Agriculture • Horticulture • Forestry • Environment • Amenity

LANDWARDS

Early Summer 2005

- Rooftop Turbines
- Young Engineers

Sustainable Soil Use

IAgrE JOURNAL Volume 60 No.3 www.iagre.org

The Awards are made to persons distinguished by work in the agricultural engineering profession.

Peter Leech

Peter Leech MIAgrE (left) receiving his Award of Merit certificate and citation from IAgrE President Peter Redman at the ceremony, held at the Annual Conference in March.

Born into a farming family, Peter Leech has spent his entire working life working in the agricultural sector. Following his initial training and helping with the family farm, Peter joined John Deere UK at the age of 20 and, with the exception of a three-year stint in John Deere in Germany, has been there ever since.

With the emphasis on service, Peter's experience covers all aspects of the customer support role and he is now responsible for the management of the company's Customer Support Department. This covers all aspects of the department and includes the total parts operation. He has over 45 staff reporting to him.

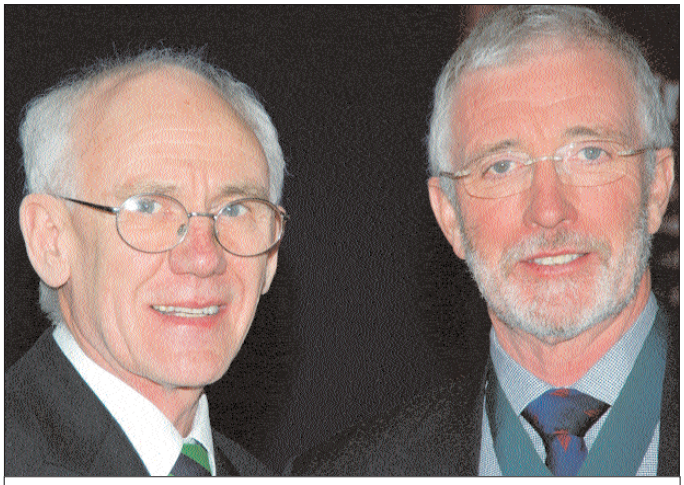
Peter has long been concerned that the company's service function should match the quality of the product and this Award of Merit reflects the time and energy he has put into this at John Deere. Indeed, his introduction of the John Deere Ag-Tech Diploma and Certificate programmes, in association with Brooksby Melton College, BAGMA, the Training and Enterprise Council, City & Guilds of London Institute and IAgrE, represents an achievement that is now the industry standard to which other companies aspire.

His work in encouraging dealer technical staff to register as Engineering Technicians through IAgrE should not be underestimated, both for its raising of staff self esteem and for its impact on raising the profile of land based service engineering, to those within and outside our industry.

The John Deere Ag-Tech Programme recently celebrated its 10th anniversary with over 100 technicians, who have graduated from the scheme, gathering together.

Given the success of the John Deere programme, one could forgive Peter if he rested on his laurels but his recent efforts in supporting the BAGMA/AEA funded industry wide careers initiative shows just how committed Peter is, to this industry as a whole, and to raising the status of service technicians in particular.

Ray Clay



Ray Clay FIAgrE (left) after receiving his Award of Merit from IAgrE President, Peter Redman, at the ceremony held at the Annual Conference.

Ray Clay is a professional engineer of the highest calibre who has spent the whole of his career in vehicle engineering. His contribution to the Agricultural Engineering industry has undoubtedly made an impact on the industry as a whole and his work can be truly considered as worthy of the IAgrE Award of Merit.

Ray graduated with a degree in Automotive Engineering in the early 1960's. He then worked at the Road Research Laboratory (RRL) developing his lifelong interest in vehicle suspension, steering and braking systems.

From the RRL, Ray moved to Vauxhall Motors where he worked for some 10 years primarily as a steering and suspension engineer but also working on early automatic transmissions. A 10 year period at Bedford Trucks followed where Ray extended his experience into the engineering of Heavy Goods Vehicles.

In 1986, Ray joined JCB Developments as Principal Engineer working on the creation of a brand new concept of high speed on/off road vehicle.

