-RI-TR-09-20.pdf*

2. SOFT FRUIT

2.1 PLANTING STRAWBERRIES

In the UK

Growers plant by hand both in ground and table-top crops. The majority of growers view planting as so important to get right that they accept the high labour cost. It is not seen as an area to compromise on quality. Planting machines were last widely used in the 1980s when small bare-rooted runners were planted into bare soil.

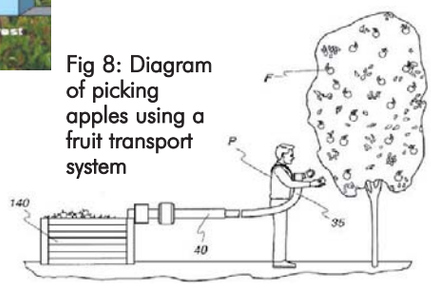


Fig 8: Diagram of picking apples using a fruit transport system

Fig.9: Pic-King 3 rig in field

The Pic-King 3 rig (*Figure 9*) from Haygrove enables up to 15 planters (*Figure 10*) to plant barerooted runners at speeds up to 50% faster than by conventional means, whilst eliminating damage to beds from kneeling.

Fig.10: Planters on the Pic-King 3 rig

Worldwide

The Mechanical Transplanter Company in Michigan, U.S.A. produces machines (*Figures 11* and *12*) that will plant plugs and pots up to 5.5cms in diameter in staggered twin rows through plastic mulch, making the hole, planting and watering in, in one pass.

Fig.11: Twin mulch transplanter with water tanks

Fig. 12: Twin transplanter in operation

In development

Haygrove has designed and patented a ground level gutter system for high-density substrate production. This system is designed for high density planting of up to 120,000 plants per hectare for long season production. It is a system that would lend itself well to automated plug planting.

2.2 PLANTING CANE AND BUSH FRUIT

In the UK

Fruit that require a post and wire support system such as raspberries, redcurrants and perhaps blueberries, are planted as tree fruit (see section 1.1 - Tree Fruit Planting In the U.K.).

Blackcurrants are typically planted as hardwood cuttings and are simply pushed into soft prepared ground.

. . . The major change in top fruit harvesting in recent years has been the introduction and widespread uptake of picking trains

Worldwide / In development

There is little focus on mechanisation in cane and bush fruit planting.

The North American Raspberry and Blackberry Association 2010 conference was due to feature mechanisation including planting machines. There are no details available to date.

Further reading: *http://www.raspberry-blackberry.com/local.cfm?doc=web-docs/2010ConferencePreview.htm*

2.3 PLANTING INTO SUBSTRATES

In the UK

There has been a huge increase in the amount of soft, cane and bush (blueberries) fruit grown in substrates in the U.K. in recent years and the trend is set to continue.

Whilst planting is still done by hand, some growers are now bench planting and transferring the planted container (e.g. bag or pot) into the row by conveyor (*Figures 13* and *14*).

Fig.13: Plants on Aeropick inflatable conveyor

Fig.14: Conveyor in use in field

2.4 PLANTING INTO SUBSTRATES

In the UK / Worldwide

Fig.15:Runner cutter

Most growers are still using hand labour to control runners in ground and table-top crops. A German company, Maschinebau Heuling have developed an effective runner cutter for use on 2-row crops on poly beds (*Figures 15* and *16*). They also have a contra-rotating brush bed cleaner, which removes cut runners and debris into the alley (*Figure 17*). Both are available via Haygrove.

Fig. 16: Runner cutter fingers and blade

Fig. 17: Bed cleaner

In table-top production a simple method used by some growers involves letting the runners drop down below the table and cutting with a small handheld powered hedge cutter.

2.5 DE-BLOSSOMING / FRUIT THINNING

In the UK

The main de-blossoming task that growers undertake is a few weeks after planting everbearer crops, typically in March / April. The winter initiated flowers are of a lower quality and clash with the June bearer production. These blossoms are removed by hand.

Fruit thinning is seldom done as it is very costly. Fruit load on older June-bearers is reduced by de-crowning, however this does not improve the flower: leaf ratio. Following a mild autumn, varieties such as Elsanta can carry too many flower trusses and too many flowers per truss, resulting in a glut of small fruit.

Fig. 18: The prone position employed on the Pic-King 5, seen here at harvest, works well for de-blossoming

Many growers are using rigs such as the Pik-King 3 and 5 from Haygrove. Whilst the job is still manual, the improved ergonomics and the fact that output is dictated by the machine speed have reduced the costs significantly (*Figure 18*).

Worldwide / In development

Although there is plenty of research into the effects of de-blossoming and fruit thinning, any detail of mechanising the tasks could not be found for this review.

The Darwin Mechanical Fruit Thinner (see section 1.5) can also be used horizontally and could be adapted and used in trials on strawberry blossom.

2.6 GANTRY SYSTEM OF STRAWBERRY PRODUCTION

In the UK

Haygrove has developed a ground level gutter system of substrate strawberry production (*Figures 19a* and *19b*) that can incorporate underground water heating. The system uses a steel framework with 4 gutters enabling higher planting densities of up to 120,000 plants / ha.

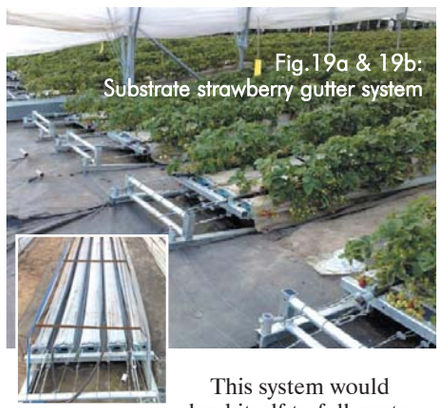


Fig.19a & 19b: Substrate strawberry gutter system

This system would lend itself to full gantry production, doing away with tractors and alleyways. Permanent tunnels with planning permission and substrate production take 'outdoor' strawberry systems ever close to glasshouse conditions and this would be a logical next step.

2.7 CANE AND SPAWN MANAGEMENT

In the UK

Cane and spawn management is not currently mechanised by UK growers. Many are using a Vsystem trellis that allows separation of primocane and floricane, which aids fruit presentation at harvest but still involves manual management of cane.

Worldwide

Herb Stiles, a fruit advisor from Virginia, U.S.A., experimented with trellis systems in the 1980s and 1990s and developed the Single Side Swing System (SSST) for blackberries (*Figures 20a* and *20b*). This system is used widely in the U.S.A. and could overcome the problem of picking whilst

continues over

. . . The cameras stereoscopically analyze the vines to create a virtual 3D image of the grape vines

Fig.20a:
SSST Non-fruiting side

Fig.20b:
SSST Fruiting side

looking up into the sun. The picture shows how well the fruit is displayed.

In development

Whilst there are no obvious new developments, there are older ideas that may have value in some circumstances. The 'alternate year' or 'biennial' system was developed for raspberries and works with blackberries as well.

This system enables mechanical pruning after the cropping year and other factors such as disease control make it attractive, particularly to organic growers.

2.8 CANE TRAINING

In the UK

Cane fruit requires support both to keep canes upright out of the alleys and to reduce fruit bruising through wind damage. Canes are usually tied or clipped to tensioned support wires. The fruiting laterals also require support to improve fruit presentation and picking speed. Together these tasks involve a considerable amount of labour.

Increasing numbers of growers now use netting to improve lateral support. Both wire mesh held horizontally and or plastic bird netting held vertically are used.

Bird netting @ 0.5m wide is fixed to 2 horizontal parallel strings at a height of typically 0.5m and again at 1.25 -1.4m. The canes grow up through the holes and are thus fixed in place (*Figure 21*).

Fig. 21: Horizontal bird netting for cane support

Netting is used on either side of the rows to support laterals (*Figure 22*). Though faster to erect than up to 5 lines of baler twine, the laterals do not all find their way through and those that don't are more difficult to pick.

Fig. 22:
Netting truss support

Fig.23a: Pellenc battery powered tyer

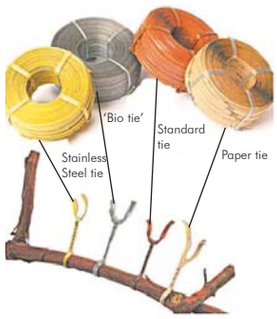


Fig.23b: Types of ties that can be used

Tying canes to support wires can be very time consuming. UK growers are now using equipment designed for vineyards such as the Pellenc AP-25 tyer available from Lamberhurst Engineering Ltd. which speed up the job considerably (*Figures 23a and 23b*).

2.9 BUSH PRUNING

In the UK

Blackcurrants are the main bush fruit crop grown in the U.K. and are almost all grown for processing. Pruning consists of mowing to the ground with a pulveriser every 7 years.

Bush fruit growing for the fresh market requires regular selective pruning to maintain fruit size and quality. The only mechanisation currently available are electric and pneumatic pruners, as used in tree fruit. Electric pruners are powered by a battery carried on the waist. Pneumatic pruners work from a tractor mounted or stand alone compressor.

Worldwide

The Dutch grow a lot of bush fruit for the fresh market. Most are grown on a cordon system, which makes the pruning simpler, though not mechanised.

In development

Vision Robotics Corporation, based in San Diego, California is developing a robotic vine prune (*Figure 24*). 'The frame is mounted to a human-driven tractor with a series of cutting arms suspended around the grape vines. The cameras stereoscopically analyze the vines to create a virtual 3D image of the grape vines. Cutting arms are then precisely positioned to trim the vines at an exact angle and location.'

Further reading:
http://www.visionrobotics.com/index.php?option=com_zoom&Itemid=26&catid=2

If this project is successful, there would be potential to adapt for cane and bush fruit.

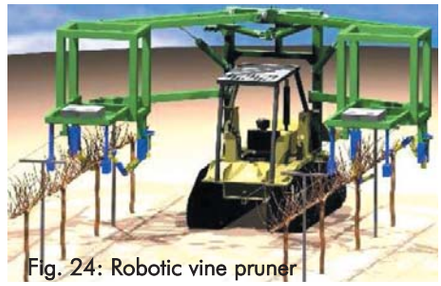


Fig. 24: Robotic vine pruner

2.10 REMOVAL OF PRUNINGS / DEBRIS ETC

In the UK

Cane and bush fruit prunings are generally deposited in the alley and then chopped up with a pulveriser or flail mower. Where there is risk of disease spread, prunings are collected and removed by hand.

Strawberry fields are usually topped by machine after harvest and the debris remains in the field. Some growers have used an adapted forage harvester which collects the debris allowing removal of diseased material.

Worldwide

Ferrari market pulverisers (*Figure 25*) collect the prunings in a hopper that can be raised and emptied into a trailer for dispos-

Fig. 25: Mechanised hopper

al / green manure. These are available in sizes down to 42" (105cms).

In development

The level of mechanisation already achievable with existing tools renders this a task that does not require significant development. Major improvements in plantation hygiene can be achieved by utilising existing methods of debris removal.

2.11 HARVESTING

In the UK

Mechanical harvesters are used for processed fruit such as blackcurrants and raspberries. To date, there are no harvesters capable of picking to the standard required for the fresh market. Robotic harvesting is seen by many as inevitable. Although developed for mushroom harvesting, it is still a long way off for soft fruit.

A number of U.K. strawberry growers are using harvesting rigs of varying complexity. They typically enable a 5 bed tunnel to be picked by 10 pickers lying prone above the crop (*Figure 26*).

Fig.26: Typical strawberry harvesting rig

Whilst many growers are moving to table-top systems to improve picking speed and ergonomics, those that have persevered with rigs are making them work.

The Pik-King 1 is an innovation from Haygrove which is a motorized in-tunnel tray transporter (*Figure 27*). This enables fruit to be stacked straight onto pallets in the row. The pallets optionally sit on rollers and can be rolled onto a truck removing any double handling.

Worldwide

In Japan researchers at Miyazaki University Faculty of Agriculture, have developed a prototype robotic strawberry harvester (*Figure 28*) that will select and pick individual ripe berries.

Fig.28:
Robotic strawberry harvester from Japan

Further viewing:
http://www.youtube.com/watch?v=Fcvhtn7I2qw

At present it averages 10 seconds per berry and so is not close to earning minimum wage! Whilst this project is not yet close to providing a commercially viable machine, future versions will become faster and labour will continue to become more scarce and more expensive.

Fig. 27:
Pik-King 1 motorized tray transporter

3. COMMENT

Mechanisation and the need to reduce labour costs are pertinent to all sectors of horticulture and would benefit from a cross-sector approach within the HDC.

There are many potential benefits from the cross-fertilisation of ideas. There would be value in having a committee within the HDC purely focussed on these areas. UK Horticulture would benefit from actively keeping abreast of developments in mechanisation worldwide through regular internet searches, developing a global network of individuals and organisations, and attending relevant industry events.

This in turn could lead to an involvement in specific R & D projects and a share in the resulting competitive advantage.

4. POTENTIAL FOR FURTHER STUDY ON DEVELOPMENTS IN MECHANISATION

SUGGESTIONS FOR A STUDY TOUR AND COLLABORATION

Tree fruit

1. Vision robotics California
2. CASC, Carnegie Mellon University
3. Appalachian Fruit Research Station, Kearneysville, West Virginia
4. Speciality Crop Research Institute (SCRI) Penn State University

Soft fruit

California and Spain are the largest berry producers globally, however both have good supplies of cheap labour and so have been slow to mechanise.

The vast majority of research programmes are focussed on improving crop production through variety development and enhancing crop protection. Commercial companies are mostly focussed on improving the efficacy of existing machinery and improving systems such as table top design.

There is a need to identify and establish links with individuals and organisations that are currently involved in mechanisation projects before a worthwhile study tour can be proposed.

. . . Mechanisation and the need to reduce labour costs are pertinent to all sectors of horticulture and would benefit from a cross-sector approach within the HDC

READER RESPONSE

*Feed*BACK

Landwards would like to hear readers' thoughts on articles published in the journal. First, two comments on the _Review of Mechanisation in Fruit Production_ in this issue.

CERTAIN sectors of our commercial horticultural industry remain stubbornly labour-intensive.

Perhaps the best examples of this can be found in tree fruit and soft fruit production; both employing regular skilled labour and, mainly seasonal, casual labour, all of which can with some crops amount to as much as 55 percent of their direct production costs. Both sectors are almost entirely dependent on supplying the home market which, particularly for fresh produce, is now mainly controlled by our strongly competitive supermarket chains, particularly in terms of their retail pricing, which are always open to lower cost sources, most of which exist off shore.

A combination of increasing labour costs and diminishing availability of skilled workers have become a major concern of British fruit growers and it was for this reason that The Worshipful Company of Fruiterers and The Horticultural Development Company (HDC) jointly commissioned a study reviewing the current state of mechanisation in the commercial fruit industry ('*Review of Mechanisation in Fruit Production*' - produced by Chris Rose of Chris Rose Associates).

The review covers aspects of current practice in planting, general field work, crop management and harvesting specific to fruit production while highlighting potential opportunities for effective mechanisation in all these sectors. Comparisons are made between typical production systems currently used in the UK and those elsewhere worldwide.

UK growers have given mechanisation a lower priority than for aspects such as varietal development and improved growing techniques to improve both quality and yields which have boosted gross income but now increasing labour costs are threatening to erode much of this advantage.

Equipment manufacturers generally regard commercial fruit production as a relatively small market suffering from the further disadvantage of a multiplicity of numerous sectors, each with its own specialised requirements. As a consequence little innovatory development in mechanisation is currently taking place in the UK and scope for future development will always be limited both by funding from the industry and manufacturers' available resources.

UK growers have given mechanisation a lower priority than for aspects such as varietal development and improved growing techniques

Mechanisation is not only the key to reducing labour requirement but also to getting better value from skilled and semi-skilled labour by improving numerous field management and harvesting tasks which can result in better crop health and ensure quality. The review points out that in many cases existing equipment used elsewhere in agriculture can be easily modified to match specific tasks in fruit production.

In its comparisons (UK/Worldwide) numerous examples are given of labour-saving systems not used in the UK, which could be adopted by British growers to improve labour productivity. Various overseas forward-looking development projects also indicate a strong potential both for automated and robotic applications.

It is obvious that the development and application of labour saving mechanisation will be a key factor in maintaining the future competiveness of UK fruit growers. Chris Rose concludes that the current piecemeal approach to such development work does not make the best use of resources and suggests setting up a committee, specifically for coordinating R&D in mechanisation for fruit production, under the auspices of the HDC.

This would facilitate improved communications with the industry worldwide bringing in new ideas while creating the groundwork for an ongoing coordinated development programme.

John Weir

I THINK that this is an excellent resume of mechanisation of fruit orchards over the past 40 - 50 years.

Possibly there should be some reference to tailoring the husbandry of the orchard to suit mechanisation. I remember when NIAE was developing its strawberry harvester it needed the plants and growing methods to make it possible for the fruit cutter to work across the top of the crop.

As I have found in other branches of horticulture, the paper correctly emphasises the relatively small market for dedicated machinery, and the consequent lack of development funding, both private and public.

Contents

Para1.3:- I thoroughly concur with his comments on pneumatic pruners, I remember the same problems arising in the rose industry where one of the earliest reported symptoms of RSI came from constant use of hand pruners but attempts at pneumatic or electric devices were not taken up due to tangling of airlines or weight of battery packs.

Para 1.4:- The hygiene issue of prunings left amongst the trees is very important and I would consider that pulverising in dry conditions could result in a fine cloud of undesirable fungi and other harmful micro-organisms getting well distributed into the tree canopy.

Para 1.7:- Harvesting, there might have been greater emphasis on "damage" and selectivity of only those fruits which major customers (i.e. supermarkets) deem marketable.

Soft Fruit Paras 2.1 - 2.5; very comprehensive

Para 2.6:- I am pleased that Chris mentions "planning permission" issues with permanent tunnels, as I note that this is becoming an increasing bone of contention with rural communities in places like Herefordshire.

Para 2.7:- would have benefited from a definition of "spawn".

Para 2.9:- The system described from Vision Robotics ties in well with other vision selective development work in the horticultural industry, such as the robotic weeder under development from Tillet & Haigh.

Roger Balls

. . . and a reader takes issue with *Training in a Changing World*

I WOULD like to pass comment on the report in *Landwards* (Autumn 2010) '*Training in a changing world*' pp 14.

With reference to presentations made by Alastair Tulloch, John Palmer, Keith Christian and Jason King, they all seem to be suggesting that the industry only needs 250 -300 apprentices a year; well, I would like to see where this figure has come from, what they are defining as an "apprentice" and how they define the Land-based sector.

If learners on full time level 2 and 3 courses are in addition to this number, and the apprentices are from what would traditionally be described as 'agricultural engineering', this figure may be roughly correct. But the sector is wider than that, and are the needs of the recycling and arboriculture industries included, for example?

My response to the suggestion of 250 - 300 apprentices is, 'show me the evidence'.

The actions suggested by the AEA / IAgrE appear somewhat flawed to me, because they leave out 2 - and arguably 3 - important groups, namely the taxpayer, the users of land-based machinery and possibly the small independent distributors/peripatetic fitters/small specialist manufacturers, etc.

I can speak for the first two, being 1) a taxpayer and 2) a user of land-based machinery.

1. Firstly, as a taxpayer, I am unhappy that the agenda seems to be driven by the requirement of a small group of large (overseas?) manufacturers who do not represent the whole sector. The quote "fewer machines for fewer customers..." may be Claas UK's business model, but does it reflect the whole sector; would a spokesperson for Stihl say the same thing?

Also, the theme that everything is electronic is also misleading; I bought a brand new cultivator from Weavings last year and the only electrics were the rear lights and indicators.

Therefore, as a taxpayer, I would be happy to support basic fundamental engineering, but less happy to support the requirements of two or three large manufacturers (who should be responsible for training their own staff in the complicated bits). Would the taxpayer be happy to base motor vehicle training around the requirements of Porsche to the exclusion of scooter, bus or lorry manufacturers?

2. As a user of farm and other land-based machinery, I resent the implication that everything has to be brand new. Many of us are still using technology from the 60s (Lister MEU) let alone the 70s, and many machines have not changed in that time (disc harrows for example), so the comment re. Colleges having machines from that era is just 'College bashing' and reflects some manufacturers' contempt for smaller land-based businesses rather than the reality of the industry.

3. Finally, while I do not work in the small scale independent sector, I do sub contract people who do. There is a demand for technicians who can conduct repairs to old machinery, undertake small fabrications or small scale manufacture. Any follow-up from this meeting must consider the needs of these groups, and from what is reported in *Landwards*, this is not happening.

Finally, I sat in on the meeting where the NOS was finalised and would be interested to see where it has been "watered down".

Will Green

Dewpoint

RICHARD LANGLEY from Harper Adams University College explains psychrometrics and how it relates to agricultural engineering

INTRODUCTION

'PSYCHROMETRICS' is a term used to describe the determination of physical and thermodynamic properties of gas-vapour mixtures.

The term derives from the Greek *psuchron* meaning 'cold' and *metron* meaning 'means of measurement'(*Wikipedia*).

Although the principles of psychrometry apply to any physical system consisting of gas-vapour mixtures, the most common system of interest is the mixture of water vapour and air, because of its application in heating, ventilating and air-conditioning.

In human terms, our comfort is in large part a consequence of, not just the temperature of the surrounding air, but (because we cool ourselves via perspiration) the extent to which that air is saturated with water vapour (*Wikipedia*). In agricultural engineering, we also have an interest in psychrometrics through grain, fruit and potato drying and storage.

DALTON'S LAW

John Dalton was born in 1801, in Britain.

His law of partial pressures states that, "the total pressure of a gas is equal to the sum of the different gases' partial pressures" (*McDuffy, 2009*). In other words

$$P_t = P_1 + P_2 + \ldots\ldots + P_n$$

The air around us can be given as:

$$P_t = P_{NO} + P_{O2} + P_W + P_{misc} \text{ (trace gases)}$$

A practical example of Dalton's Law gives: Nitrogen 77%; oxygen 21%; water vapour 1%; other gases 1%. This equates to, as an example:

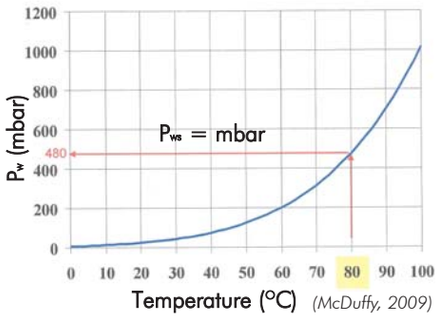
1000mbar = 770mbar (N) + 210mbar (O2) + 10 mbar (H2O) + 10 mbar (trace gases).

Partial pressure of water vapour, P_w

This may be considered as the key parameter that affects all other humidity parameters. Note, the only two properties that can affect a change in P_w, are:

- Adding or removing water vapour
- Changes in system pressure

Saturation vapour pressure, P_{ws}



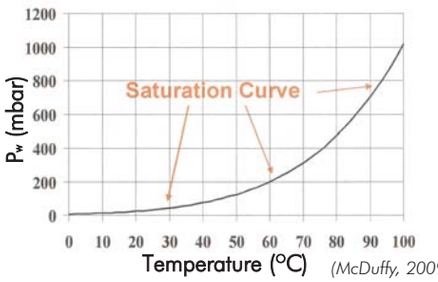
(McDuffy, 2009)

On the saturation curve:

- Evaporation and condensation are in equilibrium and occur at the same rate
- $P_w = P_{ws}$
- Dewpoint = temperature
- Wet bulb = dry bulb
- RH = 100%

Note, the only property that affects P_{ws} is temperature.

P_{ws} = maximum vapour pressure or amount of water vapour that can exist at a given temperature; it is expressed in units of pressure.



(McDuffy, 2009)

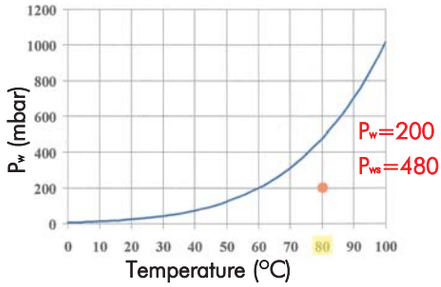
RELATIVE HUMIDITY, RH

Relative humidity is the ratio of water vapour partial pressure present in a gas (P_w) to the saturation vapour pressure at that temperature [$P_{ws}(t)$].

$$\% \text{ RH} = 100 \times \frac{P_w}{P_{ws}\ (t)}$$

From the graph, *Fig 5,*

$$\% \text{ RH} = 100 \times \frac{200}{480\ (t = 80)} = 42\%$$



Note - relative humidity is strongly proportional to temperature, and its measurement is very sensitive to temperature differences.