The resultant vehicle, launched in 1991 as the JCB Fastrac, has changed the face of the farm tractor in a similar way to the introduction of the grey Ferguson in the 1950's. The belief that it was not possible to design a machine providing high draught capability and high speed in the same package was dispelled. Today, all major tractor manufacturers offer models in the market capable of 50 km/h and fitted with front axle suspension.

Ray's understanding of wheel and tyre dynamics, built up over 40 years, is probably unsurpassed in the industry

In 1996 Ray became Chief Engineer at JCB Landpower, the Agricultural Division of the JCB Group, a position he still holds.

Throughout his career, Ray Clay has been an inspirational motivator to all those he works with. He shares his experience generously always finding time to encourage and develop younger engineers. He carries out his work to an exemplary standard and sets the highest level of ethical and moral standards to those around him. He is a true enthusiast in the workplace and those that work for and around him hold him in the highest esteem.

The Wrekin Branch has great pleasure in nominating Ray Clay for the IAgrE Award of Merit. His engineering career has been of the highest calibre and he has undoubtedly made a lasting contribution to the engineering of agricultural vehicles.

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Front cover: *Rooftop turbine (Photo: copyright ©2005 Renewable Devices Swift Turbines Ltd)*

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SUSTAINABILITY IN ENGINEERING DESIGN

Tim S Rymer

BIO NOTE

This paper was presented as the Keynote Address at the IAgrE Annual Conference entitled ' Sustainability in Engineering Design' and held at Harper Adams University College, Newport, Shropshire, UK, on 9 March 2005.

Having read Agricultural Engineering at Newcastle University, where he gained an honours degree, Tim Rymer MIAgrE returned to the JSR business in 1985. Initially he focussed mainly on the arable side of the business with the additional responsibility of running a local pea vining cooperative, Driffield Pea Growers. He subsequently set up a second pea cooperative, Swaythorpe Growers Ltd to grow peas for J S Frozen Foods by farmers who were outside the Birds Eye catchment area. He is currently Chairman of Swaythorpe Growers and a Director of Driffield Pea Growers.

The JSR Farming Group of which he is Chairman has a turnover of £20m and employs 160 people on 4000 ha, owns 7,000 sows and has an international pig genetics business which exports to 34 countries worldwide.

Sustainability in engineering design is a challenging theme. My academic trophy cabinet hardly qualifies me to address the theme, namely a degree in Agricultural Engineering at Newcastle University rather a long time ago, and I am a member of the Institution of Agricultural Engineers. However, I have spent 20 years working within a business that on a daily basis tries to turn the resources of land, labour, capital, machinery and livestock into a profit. Without profit, we do not have a sustainable business. Evaluating new technology today is essential in making the right decisions that combine those reserves more effectively. Too often new technology over promises and under delivers though some of this is due to our own lack of knowledge and skill. I shall return to our own experiences at JSR Farming Group in a few minutes.

Sustainability

So to the theme 'Sustainability in Engineering Design'. Sustainability is the new buzzword of politicians, businessmen and environmentalists. Apparently, there are over 350 definitions of sustainability which is probably why politicians like to use it so much!

The most well known definition is from the Brundtland Report of 1987 which states that 'sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their own needs'. In practice, this is almost impossible for all of us in the developed world where most people's life style is profusely unsustainable and for engineers in particular whose brief often commits them to unsustainable projects. So how

do consumer lifestyle engineering companies address sustainability?

This is Daimler Chrysler's sustainability statement: 'Sustainability means using natural resources in a way that current needs are fulfilled without imposing limitations on the lifestyle of future generations. Environmental compatibility, social responsibility, politics and success in business must not be mutually exclusive. In fact, they need to be closely co-ordinated because society, the economy and the environment are interdependent and constantly changing'.

'Wow' – bit of room for manoeuvre there then!

You will be relieved to hear I don't intend to wade through the other 348 definitions of sustainability. The point I am making is that at its worst sustainability is a word you can weave into just about any statement you like and at best is a vision, something we aspire to but there will always be compromises because for many people the future is less important than surviving today. However, I have to admit that a conference theme 'less unsustainable engineering design' is a bit of a mouthful!

Nevertheless, the focus on 'not compromising the ability of future generations to meet their own needs' does make engineering design more challenging. This is something that has gradually become more important as society's priorities have changed.