As a rule of thumb, we can say that:

- As temperature increases, air becomes drier (RH decreases)
- As temperature decreases, air becomes wetter (RH increases)

. . . Agricultural engineering is interested in psychrometrics through grain, fruit and potato drying and storage

Drier and wetter are relative terms; applies to a closed system where pressure and water vapour content do not change.

PRESSURE AND RELATIVE HUMIDITY

If we recall Dalton's Law of partial pressures:

$$P_t = P_w + P_{dry}.$$

Thus, if we double the pressure, then

$$2(P_t) = 2(P_w + P_{dry}) = 2P_w + 2P_{dry}$$

So P_w changes proportionately to overall pressure changes. (Remember that P_{ws} remains unchanged because T is unchanged).

As a rule of thumb, we can say that:

- As the pressure decreases, air becomes drier (RH goes down)
- As the pressure increases, air becomes wetter (RH goes up)

DEW-POINT

The temperature to which a given portion of air must be cooled, at constant pressure and constant water vapour content, in order for saturation to occur.

As the condensation indicates saturation of the air with water vapour, the state point is always located on the 100% relative humidity curve. The units will usually be ^{o}C (*McLean, 1989*).

Dew-point is not a temperature dependent parameter; only pressure and water vapour affect it.

DRY-BULB TEMPERATURE

This is the temperature of air as indicated by a standard thermometer; the units will be ^{o}C (*McLean, 1989*).

WET-BULB TEMPERATURE

This is the temperature of air as indicated by a thermometer, the bulb of which is surrounded by a moist wick.

Wet-bulb temperatures are always lower than dry-bulb temperatures, except when air relative humidity is 100%. The difference between the wet-bulb and the dry-bulb temperatures of a sample of air is termed its 'wet-bulb depression'.

This is caused by water evaporating from the wick and absorbing latent heat from the air surrounding the bulb. The rate of evaporation and, hence, the extent of cooling are proportional to the quantity of moisture present in the air at a specified temperature (*McLean, 1989*).

By comparing the wet-bulb temperature to the dry-bulb temperature, we can determine the relative humidity (usually from tables or from the psychrometric chart).

SPECIFIC VOLUME

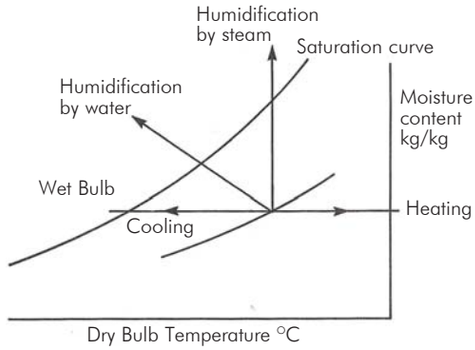
The volume of that quantity of humid air which contains unit mass of dry air (units m^3/kg) (*McLean, 1989*).

SPECIFIC ENTHALPY

This is the heat content/unit mass.

This is equal to the sum of the enthalpies of the components of moist air ie dry air and water vapour (units kJ/kg) (*McLean, 1989*). In other words, it is a measure of the total energy in a moist gas, or the sum of latent heat and sensible heart.

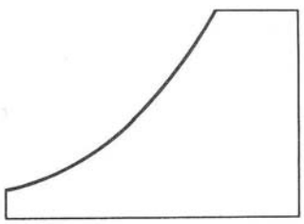
BASIC LINES ON THE PSYCHROMETRIC CHART



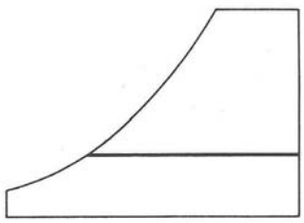
continues over

The Psychrometric Chart

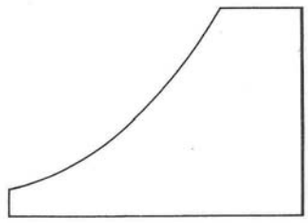
The diagrams below explain in outline form the various lines and scales on the chart



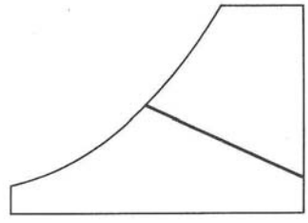
1. Dewpoint scale (at 100% saturation curve)



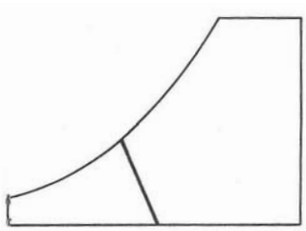
2. Moisture content line



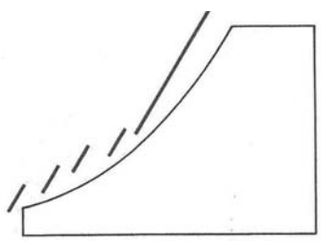
3. Moisture content scale



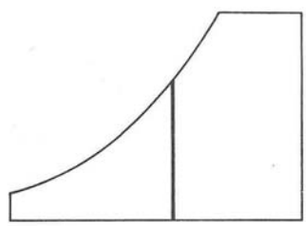
4. Wet bulb temperature



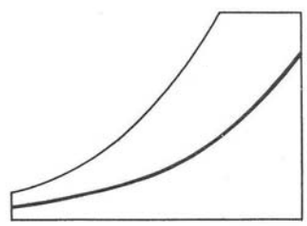
5. Specific volume line



6. Specific enthalpy scales

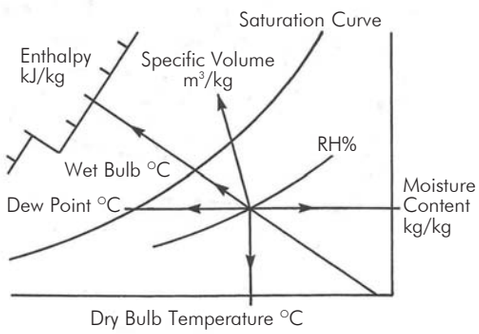


7. Dry bulb temperature



8. Relative humidity line

MORE BASIC LINES ON THE PSYCHROMETRIC CHART



PRACTICAL PSYCHROMETRY - SOME PROBLEMS

1. If the dry-bulb temperature is 25°C and the wet-bulb temperature is 15°C, then what is the RH, dew-point temperature, the specific volume, the moisture content and the specific enthalpy?

Answers: RH = 33%; Dry-bulb temp = 8°C; specific volume= 0.854m³/kg; moisture content=0.0065kg/kg; specific enthalpy=41.5kJ/kg

2. The relative humidity of the air in the main air duct of a grain drier is 80%, and its temperature is 11°C. To what temperature must the air be raised to lower its relative humidity to 70%? (*McLean, 1989*).

Answer: An air temp increase of 2°C is required

3. If the temperature in a potato store is 4°C and the RH is 90%, what is the wet-bulb temperature and the moisture content?

Answer: Wet-bulb temp=3.5°C; moisture content=0.0045kg/kg

4. You are the manager of a glasshouse and you need to determine if there are any issues with the heating system and its effect on the plants during the winter months. The conditions for optimum plant growth are 27°C, 30%RH. The outside air is 5°C and 60%RH.

- **If we heat the incoming air to 27°C, will we need to humidify it?**
- **If we assume that the air is 30%RH at 27°C inside the glasshouse, should you expect to have condensation on the glass making it hard for customers to see inside?**

Answers: Yes, the air RH is only approx 15%; yes, the dew-point is 8.5°C, which is higher than the outside air.

REFERENCES

J S Humidifiers plc, (unknown date).

McDuffy, B, (2009) Vaisala Humidity Seminar

McLean, K A, (1989) Drying and Storing Combinable Crops, 2nd edition.

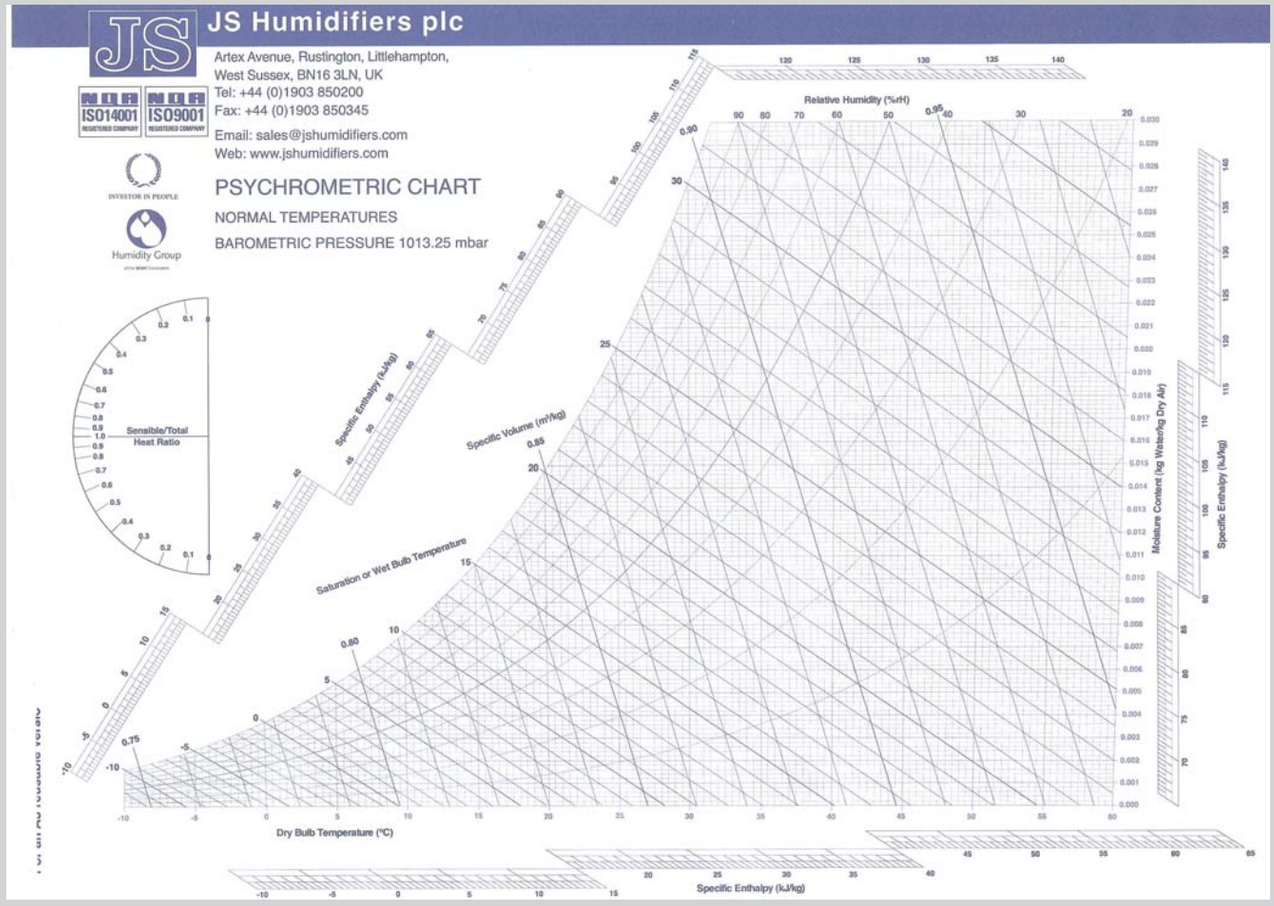
Spirax Sarco Ltd, (unknown date)

http://en.wikepedia.org/wiki/psychrometrics

http://en.wikepedia.org/wiki/Dalton's_Law

An example of the Psychrometric Chart -

J S Humidifiers plc, *date unknown*



well groomed

Howard Marshall Engineering faced a specific challenge to create a machine capable of collecting and removing every cut blade of grass on a playing field

David C Preece
Eng Tech, MIAgrE

THE marketing personnel at Howard Marshall Engineering (HME) are in contact with people from a vast number of different industries and when the question was raised about collecting and removing every blade of cut grass on a playing field, the subject was not particularly high on anyone's priority list.

The customer then added that attempts so far to do the job well and to their satisfaction had failed.

This challenge seemed easy enough to overcome!

So what exactly was the requirement? From our engineering point of view what was the specification? Each meeting brought forth an additional requirement until we had the following:

- **Collect all the cut grass after a rotary mower.**
- **No driving on the grass before collection.**
- **Being able to travel up and down a football pitch before unloading.**
- **Unload into a small high side trailer.**
- **To be fitted to the customer's existing tractor.**
- **Needs to work in the dry and the reasonably wet**

Some pictures of what the grass to be collected looked like were furnished (it looked as though the grass had been cut when it was damp with a walk behind mower and the collection box had been left off).

Minds were concentrated on the project and the expertise from each of our departments and that of the founder of our company began the task of putting together a concept that would work and could be built at a price. From the specification it was clear the customer required a front mounted unit. It also followed that it would need to be on a loader and be wider than the tractor wheels.

How to collect all grass in one pass? We have experience in road sweep type brushes and this was adopted as our method of collection. I have worked with field going mower conditioners for many years and what we were looking at here was throwing up the same type of issues. First take control of the grass and then deliver it where required.

Brush technology says that the amount of contact with the ground has to be carefully controlled. Wheels out front were considered in many formats and finally discarded. A roller would be used tucked in behind the brush. To prevent the roll from growing in diameter with wet grass and so destroying the bristle to ground contact setting, the brush would be positioned in such a way that it continually wipes the roller's face.

It was calculated that more than 40 cubic feet of hopper capacity would be required. Several designs were drawn up but the unloading into a trailer using fold down doors and back panels proved unworkable. The breakthrough came with a rotary hopper. This also gave the Turfgroom the very recognisable overall profile.

The mower conditioner technology came into play again when it was now necessary to transfer the collected grass from a front feed plate to the hopper. Adjustments were built into the components as they were developed.

There still remained the question of keeping the brush at the optimum height.

Rarely are we given a level playing field to work from, although here we were with just that, but of course playing fields are not without their undulations. Our second roller with a scraper was positioned behind the hopper and set at a fixed height. To allow for the yawl and pitch a type of floating headstock has been employed at the Turfgroom to loader connection. So the machine sits happily on its rollers and is just pushed along as it works.

The components of the main chassis, side plates, collection hopper, headstock frame, front feed plate and main canopy were drawn up and produced using the CAD system, with special emphasis on controlling the over weight.

The parts were assembled with the brush segments being hydraulically driven and the hopper arranged so that twin hydraulic cylinders provided the correct amount of rotation to allow filling and discharge.

The unpainted Turfgroom

THE unpainted unit was soon ready for field test trials.

Suitably mounted on a tractor we went off to cut grass as would be expected on a domestic lawn and the initial performance of the Turfgroom, with just 'barn yard' settings was good.

With a little fine tuning of the front feed plate and the brush height and speed, the performance was considered very good. The trajectory of material into the hopper, spot on. Dry, wet, short and long grass was successfully collected and we were ready for customer acceptance trials.

This was a different game. Once the Turfgroom was connected to the customer's tractor and the hydraulic hoses sorted out it was time to provide the operator training and explain how the machine was intended to work. We had an operator who was extremely capable, quick to learn and after two or three practice manoeuvres had the operation under control.

We were shown to a football pitch that appeared to have little or no grass and this was our test site. In attendance we had the head groundsman who is renowned in his field of expertise for providing the finest playing fields in the land.

He gave instructions that the test site be cut again, down to two or three millimetres. This being part of the treatment that the football pitches undergo periodically to obtain the world standard playing surfaces. Needless to say this was not in the original specification.

The unfinished Turfgroom was set to work and we were able to lift and collect the loose debris in one pass up the field, something that had not been possible in the past. Raising the Turfgroom, positioning it over the trailer, and rotating the hopper to discharge, appeared to exceed the customers expectations.

It was most satisfying to have the customer's undeniable satisfaction on a machine that is unique in its field.

Back to base where the welding and finishing off was conducted before the painting and livery along with the safety decals were applied.

The Turfgroom has now been at work for a period and we were pleased to receive a telephone call explaining that the use of this machine has reduced the number of passes and improved the care and preparation of the 12 or so football pitches under management at this one site.

recruitment drive

GEOFFREY WAKEHAM in his Christmas address, considers why we are struggling to recruit into our industry and what can be done to alter the situation

FATHER Christmas feels that somewhere along the way things had gone wrong; it is no longer as it should be. FC Enterprises Ltd is not what it was.

Before we go any further I think it would be a good idea to sweep away a few misconceptions and myths.

Some of you may have been to Lapland on a flying visit to meet Santa Claus just before Christmas and were surprised by how few elves there were making and packing presents. There never were many in Lapland or at the North Pole either, most of them worked close to where the presents were going to be delivered.

Britain had an army of elves, when they were not working for FC Enterprises they built ships and combines, pottery and ploughs. Most have lost their jobs; there are still a few out there; most of his staff are now located in China or India or beyond.

You may have wondered at how he delivered all the presents in one night using a reindeer powered sleigh? Some of you may have had a go at calculating flight speeds and energy consumption.

There may have been a time long, long ago, when this would have been possible but now the sleigh and red nosed Rudolph are really only used as a marketing gimmick. Only the very little children get a visit these days. It is rather like the dray horses one sees at county shows pulling barrels of beer. They are only for show; they don't deliver all of Whitbread's ale to all of their pubs. Don't tell me you thought they did?

The practice of parents paying for the presents is still how it works and for older children the parents have to go to the shops and pick up the gifts. These will have been delivered by the container load, never seeing a sleigh or the snows of the Artic.

Monies are being drained from local economies and soon some parents will be unable to organise and pay for Father Christmas to visit even the little ones, as their jobs will have been lost from the local economy.

In these difficult times do not expect the all beneficent state to step in. Dear Uncle Gordon may have contemplated funding such a scheme but times are now very different. FC Enterprise has become a virtual company, no more than a website and a 'factory shop'.

So what can be done? Is there a future for boys and girls who would love to become Father Christmas' little helpers; boys and girls who would like to help their local economy by making agricultural equipment when they have time off from tending to the reindeer and making wooden toys in rural workshops?

THE latest estimate of the size of the industry (UK Agricultural Engineering not F C enterprises Ltd.) is in the order of £3 billion with £1.2 billion as exports.

Assuming a turnover of £150,000 per employee and we have an industry of 20,000 people. Lantra figures identify some 3200 firms/employment organisations with 50 employing over fifty staff and 2,500 with ten or less.

With a bit of simple maths and assuming half of the staff are in technical posts, there is a need for some 250 new recruits per year. Twenty-five to thirty of these will need to be aspiring for Chartered or Incorporated status and some 200 need to consider registration as Engineering Technicians.

There are jobs out there, but thinly spread and too few of the organisations provide chances for professional advancement. To make significant professional progress one must expect to have to move five or six times through one's working life.

The handful of large companies that may provide a career path are likely to be international and even if one stays with them for half one's career then relocation round the world can be expected for those that aspire to the best paid jobs.

Once again, what can be done to increase the opportunities of jobs and a reduction in the upheaval of moving one's home? It has always been the case that to flourish in most industries, one must upsticks and move, so I can offer no suggestions. Expect to move and expect to expand your life and your horizons way beyond those who decline the opportunities.

As far as more UK jobs go it is up to current organisations seeking out new products and markets. Once many manufacturing companies in agricultural engineering produced 75% or more of their turnover from the export market. Is it not possible for groups of producers to work together to provide a single UK identity for overseas buyers, so cutting the cost to both buyer and sellers.

In spite of the depreciation of the pound, the rise in wage levels in newly industrialised nations and rumours of manufacturing being repatriated, it is more likely that we will see further loss of manufacturing capacity for some time to come.

The chance of any large multi-national relocating manufacturing plant into the UK is minimal, the chance of loss in this area substantial. We can no longer compete in manufacturing for trade in established product lines.

Is it only the capital cost of establishing new production facilities that keep factories located in Great Britain? When present factories need re-equipping will they move to more economically justifiable locations?

So is there anything that can be done? Can we compete in new technologies? Have we research projects underway in industry and in the universities working on areas with world wide potential? Have we companies with vision working with the universities?

Have we graduates leaving the research environment with the entrepreneurial drive to exploit such new ideas? Are universities even promoting entrepreneurial thinking in their graduates? Are there funds available to support the necessary generation of new agricultural systems and equipment and turn them into marketable products?

In the end it comes down to financiers or organisations being willing to support new research and people. Is there money to develop algae based fuel as an agricultural product? Is there real money going into agricultural robotics in the UK? Has someone a robust security system for agricultural equipment just looking for a backer?

Can we corner the market in precision livestock farming? Has the AEA initiative to promote UK based research stalled or has the industry given up on the future?

Whatever the position, just for a few days, forget the future and concentrate on the present.

Have a good Christmas, enjoy the New Year celebrations and I hope Father Christmas outsourced locally just what you wanted.

The Vikings show us the way

Timber Bridge Conference, September 2010

Dr Geoff Freedman
BSc CEng CEnv FICE FIAgrE FIWSc

The Leonardo Da Vinci bridge south of Oslo. It is said to be a smaller scale timber equivalent of a famous design by the man himself for a masonry arch over the Golden Horn. For details visit *www.leonardobridgeproject.org/engineering.htm*

THE Norwegian Public Roads Administration sponsored and ran the first truly international bridge conference specialising in timber construction.

150 delegates from 23 countries learned from 40 excellent papers on current design and practice in modern timber pedestrian and road bridges.

In 1988 the Norwegian Government took a positive step forward in this field by deciding to promote and support the re-introduction of timber bridges on the public road network. They began by sending Otto Kleppe from the Administration on a world tour to look at best practice, modern design and particularly why many timber bridges around the world have survived for over 100 years. The aim was to use this knowledge alongside extensive Norwegian experience with timber to build bridges which would compete with steel and concrete in every way - including durability.

Norway has collaborated with other Scandinavian countries, Europe, USA and Australia over the last 20 years to produce some of the most spectacular timber bridges in the world. The tour after the conference took us to see three public road bridges between 150m and 180m long. One had a 70m span and another 45m for military tanks.

However they picked up on stress lamination techniques from the USA and have introduced this reliable design to much smaller, less spectacular bridges with great success. The aim of the Nordic Timber Council, a collaboration of Norway, Finland, Denmark and Sweden was to show that their own plentiful product, timber, could be durable and strong enough to build competitive and more sustainable bridges. They concluded that they have achieved this and they are now willing to share their knowledge.

I first picked up on this initiative in 1990 through meeting Otto and then in 1992 at a conference in the USA where I saw SLT for the first time. Over the last ten years I have actively introduced this technology to the UK.

It is an uphill battle - indeed no other practicing engineers from the UK attended the Norway conference - and we have so much to gain in terms of cost savings and sustainability improvements. There is a resistance to using timber as a primary structural material in an external situation in the UK because of durability concerns.

Norway uses creosote pressure treatment and covers exposed members with copper flashing to give all structures 100 years life. We wince at the thought of creosote but European legislation permits its use for bridge decks in the UK. However it is almost impossible to find a facility to carry out the treatment of small amounts for a single bridge.

I PRESENTED a paper with Prof. Abdy Kermani from Edinburgh Napier University to show developments in the UK.

They are modest compared with most other countries in the world but we have gained respect for our development of the SLT arches. Over the last 10 years we have perhaps built 100 bridges in the UK using new engineering techniques and carried out enough research to build arches for long span road bridges.

Over the last 20 years the Forestry Commission has supported this effort while other land owners and Local Authorities have benefited from our innovations. However, there is a lack of investment to take timber bridges in the UK to the next step.

The message from the conference is that timber can compete with steel and concrete in durability and cost. I put forward an alternative message that I think is more relevant to the UK where timber does not have much public appeal - that I want to build timber bridges at half the cost for half the life when compared to steel or concrete.