Engineering achievement

The heroic age of British Engineering was the Victorian era and epitomised by engineers such as the Brunels (father and son), the Stephensons (father and son), Smeaton, Boulton and Watt. Isambard Brunel has come rapidly to receive from posterity the accolade of having been one of the greatest and most heroic of British engineers. Furthermore, he was narrowly beaten by Winston Churchill for the BBC award of 'Greatest Briton of all time'.

Brunel possessed a vision of great works, his 'castles in the sky', many of which he was able to translate into reality. He possessed the skills, the drive and the organisational ability to see through enterprises that would have defeated most men. He was not always successful but even his failures were impressive. His leading role in the transport revolution of the 19th century, especially the building of the Great Western Railway, left an indelible mark on the British landscape. It is a remarkable tribute to the man that his reputation has been able to endure blows, which would have overwhelmed most engineers. The largest of these failures was the collapse of the atmospheric system on the South Devon Railway and the extraordinary series of problems which accompanied the attempts to build, launch and fit out the Great Eastern. However, as the Americans are keen to tell us 'if you haven't been bust you haven't been trying' and it was Brunel's ability to learn from his failures that set him apart. Failures, I might add, that he would not have been able to make in today's risk averse society. Quite simply, he was a man motivated by a vision or creative imagination to transform the ability of people to travel.

Did Brunel meet the Brundtland Report sustainability definition? In many ways he did, although there were human and environmental costs. To me, though, it was the failure of the future generation to share his transport vision and invest in the infrastructure that could have led us to a more sustainable transport policy today. This example illustrates how important it is not to try and predict too greatly the future generation's needs and requirements as they themselves may subsequently adopt different visions and priorities.

"...the focus on 'not compromising the ability of future generations to meet their own needs' does make engineering design more challenging. This is something that has gradually become more important as society's priorities have changed."

Adopting better practices

Clearly, though, there are some unsustainable engineering practices going on today. However, in the main this isn't the fault of the engineer but a project they inherit or a project driven by political expediency. Mining sand from the beach to build beach side hotels or the slash and burn of rain forests for a year's crop of fruit or vegetables. These examples involve engineers. Structural engineers build hotels and road engineers open the way into the rain forest.

Engineers are deeply involved in unsustainable initiatives, especially in the highly political business of exploiting resources, such as drilling for oil or providing water.

But engineers are adapting their designs and operations to make them more sustainable and even reverse previous unsustainable projects. A good example of this is river engineering whereby modern river engineers restore wetlands and re-excavate the meanders of previously straightened rivers.

Too often engineering schemes in developing countries are too ambitious and fail to appreciate the skill and knowledge required by the indigenous population to keep the scheme running after the engineers have left.

Pump Aid is a small charity that provides appropriate technology water pumps called 'Elephant Pumps' to Africa to provide access to clean water for drinking and irrigation. Importantly, these pumps can be maintained by poor rural communities without outside assistance. Pump Aid says that for economic sustainability they only employ technology that the local community can understand and afford to maintain in the long term. Interestingly, the 'Elephant Pump' comes from a 2000 year old Chinese design and has been adapted in Africa to make use of locally available materials. The lesson here is that, in some parts of the developing world, solutions can be found from engineering designs that were sustainable long before the word became fashionable.

Engineering and agriculture

The 18th Century saw a march of progress in agriculture – not all of it welcomed. Jethro Tull designed his seed drill in 1701; Meikle, a windrowing machine in 1720; Menzies, a water driven threshing machine in 1732; and followed by Turnip Townshend's four course rotation. Shows

and societies were instrumental in communicating those technological developments throughout agricultural and rural communities – a similar role that this Institution plays today.

The Common Agricultural Policy is an example of how politics has influenced engineering design. In the Treaty of Rome signed in 1957 which established the EEC, the specific objectives of the treaty relating to agriculture were: 'To increase agricultural productivity by promoting technical progress and assuring the availability of supplies'.

From this context, the objectives were met so successfully that the kind of review which today has led to the Single Farm Payment System should have happened in 1984 not 2004.

Technological progress was very rapid indeed. In 1979 at JSR, we managed to combine a record yield of wheat at 6.9 t/ha. In 1984, just five years later, we averaged 10 t/ha. Last year (2004), 20 years later, we still averaged 10 t/ha. However, we consistently do this now and 1984 was an exceptional year. The point is that in the late 1970's and early 1980's there was a technological output revolution happening on UK and European farms with scientists and engineers at the forefront. Like all revolutions though it all got out of control and the damage to the reputation of UK farmers as custodians of the countryside and providers of food was largely done during this period.

Adoption procedures

At JSR, we have never seen ourselves as pioneers of new technology but as investors in proven technology. People capabilities are an important guide to this proven technology. Their experience and capability is of course the first consideration but unfortunately apart from track record, the information or data on people tends to be entirely subjective. It remains vital to carefully assess staff competence in normal day-to-day activity before embarking on new investment with technology.

The use of computers in farming is an interesting example. I am not convinced that the exact answer to a financial calculation is particularly important. I still make use of that much maligned but free financial tool, the back of an envelope.

In making management decisions, it is only necessary to make a judgement on what is most likely to prove the most advantageous course of action. If the potential result between two alternative investments decisions appears very close then the only important consideration is that a decision is actually made. Indecision is another name for bad management. I'm not, however, advocating instant policy commitment but that a well thought out strategy should be backed by reliable information.

Computers have helped to mechanise our processors remembering that you can only do so effectively if the process itself is efficient. Bad processes defeat good people just as mechanised bad processors defeat good people. So often we find people operating as a spreadsheet island with no connectivity to the accounts package leading to duplication and inaccuracy.

Experience is of course the polite term for well programmed grey matter, a valuable commodity sadly undervalued in the electronic microchip age. Fortunately, there is still no substitute for the farmer's boot, stockman's eye or potato store manager's nose in commercial farming. Within our international pig breeding company once a week we run a computer on all test data for that week and BLUP or PEST as it is now called selects the right boar or gilt from 3 million records. The nucleus team leader then verifies the computer selection through his well programmed grey matter or experience. The genotype may be right but phenotypically the pig may be wrong. The nucleus team leader has the final say, not the computer!

There is no doubt that computer technology in farming has helped improve our processes whether through cost control, safety, improved quality or outright performance. The globalisation of markets and the growth of the Internet have allowed us to centrally purchase more effectively. Fail safes and diecams on pig farms have made them safer and provided a better environment for stock. Potato and onion store 'fridge units and control systems make it easier to control deterioration in quality and tractor harvesting and cultivation equipment have all allowed us to embrace large scale arable crop production in a way that was nearly unthinkable just ten years ago.

The future

Our Genetic Improvement programme is designed around three principles - performance, prolificacy and robustness – or, specifically, performance of the finished pig, prolificacy of the sow and robustness of the genotype to thrive in the environment which might be indoors, outdoors or in the tropics. Designing a new genotype takes seven years from the first great grandparents produced to having enough parents on the ground to sell to customers. The marketplace is fickle and changing so making a bet on the right genotype for the market in seven years time is difficult. The majority of our resource therefore is improving what we have. Each animal this year is genetically superior to the animal we produced last year on the traits we select for. The challenge for us is getting that improvement down to the commercial producer where it is sometimes not seen due to health, environment, feed or management practices.

In the past arable farming at JSR has been high input and high output. The future is about low input and high output. Yield is still the key to recovering our costs per tonne. However, input costs both variable and fixed need to be recovered to survive and prosper with wheat at £70 per tonne. I believe this process will be facilitated through engineering and technology.

We have made an investment in precision farming. At the moment this is essentially information gathering, yield mapping, soil nutrient analysis, using P & K variable rate fertiliser applicators and

"Engineers have constantly had to adapt to changing society wants and consumer wants. In the UK, society's wants are for the countryside to be a rural idyll"

HydroAgri nitrogen sensors to variable N spreading. The future will be variable seed drilling and patch spraying leading to a reduction in inputs. Laser eye technology allowing combine harvester operators to maximise bed width and similar technology on tractors and cultivation equipment to allow more even matching of boot widths and reduced compaction on headlands. The land that we do farm will need to be farmed like this or not at all. Using satellite technology and engineering design to optimise inputs according to the yield potential of each square metre of soil in each field will aid competitiveness. Scale and skill are the other two key components.