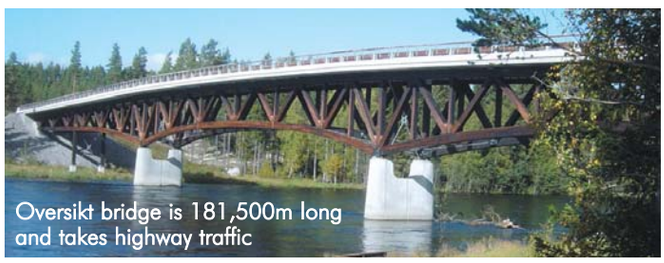
This would reduce the need for high initial capital while minimising the CO^2 emissions and improving the aesthetics within our countryside. This has been the basis of my aim to introduce timber bridges to the minor public road network in the UK. Until now, I have concentrated on the forest and countryside road networks and footbridges to prove the material.

The conference confirmed that timber has its limitation even when laminated and stressed so a good timber engineer will composite it with steel or concrete where the design can benefit.

Timber is very poor at distributing high stress concentrations at joints which is one area that steel can provide a benefit. I was very impressed with three papers from different countries which showed recent developments of timber beam and concrete deck bridges.

There is so much for the UK to copy. The Nordic countries have similar climates and exposure conditions. We have legislation to minimise the CO^2 emissions. Every business wants to invest minimum initial capital.

Why are we not building more timber bridges?



Oversikt bridge is 181,500m long and takes highway traffic

PROFILE: Chartered Professional

Michael Woodhouse is a Chartered Surveyor and Chartered Environmentalist working for Natural England.
His career has mainly been within government organisations - which have changed name over the years. This was interspersed with a seven year secondment from the then English Nature to the Farming and Wildlife Advisory Group from 2001 to 2008. It was during this time that FWAG engaged with IAgrE and as a result he is now a Council Member for IAgrE and represents IAgrE at the Soc Env Board.

Q&A

Why did you choose to become a Chartered Professional?

When working at FWAG it became apparent that as an organisation we needed to recognise the skills we had within our staff.

I approached IAgrE as a well recognised player in the land based sector that were able to ensure that FWAG staff, including myself, were able to secure Chartered Environmentalist status as a true recognition of their skills.

Even with my Chartered status with the RICS it was important that I had links with a land based sector pertinent to the work we were undertaking with farmers. IAgrE fulfilled that role and helped secure SocEnv status.

How do you feel that being professionally registered helps you in your career?

Being a chartered professional both through IAgrE and RICS provides an important link to other professionals practicing in the same field, ensuring that CPD is undertaken to maintain knowledge and skills appropriate for work today and for the future.

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

Main skill areas are the link between land and farm management and environmental conservation.

This has been the main factor in all of the work I have undertaken. In later years it has involved less on-farm work, but leading organisations and projects that relate directly to land management and ensuring that the environment is an integral part of farming and land management.

With FWAG it was this knowledge that we were able to work with Defra and the then RDS to help develop and shape the design of programmes such as Environmental Stewardship for both ELS and HLS, based on FWAG's many years of experience of delivering Countryside Stewardship Scheme applications to farmers.

My current role is the Contract Manager for our major advice contract using external consultants to work alongside Natural England to deliver training to farmers on Environmental Stewardship and Catchment Sensitive Farming. I am also the lead in Natural England on our input to the Campaign for the Farmed Environment.

What makes your work important?

Most of my work is ensuring a join up between the land based sectors and Natural England work.

Government organisations can set the rules and framework for scheme to deliver conservation and environmental gain, but when it comes to delivery it is important that we engage with the farmers and the organisations that represent them, otherwise we should not be surprised if the outcome is not what we expected.

We need to learn from each other and ensure that best practice and practicable ways of achieved the environmental goals are agreed through partnership.

What have been your main achievements?

In the early days of my career as a land agent it was to work with farmers to secure funds through management agreements to protect and enhance the sites of natural conservation interest.

This also involved the acquisition of land and the setting up of National Nature Reserves across many counties.

My time at FWAG was marked by the success of bringing together the immense set of skills and talent within the Charity to influence the setting up of Entry Level Stewardship and working more closely with the agricultural industries to promote the need for environmental management to be an integral part of their business.

Latterly I spend a lot less time in the field but enjoy the role of influencing the work of Natural England through ensuring we have a good dialogue with external contractors and the agricultural sector.

I have always seen my role as using my knowledge of land management, farming, and nature conservation to oil the wheels of delivery in whatever programmes I am working on.

How do you see your work developing in the future?

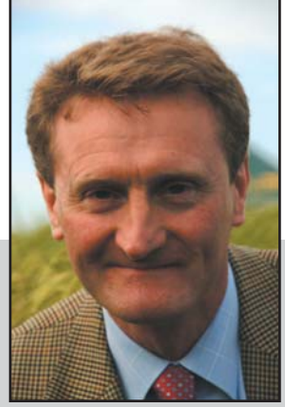
As Natural England is reshaped following the discussions with Defra and government it is not always easy to predict one's future, suffice to say that I hope my skills and knowledge built up over 25 years will be useful in the years ahead.

As I write this I am now home based with excellent communication with the rest of the team I work with through conference calls and emails. This not only reduces our carbon footprint though reduced travel, which is a major target within Natural England, but makes for flexible and effective working

Any tips for those newly qualifying?

The need to be flexible remains the key to the future.

I have been fortunate in my own career that opportunities have arisen that have lead to very rewarding posts, either with the current organisations or through my secondment to FWAG. If you are willing to move around and take these opportunities then reward will come through the experience you will gain which can be put to good use in furthering your career.



Name
Michael Woodhouse

Position
Delivery Manager - Natural England

Current Assignment
Contract Manager for the Farm Advice, Training and Information Programme

Academic Career:
- Diploma in Rural Estate Management from the Royal Agricultural College, Cirencester - 1985
- Member of the Royal Institution of Chartered Surveyors (MRICS) - 1988
- Member of the Institution of Agricultural Engineers (IAgrE) - 2005
- Chartered Environmentalist - Society for the Environment (Soc Env) - 2005
- Associate of the Royal Agricultural Societies (ARAgS) - 2008

Areas of Expertise:
Land and farm management linked to environmental conservation.

My career has taken me from working directly with farmers to secure nature conservation on farm, team leadership, working for Farming & Wildlife Advisory Group in the head office as Director England and now project and contact management within the farm advice team in Natural England.

MEMBERSHIP ENQUIRIES
IAgrE
The Bullock Building, University Way
Cranfield, Bedford MK43 0GH
Telephone 44 (0) 1234 750876
Fax: 44 (0) 1234 751319
e-mail: secretary@iagre.org
www.iagre.org

Issue 65 Number 4 Winter 2010
MEMBERSHIP MATTERS

IAgrE Council meeting discussion

28th October 2010, John Deere, Langar

IAgrE Council Meeting Discussion 28th October 2010 was held at John Deere Ltd, Langar

Two years ago, it was decided to change the format of IAgrE Council meetings to keep the business to a minimum and to follow this briefer formal meeting with a discussion based on a topic relevant to IAgrE and its membership, with an open invitation to all to attend. This approach has worked well and, together with the decision to move Council meetings to different locations around the country, has encouraged improved attendance and participation at Council meetings.

The most recent meeting, hosted by John Deere Ltd at Langar, was extremely well attended with almost 40 present. The subject for discussion was '*How IAgrE relates with Industry?*' with presentations from IAgrE President, Peter Leech (John Deere), IAgrE Vice-President, Professor Mark Kibblewhite (Cranfield University) and Dr Robert Merrall, speaking as an independent consultant and giving some information on the Technology Strategy Board and its next Call.

Peter outlined how John Deere sees its relationship with IAgrE and the importance given to the promotion of professionalism by both organisations. The development of the LTA Scheme is crucial to this and John Deere has been unstinting in its support for the scheme. Staff are encouraged to join IAgrE, to attend activities and be active members. There is also a close liaison with Harper Adams University College through a work placement programme and a scholarship.


Peter Leech

Mark began his presentation by quoting the Hauser Report in that 'The 21st Century will be a time of rapid innovation and technological change that will be spurred on by the grand challenges that we face'. The increasing demand for efficient use of all resources - energy, soil and water - in the production of food, fibre and biofuels for a growing global population, in the face of ever-increasing environmental regulation, calls for technological solutions which the agricultural engineering sector is well-placed to provide. Whilst recognising that the multinationals will still develop their own research in-house, there is also a place for the universities, independent researchers and SMEs to develop new technologies beyond traditional ag eng. The importance of the sector is such that collaborative research and development should become the paradigm.

Closer links with the farming sector are critical, to inform prioritisation of research and development priorities to achieve optimal land use and maximum yields. Collaborative multi-discipline teams are vital.

The research funding levels for the sector are not in line with its significance to the UK, both economically and actually, and government should be lobbied to prioritise the discipline. Prime funding should be sought to build grant-winning capacity and industry support sought on pre-competitive projects. Mark suggested that IAgrE, through its members, could be more proactive in this arena through:

- Further developing an innovation agenda for UK agricultural engineering and promoting this more strongly to Government
- Seeking out and coordinating industry commitment to create a pre-competitive translational infrastructure
- Facilitating development of a business case for innovation centre(s)
- Developing and sustaining continuing professional development among members that includes engagement with Universities and innovation centres.

Collaboration was again the message to be taken from Robert's presentation on the Technology Strategy Board, whose 2011 call, in partnership with Defra, BBSRC and other potential funders, will be for applied R&D projects that will deliver innovation to help secure a sustainable future protein supply for the UK.

Given the huge increase in demand for protein from developing countries and that Europe is currently around 30% self sufficient in vegetable protein, this topic is of great importance. The two areas covered in the call are Self Sufficiency in Vegetable Protein Production and Increasing Efficiency of Livestock systems, and Robert suggested that IAgrE members could be in a position for involvement in such projects.

Full details will be available shortly, but Robert stressed that all submissions must be from consortia. Robert can be reached by email at *rob@merralls.com*, but for further information including detailed scope and advice on forming consortia please contact the Technology Strategy Board's lead technologists: *david.alvis@tsb.gov.uk* or *calum.murray@tsb.gov.uk*.


Members of the IAgrE Council

A lively discussion followed the presentations, highlighting the following comments:

- There is little or no mention of agricultural engineering solutions: sensors, robotics etc in the Food Security debate at national levels. Should a committee of IAgrE members lobby for this?
- Research in Ag-eng is taking place at universities traditionally 'beyond' our sector, and closer links with these need to be established.
- With environment, energy and food security, traceability etc being to the fore, this is a crucial time.
- Agricultural Engineers need to broaden their views and think in teams with other disciplines
- IAgrE should promote its services to members, access to information and journals, access to on-line technical libraries (Biosystems Engineering, CABI).

So, a fascinating set of presentations and a stimulating discussion, but the question is, of course, what next?

The President has promised that the topics covered will be put to the next Executive meeting. As a membership organisation, it is the members whose voices need to be heard and who should lobby, through IAgrE, to raise these issues, should this be the consensus. IAgrE is a small institution, but with a history of 'punching above its weight', so this should be no deterrent.


Mark Kibblewhite

For those of you who would wish to discuss these issues further and help move forward this important agenda, please contact Peter Leech (*leechpetern@JohnDeere.com*) or Mark Kibblewhite (*m.kibblewhite@cranfield.ac.uk*).

BRANCH REPORTS

SOUTHERN BRANCH

Visit to Barfoots of Botley

SOUTHERN members enjoyed a good summer visit to Barfoots of Botley near Bognor Regis to be told about and given a tour of the new anaerobic digester plant.

We were welcomed with coffee and light refreshments and given an excellent introduction by Julian Marks Operations Director and a guided tour by Technical Director Chris Cooper and Operations Manager Alex Semenyuk. The company has a £100million turnover from their vegetable business

The plant came into operation in June 2010 at a cost of £4,000,000. The plant digests approx 25,000 tons of green sweet corn waste produced from the corn on the cob processing factory on the farm. It is collected and stored in one of three large silage clamps until required for feeding.

From there it is taken to one of two fermenters where it stays at a temperature of approx 38 degrees Centigrade fermenting for 70 days. The biogas produced is used to drive a £750,000 Jenbacher gas engine powering a generator producing 1.1 megawatt of electricity for over 8,000 hours a year.

The digestate when removed is dewatered annually producing 3,600,000 gallons of nutrient rich water and 3500 tons of 'cake' which is spread on the farm. The water is stored in a lagoon and used for irrigation purposes.

The plant qualified for a Rural Development Programme in England grant of £748,000.