I believe we will see a time when energy crops compete for land with food crops. We have 20 hectares of short rotation willow, which was originally planned for the now defunct Eggborough power station. We believe willow only makes sense if you can turn it into heat and power close to where it is grown. We would need to invest in a biomass generator to provide generation of electricity and the ability to bolt on a heat exchanger for heat/hot water production. Companies such as Talbots have these generators commercially available and they even come with the latest software for grid connection. I am looking forward to the day the JSR electricity meter is spinning in reverse from electricity produced from our own biomass!

The new waste management regulations that came into force in 2004 mean that we cannot now dispose of the waste on our farms. We are now involved in a joint venture with Agrovista and Recovered Plastics to recycle our plastic containers through a chipping process. We believe that these kinds of initiatives which involve new engineering designs are very much more environmentally sustainable.

Engineers have constantly had to adapt to changing society wants and consumer wants. In the UK, society's wants are for the countryside to be a rural idyll – lambs skipping about on green rolling fields, sprayers locked away in sheds, happy pigs wallowing in mud and plenty of public access for people to walk, bike and ride pretty much where they like. Leaving Macdonald wrappers, empty crisp packets, empty cans and disposable nappies in gateways are small irritations that farmers would willingly accept for the subsidies they receive from the EU.

These same people then metamorphose on a Sunday night at the stroke of midnight and become mean, price conscious consumers. Sunday in the countryside is just a lazy, happy memory. On Monday morning, they are focussed on spending less than 10% of their disposable income on food and the retailers respond to 'consumer wants'.

They need a value Macdonald meal, own label crisps, buy one get one free pack of Coke and Pampers – probably made in China. Value in the minds of the consumer is primarily about price.

On Monday morning most farmers responding to the need to be globally competitive quietly unlock the sprayer implement shed to spray the potatoes for blight knowing they will be rejected and worthless if they don't. They take pigs back inside to farm them intensively because they are competing with the highly efficient Dutch and Danes and indulge in some effective vermin control to protect the recent higher mortality in the lambs.

Are these two antagonistic objectives reconcilable? Can we meet society's wants and consumer's wants at the same time? No. There needs to be a compromise and I believe engineering and technology will give us the tools to make that compromise. It is an enormous challenge but Brunel would not have been daunted by it. We need to ensure that modern farming can prosper in a sustainable form within an urban society.

ENVIRONMENT

Environmentalists support Olympic bid

The Society for the Environment (SovEnv), the new umbrella organisation for environmental professionals in the UK, has signed a Memorandum of Understanding with London 2012, the company bidding to host the 2012 Olympic and Paralympic Games.

The Memorandum of Understanding establishes a partnership between the two organisations that will, among other matters, seek to:

- promote sustainability through professional environmental advice throughout the Olympic projects;
- work towards the establishment of the highest professional standards drawing on the members of the Constituent Bodies that make up SocEnv; and
- promote the concept of a quality environment during and after the Olympic Games.

William Pope said "the Society for the Environment is delighted to help London 2012 and I pay tribute to the quality of the environmental package in the Bid. We need to ensure that for such a major event the preparation of all aspects of the Games themselves as well as the exciting legacy are as environmentally sustainable as possible. The Society is ready to help the Olympic Bid. We wish London 2012 every success."

SocEnv's Chairman, William Pope, and Chief Executive, Tim Bines, met with London 2012 Chairman, Lord Sebastian Coe (centre), at the Environment Forum, held at Church House, Westminster

Lord Coe said, "from the outset London 2012 has sought to engage with environmental organisations and we are delighted at the positive response we have received. It is really important for us that our environmental and sustainable development plans have been developed in partnership with the top professionals in this field. The support of Society for the Environment through its constituent bodies and their members will help us deliver this to a high standard."

MORE INFORMATION

Will Pope, Chairman, The Society for the Environment. Tel: +44 (0)7774 275171. E-mail: williampope@compuserve.com Web: www.socenv.org.uk

ROOFTOP WIND ENERGY TURBINES

Jorji B Fredericksen

BIO NOTE

The wind turbine development and company formation was presented by Dr David Anderson, director of Renewable Devices Ltd at the conference entitled 'Renewables Here and Now' and organised under the convenership of Richard Witney, Renewables Adviser with Lothian and Edinburgh Environmental Partnership. This invited feature article was prepared by Jorji B Fredericksen, Project Support Officer, Renewable Devices Ltd, Bush Estate, Edinburgh EH26 0PH Tel: +44 (0)131 535 3301 Website: www.renewabledevices.com

Renewable Devices Ltd provides accessible renewable energy solutions worldwide through product development and consultancy services. With over 70 accumulated years of R&D and installation experience, the company is a world leader in its field.

As part of its mission to provide accessible renewable energy products and reduce fuel poverty, Renewable Devices Swift Turbines has designed and manufactured the world's first silent, rooftop-mountable wind turbine, capable of providing a cost-effective renewable energy source for domestic, community and industrial use. With a rated power output of 1.5 kW, the SWIFT™ Rooftop Wind Energy System can either be grid-connected for

The changing built environment with solar panels and rooftop turbine in perspective (Copyright © 2005 Renewable Devices Swift Turbines Ltd)

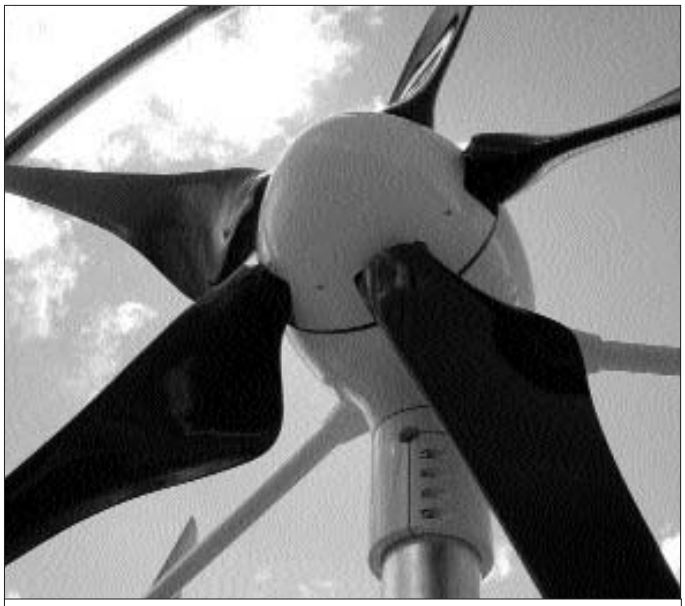
embedded power generation or alternatively linked to an immersion water heating system.

Renewable Devices has extensive experience in developing and installing wind turbines of all sizes up to multi-megawatt machines. An increasing number of industrial customers are installing wind turbines at their sites to reduce energy expenditure and offset climate change levy emissions. Indeed, our expertise covers a vast array of technologies, including: wind energy – of all scales, hydro-power, solar (thermal & photovoltaic), biomass (combustion & gasification) and ground source heat pumps. With experience in design, manufacture, project development and installation in all these fields, Renewable Devices offers a comprehensive, cutting edge, renewable energy consultancy service by a highly qualified and experienced multi-disciplinary team. We now have a diverse client base, ranging from community groups and small commercial companies right through to multinational corporations and governments.

Rooftop turbine design

The Swift design process has focused on safety (exceeding safety standard BS EN 61400/2), reliability and ease of operation. The Swift innovative carbon-fibre rotor is supported by two single row, deep-groove ball bearings, which have been specifically selected to cope with the immense gyroscopic and thrust loads which are imposed by the aerodynamics of the turbine, especially in high winds. The rotation speed and system integrity are controlled in such conditions by the uniquely developed over-power regulation mechanism. This consists of a patented twin-vane progressive mechanical furling mechanism coupled with a sophisticated electronic control system. The optimum amount of power can then be taken from the turbine under all wind and loading conditions without stalling, representing a step change in the accurate and safe control of small wind turbines.

To ensure minimal transmission of oscillations from the wind turbine to building, the Swift turbine mounting brackets incorporate damping systems designed to absorb a wide range of frequencies. The patented ring diffuser also minimises turbine noise by preventing the creation of turbulent vortices at the blade tip. In addition the five-bladed design allows for a slower speed of rotation to further reduce noise, making the SWIFT™ Rooftop Wind Energy System the quietest wind system currently available.