To complete an excellent day the party moved on to the Hampshire County Council Museum Service Victorian Farm near Botley, where we had lunch. A complete contrast to the morning visit. We toured the Victorian farmhouse, school and looked at Victorian systems being practised, plus a good selection of 1950s tractors and equipment causing some members to reminisce on their experience using them.


Anaerobic digestor plant

Southern members

Denis Welstead

YORKSHIRE BRANCH

Visit to Yorkshire Water's Esholt Treatment Works

THE Yorkshire Branch had a very interesting visit to Yorkshire Water's Esholt Treatment Works starting at the Visitor Centre where our guide for the evening Adele met us.

The site covers over 340 acres and was originally commissioned in 1924.

The inlet works

The inlet to the works is a rather grand piece of architecture.

This works serves a population equivalent of 700,000, taking sewage and effluent predominantly from the Bradford district as well as surrounding areas such as Guiseley, Yeadon and Rawdon.

Most of the sewage arrives here via a brick-lined tunnel which starts some 4 kilometres beneath the Frizinghall area of the city. Yorkshire Water are required to fully treat up to 3200 l/s - that's right per second! - which is the equivalent of the flow going down the River Aire on a summer's day.

To commemorate the completion of this amazing piece of engineering, in 1924 the Mayor of Bradford drove one of four, locally-built Jowett cars down the 3-metre diameter sewer before laying the final brick - a fantastic piece of PR for the car manufacturer at the time!

Two years later, in 1926, the main outfall sewer and most of the works were completed. In 1931 the new biological filters were added and in 1932 the final settlement tanks were completed,

The total cost at the time was £2.5m

The first stage of the treatment is where all the solid material is screened out- such as condoms, tampons, sanitary towels, make-up pads and baby wipes - which people have flushed down the toilet. Basically anything bigger than 6mm in diameter.

There's one item in particular that is the scourge of the water industry - the dreaded cotton bud. Cotton buds are particularly problematic as they often, what is called 'blind' the screens. They wedge themselves in the fine meshing and block up the system.

Once the large solids have been screened out, the water then flows on to the next stage of treatment, the primary settlement tanks.

As part of the new investment, the contractors Mott Macdonald Bentley (MMB) came up with an innovative piece of engineering to help meet the plant's rising energy needs, the first screw hydro-generator ever to be installed in a waste water treatment works.

The generator consists of two, 5-metre-long Archimedes screws that harness the energy created by the waste water as it flows from the inlet works down to the primary settlement tanks. The inlet is quite high on the side of a banking so giving a good head of liquid.

Archimedes screws are normally used to pump water up hill, however these have been specifically designed to operate in reverse.

The generator is capable of providing 5 %+ of the plant's total energy needs, a saving of more than £100,000 a year. It will have paid for itself in just five years.

With Yorkshire Water's annual energy bill now in excess of £50m, they are now looking more and more towards producing their own, renewable energy.

As well as hydro-power, they are also investing in wind energy and Combined Heat and Power units (or CHPs as they're more commonly known). These use gases generated through the sludge digestion process to create heat to maintain the digestion process and electricity to power the works.

The Primary Settlement tank is about six metres deep and there are six of them at Esholt.

Once the wood and rags etc have been taken out, the remaining solids (predominantly faeces - or suspended solids as they are politely called) settle to the bottom of this tank, with the remaining waste water then weiring over the edge and on to the second stage of the treatment process.

Each year Esholt produce around 150,000 dry tonnes of sludge and this is

disposed of at one of 19 treatment facilities in the Yorkshire region.

Changes in legislation have meant that the majority of sludge which would previously have been spread on agricultural land is now required to be disposed of either by incineration or to landfill. However, Yorkshire Water recognises the unsustainable nature of these practices for the environment and is tackling this issue through the development and use of a new composting technique, developed in partnership with Atkins Water, called Sludge Phyto Conditioning (SPC).

On this site the sludge from the primary settlement tanks is still incinerated, however sludge from the final settlement tanks is now turned into compost using the SPc process.

The innovative SPC process involves growing certain grass types on digested, windrowed sludge to develop a high quality top soil substitute product which meets both legislative and customer requirements.

This process also enables local green waste to be recycled. On this site, for example, it's mixed with the green waste collected from homes in the Bradford district (grass cuttings, bush trimmings etc) to further enhance the topsoil product. This product recently won Environmental Product of the Year at the National Recycling Awards. SPC now accounts for a small but growing percentage of all the sludge disposed of in the region, with a predicted 30% being processed through SPC by 2010.

The hydro-generator is not the only source of renewable energy on this site. There are two Combined Heat and Power units (or CHPs as they are more commonly known).

These CHPs burn the methane gas that is generated during the sludge digestion process, providing heat to maintain the digestion process as well as electricity to power other parts of the plant.

The gas is stored in a structure that looks like an over-sized golf ball. The CHPs and turbine should generate about 6900 MWh of electricity per year, which over a year saves an equivalent of 25million miles in a small family car. The CHPs alone are the same as the power needed to run a village of 630 households. These CHPs are expected to deliver savings of about £2,000 a day in running costs!

Next the Activated Sludge Plant (or ASP as it's more commonly known.This is the third stage of the treatment process. In these 12 huge tanks - each the area of 2 Olympic swimming pools and 7 metres deep - the sewage is mixed with millions of tiny micro-organisms (like protozoa) that quite literally feed on it, breaking down most of the remaining harmful bacteria. Billions of tiny bubbles of oxygen that enable the micro-organisms to breathe are pumped in. It's like a massive Jacuzzi for bugs!

This process is known as aerobic digestion - aerobic means 'with air'.

Large probes measure the amount of oxygen in the tank - if there's too little, the micro-organisms will die and treatment will be less effective. The probes are connected to a computer that will automatically adjust oxygen levels in the tank to ensure maximum efficiency.

These tanks have what is known as negative buoyancy. Usually if you fell into a tank of water you'd sink momentarily but then bob back up to the surface. Because so much of the air is dissolved in the water, in this instance you'd sink and never come back up.

The water in these tanks is flowing along to the end, where it weirs over the edge.

Sometimes repairs have to be carried out on the equipment in the bottom of these tanks, but because this is a biological process with living organisms in, it cannot simply be emptied. It would take weeks to recreate the right conditions for the bacteria.

Instead specially trained divers are sent in. They wear fully-sealed wetsuits and helmets to avoid infection.

Once the water leaves the Activated Sludge Plant, it flows down the site and across two large, 40 metre bridges that were constructed across the River Aire.

These two pipes are enormous - 2.1 metres and 1.5 metres in diameter.

The final settlement tanks work rather like the primary settlement tanks. These particular tanks are a legacy from the old works - it is still in good working order, so rather than construct a brand new tank, this design was simply incorporated into the new works. However a modification was made to the desludging system to allow the tanks to be reused which saved around £5m.

There are 12 final settlement tanks at Esholt, 8 modified tanks and 4 brand new ones. Each 35 metres in diameter and about six metres deep. Here the good micro-organisms that have feasted and grown fall to the bottom and the clean water again weirs over the edge. This is the water which is finally discharged into the River Aire.

This effluent is of extremely good quality and meets all the requirements of the European Freshwater Fish Directive that made this investment necessary. This substantially betters the 3 mg/l ammonia consent requirement.

Finally back at the Visitor Centre we were shown the excellent facilities for teaching the children all about the plant's cycle as well as doing experiments. This room is the envy of all the teachers who bring the pupils on a visit.

A vote of thanks was given by our treasurer Kevin Grundy.

Gordon Williamson

EAST ANGLIAN BRANCH

'The Energy Independent Farm' talk

A TALK given to the East Anglian branch of the Institution of Agricultural Engineers on the '*Energy Independent Farm Concept*' by Mark Howell, of New Holland's marketing support department, gave interested members an idea of what could be possible on farms in the future. Held at Diss Golf Club in Norfolk, the talk provoked a lot of discussion.

New Holland has already produced a working prototype hydrogen powered tractor, seen at the Doe Show and LAMMA last year, and has carried out successful tests. The company is now moving on to the next stage of development by building three more tractors and testing is planned on working farms in France, Italy and Germany from next year. The current prototype is based on a T6000 model and uses fuel cells to convert the hydrogen gas into electricity to power two electric motors, one driving the transmission and the other the pto, 105hp being available.

Mark talked about one pilot farm in Turin, Italy, with which the company is working, and which will produce hydrogen to use as fuel, using electricity from photovoltaic panels and via a 1MW biogas plant on the farm which has been operating since August this year. The hydrogen gas will be stored in a tank and a fuelling station will be installed.

The concept of an energy independent farm is that it produces its own fuels and power, and extra revenue is generated by supplying electricity out to the national grid. It is estimated that the available power will be enough for 10,000 people. Besides producing energy the farm has 100ha of woodland producing firewood, 25ha of woodland producing high quality timber, and 250ha of cultivated land growing maize, sorghum and triticale for the biogas plant. Forty hectares are cultivated to provide organic fodder for a 9000 hen egg production unit.

The concept of farms producing energy for the general population is not new, and already energy crops are being grown in the UK to fuel power stations and for electricity production on farms through anaerobic digesters, but as cars are being developed to run on alternative fuels such as hydrogen, then Mark says it is not unrealistic to look at the potential for farms to provide refuelling facilities for motorists.

The topic resulted in much discussion both during and after Mark's talk and one main area of concern from members was that if many farms start growing energy crops rather than food for the population, then we could enter an era in which there is not enough food being produced. The work being done by New Holland in Italy will no doubt be watched closely by farmers as well as by the other tractor manufacturers

David Williams

This article first appeared in the December issue of Farmers Guide (www.farmersguide.co.uk) and is reproduced in Landwards with their kind permission.

NORTHERN IRELAND BRANCH

Visit to Focus Farm

MEMBERS of the Northern Ireland Branch of IAgrE and their guests recently enjoyed a visit to John and Eoin McCambridge's Focus Farm which is located close to Ballycastle in a scenic hill and coastal area on the NE corner of County Antrim.

This commercial farm is one of a series across Northern Ireland, assisted by the Rural Development Programme, to demonstrate up to date good husbandry practices for the benefit of other farmers. The farm hosts visits in the Renewable Crops category because of its production of short rotation coppice willow as an energy crop. It also runs an impressive hydro electric power system on the adjacent Carey River.

The IAgrE group were pleased to have the opportunity of learning more about these enterprises in a practical setting.

Short coppice rotation willow production

Part of the farm is planted with about 15ha of willow (Salix). The biomass energy market requires dry wood chips and Eoin McCambridge chose a bulk harvesting, drying and storage system.

A contractor uses an adapted Claas self-propelled forage harvester to cut, chop and load the crop into silage trailers. At the drying shed, the material is loaded using a telescopic handler on the drive-over Welvent drying floor.

Drying has to reduce the moisture content from a typical 50% to 17%. Blowing normally takes place over an 8 week period adding some heat from gas fired burners. Drying performance is monitored and experience confirms the importance of making maximum use of periods of ambient low humidity and not allowing the chip temperature to fall too low.

Last season's dried crop was sold in bulk to fuel a wood chip burner installation at a public leisure centre in Co Tyrone. The Focus Farm status facilitates recording of useful technical information, such as seasonal husbandry experiences and the comparison of harvesting and drying costs for different years, which is passed on to other farmers' groups when they visit.

Hydro electric power

Mr John McCambridge has an ongoing interest in renewable energy sources having maintained a previous water turbine to supply the farm's electricity needs.

The old original Fleming turbine was built in Co Antrim and is now relocated to the farm yard as a static exhibit. Mr Cambridge's son, Eoin, now carries on the tradition by developing and managing the new system.

The Carey is a fast flowing salmon river which rises on the Antrim plateau and flows to the sea. Because the previous installation, including a weir, was already in place for many years it was possible to retain the necessary permission to divert water to a turbine and install a more efficient, modern and environmentally friendly system with minimal disruption.

The latest design of fish pass, consisting of a series of stepped 2.5m deep spill tanks, is now installed to help migratory salmon find their way upstream. Water is diverted from above the weir through a 1.4m diameter pipe to a holding chamber with a debris screen. The screen bars are spaced at 12mm so regular cleaning is needed to prevent accumulation of leaves and other floating debris which would restrict or stop water flow to the turbine.


Fish pass and weir

An innovative powered rake system (designed and built by Co Antrim engineer John Magill) is installed to automatically respond to a restriction in flow. It travels up the screen to comb debris up into a flume and a full width trough scoops water behind the rake to cleanly flush away the accumulated material in each cycle.