Rooftop turbine with central rotor, five blade design, ring diffuser and twin-vane furling mechanism (Copyright © 2005 Renewable Devices Swift Turbines Ltd)

Environmental contribution

In environmental terms, each unit of electricity generated from a SWIFT™ Rooftop Wind Energy System displaces one unit generated from fossil fuels, with the added benefit that the electricity is consumed on-site, thus negating transmission losses. This amounts to a displacement of approximately 1.6 tonnes of CO_2 per year – a significant environmental contribution.

The UK government, under the Kyoto agreement, made a commitment to decrease CO_2 emissions by 10% by 2010 and the Scottish Executive has set even more stringent environmental targets. Accordingly, there has recently been emphasis on renewable sources of energy. Analysis of energy demand shows that 47% of the UK's annual energy demand is from buildings, which contributes 40% of the UK's CO_2 emissions. This technology will provide substantial economic benefits to over 33% of buildings and could reduce the UK's CO_2 emissions by as much as 13%.

In general, it can be expected that the Swift will generate between 3,000 - 4,000 kWh per year (according to the wind resource at a particular site), providing a net financial benefit of up to £440 per year. The company has recently received an order for 2000 turbines from Scottish and Southern Energy Plc. This, combined with existing orders, equates to an installed capacity of 6 MW, with an annual generation of 1.6 GWh and annual CO_2 reduction of 6,400 tonnes.

It is expected that within 5 years the installed SWIFT™ turbines in the UK alone will annually produce around 80 GWh of energy and reduce CO_2 emissions by approximately 32,000 tonnes (using RETScreen calculation) per year.

Interest is escalating in the international market and we are starting to develop sales and distribution channels with major utilities/distribution agents across the globe.

ANCIENT FARMING TECHNIQUES

Rare prehistoric discoveries unearthed at Ryton-on-Dunsmore

Archaeological excavation on behalf of the Highways Agency ahead of a £3m road scheme has revealed historic treasures never before found in Warwickshire, indicating that a high-ranking Iron Age family could have inhabited a settlement at Ryton-on-Dunsmore over 2000 years ago.

Earlier fragments of Neolithic and Bronze Age pottery and flint tools on the same site date from as far back as 3000 B.C. and suggest the site held special significance almost 2500 years before the Iron Age began. As well as Iron Age pottery and remains of roundhouses consistent with previous discoveries at other Warwickshire sites, several unusual finds make it a site of particular historic interest.

The most exceptional find of the dig was evidence of a clay structure used in some sort of Iron Age kiln. This 'kiln furniture', which can be dated by an iron brooch that was found with it, is likely to be among the earliest found in the UK. These finds date from around 200 B.C., and the brooch is the first of its kind to be discovered in Warwickshire. The excavations also revealed an unusual C-shaped ditch with an eastern entrance, which is likely to have been of ceremonial or religious significance – perhaps an unusual form of shrine.

Stuart Palmer, who directed the project on behalf of Warwickshire Museum Archaeology Projects Group, said: "The fact that several of these Iron Age finds at Ryton-on-Dunsmore are atypical in this area makes it a distinct possibility that this site was the residence of people of an unusual rank, perhaps a local leader or other high status family. We can get an idea of the community's economy from a group of large, deep pits which were probably used to store cereal grain. We can also see that the pits ended their useful life as repositories for rubbish after episodes of feasting."

Other finds included a range of quern stones used for grinding cereal seeds into flour. Several different types of these querns were found, including a beehive type, which has never before been seen in Warwickshire.

Rob Sutton of Atkins Heritage, archaeological advisors to the Highways Agency, said: "The next stage will be the completion of the post-excavation analysis. Environmental samples taken from the excavated features will be examined to recover evidence of local land use and farming techniques. Particular attention will be given to the more unusual finds like the 'kiln furniture' in order to attempt to understand how it was used.

"Carbon dating of recovered material, such as charred matter adhering to the pottery or charred plant remains, will tell us more about the sequence of events during the prehistoric occupation of this site."

Andrew Butterfield, Assistant Route Manager for the Highways Agency, said: "We are delighted to have funded such a successful archaeological excavation in the lead up to this £3m safety improvement scheme on the A45 in Warwickshire. As soon as the importance of this site became clear, we made additional resources and time available to complete the excavations. Whenever we find archaeological remains on road projects, we work closely with archaeologists to ensure those are preserved for the community. Now we await the results of the analysis and look forward to learning more about the way prehistoric communities that occupied this part of the Midlands, lived their lives."