John Magill also refurbished the existing steel penstock (feed pipe) which takes the water down to the modern WKV cross flow turbine as installed in 2006. WKV (Wesserkraft Volk AG) now specialise in small to medium sized hydro power stations. In 1979 the company started making turbines at a farm barn within the Southern Black Forest area of Germany. The new turbine has automatic controls and a minimum rated output of 27kW.

During the visit it was steadily producing close to 30kW. For most of the


Debris screen cleaning system in action


Eoin McCambridge shows the turbine and its design drawing


Eoin describing the standing willow crop and the storage / drying facilities


Eoin showing where 3 phase power enters and leaves the farm

L-R: John McCambridge (host); Gary Connolly (IAgrE Branch Chairman); Eoin McCambridge (host); Ian Duff (IAgrE Branch Hon. Secretary)

time, the farm is self sufficient in electricity and all surpluses are sold to NIE (Northern Ireland Electricity). At peak demand times on the farm, such as when the willow drying fans are running, additional 3 phase power can be imported from NIE if required.

The McCambridge family acknowledge how they were able to harness this valuable local power source and avail of some funding assistance by sources such as Intereg III A which has encouraged the project as a means of reducing dependence on fossil fuels.

The IAgrE group were very impressed with how the farm has developed both enterprises and by the amount of well researched and presented information on offer to others. Future groups going to this Focus Farm can expect an enjoyable and very useful visit

Terence Chambers

Debris screen flushing trough in action

YORKSHIRE BRANCH

'Understanding Low Carbon Pig Production'

THE speaker for the evening was Nigel Penlington who spoke to us about his experiences in the pig industry. His talk was titled '*Understanding Low Carbon Pig Production*'.

Nigel began with a few words about his work and where he fitted into the pig industry having started his life as an engineer graduating from Harper Adams with an HND in Agricultural Engineering.

After a spell farming in the Middle East, he completed an MSc in Soil and Water Engineering from Cranfield University and then working in land drainage. He joined ADAS as a Mechanisation Consultant. His primary areas of work included farm waste management systems, environmental protection, odours and land restoration. Nigel joined BPEX in 2004 specialising in environmental issues affecting the UK pig industry and production technology.

He started his comments on the pig industry by showing us a slide of the various cuts of the pig of which we in Great Britain eat, but we are self sufficient in some parts and not others so rely heavily on imports and exports. We also have markets for the 'fifth quarter' and developing other products such as producing bio-diesel from guts.

The higher the utilisation rate, the lower the Carbon footprint. The saying 'you can use everything but the squeak' holds true, the squeak is energy, can we get that?

The industry after searching found outlets for the head and tail to the Far East and, the cull sows to Germany. This then made the UK pig industry more profitable.

He then carried on to tell us how the herds are housed and how their environment effects their meat conversion, quality and consequent profit margins, tools developed by engineers available to farmers for improving efficiency and consequently reducing Carbon footprint.

There are compromises between providing good animal welfare and all our most efficient production which have to be recognised by a responsible society.

Nigel eventually got onto the subject of solar energy, wind power and power anaerobic digestion
www.bpex.org.uk/KTRandD/environmentHub/Energy

This generated many questions especially as our previous meeting had been a visit to a sewage works who were producing energy anaerobically. The English Pig Industry will launch its environmental roadmap in the next few months.
www.bpex.org.uk/KTRandD/environmentHub

Gordon Williamson

WEST MIDLANDS BRANCH

Visit to the RASE Library

WHILST many people know that academic institutions have libraries and, in fact, the IAgrE library is held jointly with the Cranfield University, not everyone knows that the Royal Agricultural Society of England (RASE) has a library.

As they went past the Arthur Rank Centre, visitors to the Royal Show may have seen a sign saying it is open and inviting people in. However, William Waddilove met the librarian, John Wilson, on one such occasion and thought it would be of interest to members.

In 1838, a group of individuals with interests in agriculture - journalists, landowners and enthusiasts - had become convinced that science would help English agriculture to become more productive and meet the growing food requirements of a booming population. Shortly after in 1840, the Society gained a Royal Charter and, about that time, founded a library. The first Journal came out in that year.

The RASE adopted a motto '*Science into Practice*' and its journals demonstrate that. They record research done by, or commissioned by, members but the library is much more than that. Over the years, it has become a significant collection of books and records illustrating the development of agriculture.

The West Midlands Branch arranged a visit to the library and John Wilson put on a display of books for us from various eras and invited us to study them. Whist many libraries of this nature are restricted access, this one is open to all. However, it is necessary to make an appointment to visit as John is only there on a part-time basis.

Visitors will be impressed by John's enthusiasm and could even become involved in a volunteer capacity. That happened to me and I have been working through the Journals and other books recording the development of the use of steam in agriculture.

In earlier days, steam power was not developed enough to feature but by the 1850s the RASE was commissioning comparison trials and holding competitions for development. Then slowly the internal combustion engine started to be mentioned and the era of steam had passed. This library records the rise and fall of many other facets of agricultural development.

If you are interested in visiting, please contact the librarian directly:

John Wilson, Librarian, RASE Library, Arthur Rank Centre, Stoneleigh Park, Warwickshire, CV8 2LG. Telephone: 024 7685 3076

William Waddilove

Membership changes

Admissions

A warm welcome to the following new members:

Member
White G T (Edinburgh)

Associate Member - also EC registered as Eng Tech
Black N R (Scotland)
Dickinson S (Lincs)
Irvine A (Scotland)
Kerr G (Scotland)
Low D (Scotland)
McLean D G (Scotland)
Newton A M (York)
Wall A I (Scotland)

Associate
Adamson B (Norfolk)
McFarlane B G (Scotland)
Shewring J J (Norfolk)
Temple P P (Kent)
Thompson G (USA)

PreProf
Misiewicz P (Essex)

Student

Cranfield University
Church K
Corney P A
Laing A N

Askham Bryan
Myers A

Harper Adams
McSherry D

Associate
Hoare J (Norfolk)

Deaths

Clough M G (Norfolk)
Cross F (Dorset)
Russell J H (Nth Yorkshire)
Owen G M (Scotland)

Transfers

Associate Member
Richards T E (Notts)

Engineering Council

Congratulations to the following member who has qualified as a Chartered Engineer entitling him to use the designatory letters CEng after his name.

CEng

Sadler R W (Suffolk)

OBITUARY

Gwilym Morris Owen, CEng, MIAgrE
1936-2010

GWILYM was brought up on a Welsh hill farm.

He trained at Wrexham Technical College and then worked on fast patrol boats for Saunders Roe, in North Wales. He took up a post with the Scottish Machinery Testing Station, near Livingston, during the 1960s and stayed with this body through its evolution into the Scottish Institute of Agricultural Engineering in the 1970s and its ultimate assimilation into the Scottish Agricultural College (SAC) Engineering Department in the 1990s.

At SAC Gwilym joined the team pioneering the separation of potatoes from stones and clods, on potato harvesters using x-rays. He moved onto a project looking at machinery stability on hillsides and steep ground. He developed methods for assessing and predicting stability, both with portable weigh pads for on-site assessment, and a full scale tilt table at the Bush Estate, Penicuik, able to tilt combine harvesters. The information gained by this project was important in his helping to draft the British Standard for stability measurement of agri-cultural machinery.

He also investigated skidding on grass surfaces and pro-duced a method for allowing vehicle operators to assess grass surface conditions on-site, in a safe area, before venturing onto steeper slopes.

He became Honourary Secretary of the Scottish Branch of the Institution of Agricultural Engineers in 1995 and eventually retired in 2005. His services to the Scottish Branch were recognised by his earning the 2005 Branch Meritorious Award.

Gwilym, during this period, managed the Scottish Branch tirelessly - coordinating evening meetings, visits, members' nights, social evenings, conferences, student skills competitions and AGMs. His organisation skills were a credit to the Scottish Branch and he helped to recruit new members and spread knowledge of IAgrE in the engineering community.

Gwilym was a keen sportsman and played rugby, which was his favourite game. He was also involved in amateur theatrics.

Gwilym will be sadly missed by his wife, Carrie, his children and six grandchildren, and also by a wide circle of friends.

Long service certificates

Name	*Grade*	*Date of anniversay*
60 years		
Kenneth Henry **Lane**	IEng, MIAgrE	21 Nov 2010
50 years		
David Jestyn **Evans**	FIAgrE	21 Nov 2010
Brian David **Witney**	CEng HonFiAgrE	22 Nov 2010
35 years		
David George **Wilson**	EngTech, MIAgrE	23 Oct 2010
Christopher John Tasker **Lee**	AIAgrE	23 Oct 2010
Peter Christian **Baker**	IEng, FIAgrE	8 Nov 2010
Robert Towers **Smith**	IEng, MIAgrE	8 Nov 2010
Paul Salomo **Imonigie**	CEng, FIAgrE	9 Nov 2010
Richard Trevor Dunkley **Jones**	EngTech, MIAgrE	28 Nov 2010
Ian Drummond **Mitchell**	EngTech, MIAgrE	29 Nov 2010
Prithiviraj **Oogarah**	IEng, FIAgrE	1 Dec 2010
Richard James **Cole**	MIAgrE	30 Dec 2010
25 years		
Patrick Freer **Smith**	AMIAgrE	1 Oct 2010
David John **Roe**	IEng MIAgrE	1 Oct 2010
Geoffrey J H **Freedman**	CEng FIAgrE	14 Oct 2010
Gerald Arthur **Haigh**	IEng MIAgrE	1 Nov 2010
Jonathan **Chaplin**	CEng MIAgrE	2 Nov 2010
James **Campbell**	CEng MIAgrE	21 Nov 2010
Mark Picton **Ansell**	AMIAgrE	26 Nov 2010
Jeffrey **Livingston**	CEng MIAgrE	26 Nov 2010
Jonathan Robert **Denton**	AMIAgrE	12 Dec 2010
Michael Clive **Smith**	AMIAgrE	16 Dec 2010
Paul Timothy **Wyattt**	AMIAgrE	30 Dec 2010
Keith **Wain**	AMIAgrE	30 Dec 2010

Academic members

Askham Bryan College
Askham Bryan
York
YO23 3FR

Barony College
Parkgate
Dumfries, DG1 3NE

Bicton College
East Budleigh
Budleigh Salterton
Devon
EX9 7BY

Brooksby Melton College
Asfordby Road
Melton Mowbray
Leics
LE13 0HJ

Coleg sir Gar
Pibwrlwyd Campus
Pibwrlwyd
Carmarthen
SA31 2NH

Cranfield University
Cranfield
Bedfordshire
MK43 0AL

Easton College
Easton
Norwich
Norfolk
NR9 5DX

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

Harper Adams University
College
Newport
Shropshire
TF10 8NB

Institute of Technology Tralee
Clash
Tralee
Co Kerry
Ireland

Myerscough College
Myerscough Hall
Bilsborrow
Preston
Lancashire PR7 0RY

Oatridge Agricultural College
Ecclesmachan
Broxburn
West Lothian
EH52 6NH

Pallaskenry Agricultural
College
Co Limerick
Ireland

Plumpton College
Ditchling Road
Lewes
East Sussex
BN7 3AE

Reaseheath College
Reaseheath
Nantwich
Cheshire
CW5 6DF

Royal Agricultural College
Cirencester
Gloucester
GL7 6JS

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

Sparsholt College
Sparsholt
Winchester
Hampshire
SO21 2NF

Willowdene Training Ltd
Chorley
Bridgnorth
Shropshire
WV16 6PP

Wiltshire College - Lackham
Lacock
Chippenham
Wiltshire
SN15 2NY

Commercial members

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

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

Alvan Blanch Development
Co Ltd
Chelworth
Malmesbury
Wiltshire
SN16 9SG

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

Bomford Turner Limited
Salford Priors
Evesham
Worcestershire
WR11 5SW

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

Douglas Bomford Trust
Barton Road
Silsoe, Bedford
MK45 4FH

FEC Services
Stoneleigh Park
Kenilworth Warwickshire CV8
2LS

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

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

John Deere Ltd
Harby Road
Langar
Nottinghamshire NG13 9HT

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

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

White Horse Contractors Ltd
Lodge Hill
Abingdon
Oxfordshire
OX14 2JD

We want to hear from members.
Send branch reports or correspondence to:
The Editor, 25A New Street, Salisbury, Wiltshire, SP1 2PH.
Email: *chris@nelsonpublishing.co.uk*
Or the IAgrE Communications Officer, Marion King on *pressroom@iagre.org*

EVENTS

IAgrE Branch Meetings and Events

South East Midlands Branch
Monday 13 December 10, 19:30
REDUCING DECIBELS FROM MACHINES AND MAKING A NOISE ABOUT AG ENG
Speaker: Tony Turner, GreenMech Ltd
Venue: Maulden Church Hall, Maulden, Beds
Tony Turner will describe how Greenmech have achieved a significant reduction in noise through innovative design and engineering. He may also speak about selling machines internationally, working with lcoal schools to attract young people into an career in agricultural engineering. For further details contact the Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

South East Midlands Branch
Monday 10 January 2011 starting 19:30
FLOODPLAINS - JOINED UP THINKING?
Speaker: Quentin Dawson, Bureau Veritas
Venue: Maulden Church Hall, Maulden, Beds
This seminar considers the RELU Floodplain Project contribution to future decisions on land use policy, through its analysis of 'benefits and costs' associated with a range of environmental management regimes. For further details contact the Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

Wrekin Branch
Monday 24 January 2011
CO-OP FARMS
Speaker: Christine Tacon
Venue: Reaseheath College
For further details contact the Branch Secretary Graham Higginson
Tel: 01270 613230 Email: wrekin@iagre.biz

East Midlands Branch
Tuesday 25 January 2011 - starting 19:00
THE CHALLENGE FOR LUBRICANTS TO KEEP UP WITH ENGINE DEVELOPMENTS
Venue: Witham Oils & Paint Ltd, Outer Circle Road, Lincoln LN2 4HL
The Witham Group is a privately owned UK based business manufacturing lubricants and paints to ensure top quality performance on thousands of different applications for thousands of different customers. For further information please contact Sandy Donald sandy.donald@blankney.com Mob: 07977 521231 or Branch Secretary Paul Skinner.
Tel: 01205 353754 Email: paulskinner57@btinternet.com

South East Midlands Branch
Monday 07 February 2011 starting 19:30
BRANCH AGM AND STUDENT MEETING
Venue: Maulden Church Hall, Maulden, Beds
For further details contact the Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

West Midlands Branch
Tuesday 08 February 2011 starting 19:15
ENGINEERING OFF ROAD CAPABILITY IN LAND ROVER VEHICLES
Speaker: Jan Prins, Jaguar Land Rover
Venue: Stoneleigh Village Hall, Kenilworth, Warwickshire CV8 3DD
Jan Prins is a Land Rover Technical Specialist in Off Road Capability. For further information please contact Michael Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

East Midlands Branch
Wednesdays 23 February 2011 starting 19:00
RBM WORKSHOP
Speaker: Peter Arrand
Venue: RBM, Clarborough Hill, Retford, Notts DN22 9EA
In addition to John Deere Agricultural and Domestic Ground Care products, RBM also sell a large number of agricultural machines from some of the most well known and respected names in the industry. This meeting will also look at RBM's approach to the LTA scheme and hear from those involved and those who have benefitted from it. For further information please contact Branch Secretary Paul Skinner.
Tel: 01205 353754 Email: paulskinner57@btinternet.com

Yorkshire Branch
Thursday 03 March 2011
BRANCH AGM + FENDT TRACTORS
Speaker: Alan Wiplow
Venue: Fox & Hounds, Copmanthorpe, York
Tel: 01937 843891 Email: gordon.williamson@ntlworld.com

South East Midlands Branch
Monday 07 March 2011 starting 19:30
ADVANCES AND DEVELOPMENTS IN COMBINES FOR AN INTERNATIONAL MARKET
Speaker: Paul Freeman, CNH
Venue: Maulden Church Hall, Maulden, Beds
This presentation will highlight the challenges and many factors that have to be considered when developing and marketing combine harvesters (and other machines) for an international market. For further details contact the Branch Secretary John Stafford.
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

West Midlands Branch
Tuesday 08 March 2011 starting 19:00
BRANCH AGM + PRESENTATION FROM FENDT TRACTORS
Venue: AGCO Training School, Stareton Nr Stoneleigh, Kenilworth, Warwickshire CV8 2TQ
For further information please contact Michael Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

Wrekin Branch
Monday 21 March 2011
BRANCH AGM AND TECHNICAL TALK
Speaker: Peter Leech
Venue: Reaseheath College
For further details contact the Branch Secretary Graham Higginson
Tel: 01270 613230 Email: wrekin@iagre.biz

East Midlands Branch
Wednesday 23 or Thursday 22 March 2011- tbc
BRANCH AGM AND 'THE UNIVERSITY OF LINCOLN'S STRATEGIC DIRECTION & DEVELOPMENTS WITHIN LANDBASED ENGINEERING'
Speaker: Bill Meredith, Head of Agriculture and Landbased Studies, Riseholme College
Venue: Riseholme College, University of Lincoln, Riseholme Park, Lincoln LN2 2LG

An update of the University's strategic direction and evelopments within landbased engineering, including food processing and packaging. For further information please contact Branch Secretary Paul Skinner.
Tel: 01205 353754 Email: paulskinner57@btinternet.com

South East Midlands Branch
Monday 11 April 2011 starting 19:00
HYDRAULICS ON MOBILE EQIUPMENT
Speaker: Rexroth
Venue: Maulden Church Hall, Maulden, Beds
For further details contact the Branch Secretary John Stafford
Tel: 01525 402229 Email: john.stafford@silsoe-solutions.co.uk

West Midlands Branch
Tuesday 12 April 2011 starting 19:30
MODEC ELECTRIC VEHICLES
Speaker: Colin Smith
Venue: MODEC, Progress Way, Binley Industrial Estate, Conventry CV3 2NT
A visit to look at the design and manufacture of MODEC's specialised product. For further information and to book a place please contact Michael Sheldon
Tel: 01926 498900 Email: michaelcsheldon@yahoo.com

East Midlands Branch
Tuesday 10 May 2011 starting 18:30
SEVERN TRENT FARMS APPROACH TO: RENEWABLE ENERGY, ENERGY AND CARBON
Speaker: John Jackson
Venue: Severn Trent Farms, Stoke Bardolph, Nottingham
Visit to Severn Trent Farms, including a visit to the new digester facility For further information please contact Bill Basford on 01636 813412 or mob 07831 141622 or email: mechbasford@aol.com. Alternatively, contact the Branch Secretary Paul Skinner.
Tel: 01205 353754 Email: paulskinner57@btinternet.com

Other Events:

Tuesday 14 December 2010
Assoc of Applied Biologists
ADVANCES IN NEMATOLOGY
Venue: Linnean Society of London, Piccadilly, London
For further information contact the Association of Applied Biologists.
Tel: 01789 472020 Email: rebecca@aab.org.uk

Wednesday 15 December 2010 to 16 December 2010
Assoc of Applied Biologists
WATER & NITROGEN USE EFFICIENCY IN PLANTS AND CROPS
Venue: Olde Barn Hotel, Marston, Lincs
Tel: 01789 472020 Email: rebecca@aab.org.uk
Web: www.aab.org.uk/contentok.php?id=95&basket=wwsshowconfdets

Friday 07 January 2011 starting 1400h
Forest Research
FORESTS AND THE CLIMATE SYSTEM
Speaker: Prof John Grace
Venue: Northern Research Station, Roslin EH25 9SY
Seminar is FOC. Please advise Jordan Chetcuti if you are planning to attend. Tel: 0131 445 6977 Email: jordan.chetcuti@forestry.gsi.gov.uk
Web: www.forestry.gov.uk/forestresearch

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

Wednesday 09 February 2011
Assoc of Applied Biologists
INTERACTION OF PESTICIDE APPLICATION AND FORMULATION ON RESIDUES IN FRUITS & VEGETABLES
Venue: Syngenta, Jealott's Hill, Berks
For further information contact the Association of Applied Biologists. Contacts as previous.

Tuesday 01 March 2011
IAgrE
SMART SENSORS IN AGRICULTURE
Venue: East of England Showground
TEL: 01234 750876 Email: conferences@iagre.org
Web: www.iagre.org

Wednesday 02 March 2011
Fusion Events
PRECISION FARMING EVENT
Venue: Exec Exhibitions Centre, East of England Showground, Peterborough PE2 6XE
This well-established Precision Farming Event is now recognised as the UK's leading advanced agricultural technology show. This year the organisers are building on its success and providing new working demonstrations and advice clinics, which will run alongside the existing highly-regarded seminar programme and exhibition.
Contact: Andy Newbold
Tel: 0845 4900 142 Email: info@farm-smart.co.uk
Web: www.farm-smart.co.uk

Tuesday 8th March 2011 starting 10:00
IAgrE
CONSERVATION CROPPING
A Workshop to share lessons and experiences from Tropical and Temperate regions.
In association with the Tropical Agricuture Association, NIAB-TAG, the British Society for Soil Science and Cranfeld University
Tel: 01234 750876 Web: www.iagre.org

Tuesday 10 May 2011
IAgrE
DIESEL ENGINES - THE FINAL FRONTIER
Venue: The Auditorium, Vincent Bldg, Cranfield University, Cranfield, Bedford, MK45 0AL
A conference to understand current and forthcoming off-road diesel engine emissions legislation, new technologies and the impact of Stage IIIB (Interim tier 4) and Stage IV (Final tier 4) on engine manufacturers, fuel and oil suppliers, equipment manufacturers, servicing dealers and end users.
Tel: 01234 750876 Email: conferences@iagre.org
Web: www.iagre.org

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

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

Conference 2011

Landwards
Agriculture • Horticulture • Forestry • Environment • Amenity

Diesel Engines – The Final Frontier

A CONFERENCE FOR ALL SCIENTISTS, ENGINEERS AND MANAGERS WITH AN INTEREST IN OFF-ROAD DIESEL ENGINED VEHICLES

Current and forthcoming off-road diesel engine emissions legislation, new technologies and the impact of Stage IIIB (Interim tier 4) and Stage IV (Final tier 4) on engine manufacturers, fuel and oil suppliers, equipment manufacturers, servicing dealers and end users will be discussed.

The Conference will be of interest to all those involved with:

- the installation of engines in to whole machines
- transmission integration
- filtration issues (air and fuel)
- fuel supply and storage

The conference, to be chaired by Mike Hawkins formerly of CNH and current President of EUROMOT, will feature noted speakers from across the industry and will cover the impact this legislation will have on:

- Future trends in diesel engine design
- Users (fuel, lubricant and fuel systems, fuel specification (low sulphur for off-road use) and storage issues)
- Installers (design installation and transmission matching issues)
- Manufacturers (sales and after-market issues)

Speakers, organisations and topics will include:

- Future trends in diesel engine design
- SCR to achieve Tier 4 compliance
- John A. Radke (Manager, Worldwide Customer Support – John Deere Power Systems) The EGR Route
- Carl Stow (Senior Scientist - Crankcase Lubricants Industry Liaison Shell Global Solutions) - *Fuels and Lubricants – The Impact for Tier 4 off highway engines*
- Roger Weyman (Director - Business Development Torotrak Plc) The Challenge of integrating transmissions to achieve improved energy efficiency and reduced levels of emissions for Tier 4 compliance.

Plus speakers from: Rexroth Bosch, Sauer-Danfoss and Parker-Racor on topics ranging from “Instrumentation and control of the drive chain” to “Fuel and air filtration challenges for Tier 4 compliance”

LANDWARDS™2011

Conference
May 10th
Venue:
Cranfield University
Cranfield

For further information, please contact:
IAgrE Secretariat:
conferences@iagre.org
01234 750876

For online booking, please visit
www.iagre.org
The professional body for engineers, scientists, technologists and managers in agricultural and allied industries including food, forestry and biological systems

IAgrE is a licensed body of the Engineering Council and

Engineering Council

SocEnv Society for the Environment

a founding constituent body of the Society for the Environment

Convened by IAgrE

In association with Cranfield University

Sponsored by

SAUER DANFOSS

Shell

Innovation, science and technology in **Ag**riculture and the **R**ural **E**nvironment

AGRICULTURE **FORESTRY** **ENVIRONMENT** **AMENITY** **HORTICULTURE**

www.iagre.org