AWARDS

Honda awards first ATV Master Technician status

Kevin Haxell of Fieldens in Stowmarket, Suffolk has become the first Master Technician within Honda's ATV dealer network. Haxell joins an elite group of 23 Honda Master Technicians including just one other within the Power Equipment division.

"Kevin was the only technician put forward for the rigorous assessment day at Honda's training facility, the Honda Institute," explains Kevin's assessor, John Mesger Schofield. "We were therefore very pleased that he passed the requisite five out of six tasks with honours, enabling him to use the prestigious title Master Technician.

"The assessment tested Kevin's trouble-shooting abilities across the whole range of Honda ATVs," continues Schofield. "Kevin proved to us that he could diagnose complex faults on machines ranging from the TRX250EX to the TRX650FA."

Kevin, 30, started working at Fieldens on Saturdays when he was still at school. Over the past 16 years he has risen through the ranks to become one of the dealership's most experienced technicians. "I am very proud of Kevin," says David Williams, Fieldens' Dealer Principal.

"There are no university courses or qualifications for this type of specialist knowledge so I'm pleased that Honda has devised a means of recognising technical ability. The Master, Diagnostic and Maintenance Technician grades encourage dealership employees to better their skills and give them something to aim for. Kevin's Master Technician status gives him the recognition he deserves from Fieldens, Honda (UK) and from our customers. It will also help him in the future with whichever career path he decides to take."

Geoff Matthews, Head of the Honda Institute, concludes, "This is a great achievement for Kevin and a top accolade for both him and Fieldens. I look forward to other Honda ATV specialists rising to the challenge in striving for and attaining this pinnacle of technical achievement."

FOOD STANDARDS

Red tractor logo flies the flag

A powerful new logo has been launched for the Red Tractor. Designed by Assured Food Standards (AFS) as part of their new marketing strategy, the logo is presented as a robust and recognisable symbol signifying whole food chain assurance to a rigorous set of independently inspected standards.

A new consumer message will focus on the fact that Red Tractor food is delivered by an alliance of British farmers, processors, retailers and distributors working together to deliver safe food 'every step of the way'.

With the Union flag a clear part of the new symbol, the logo also offers a stronger endorsement of origin, dispelling any confusion about the provenance of Red Tractor food.

Replacing the words 'British Farm Standard' with 'Assured Food Standards' more accurately explains the full scope of Red Tractor assurance to consumers. Research has shown that the average consumer responds well to the concept of 'whole chain assurance'. Now that the Red Tractor covers all links of the food chain, this powerful claim will be used to its full potential.

Replacing the word 'British' with a Union flag tells consumers that the food has been produced, processed and packed in the UK. It will make it easier for consumers to seek out British produce with a single point of reference.

Commenting on the new logo, AFS Head of Marketing, Bev Wilson said, "The new logo is a powerful expression of Red Tractor values. It offers reassurance about origin and traceability throughout the food chain. And symbolises the delivery of safe and conscientiously produced food."

The red tractor is the world leader in food chain assurance and is there to protect and reassure consumers. It's the trusted symbol for conscientiously produced food. It stands for a rigid set of standards spanning cultivation, storage and animal welfare to transport, processing and packing.

Top 5 reasons to believe in the red tractor

- Red Tractor food is produced by an alliance of farmers, processors and retailers who work together to maintain and improve standards.
- Red Tractor businesses must be independently inspected to qualify for a licence, with 450 independent experts carrying out 60,000 inspections every year.
- The Red Tractor certifies that production standards have been complied with at every stage of the food chain.
- All products that carry the Red Tractor can be traced back to the farm.
- Red Tractor businesses must comply with independently approved standards for food safety, animal welfare and responsible management of pesticides and waste.

Some key facts

- There are 78,000 Red Tractor farmers and growers in the UK, accounting for between 66% and 90% of output in the main commodity sectors.
- The Red Tractor features on £4.6 billion worth of UK food each year.
- There are approximately 350 companies currently licensed to pack Red Tractor assured food.
- The Red Tractor can be found on beef, lamb, pork, chicken, milk, cheese, cream, vegetables, sugar, some bread lines, flour and fruit.
- Red Tractor assurance now oversees all significant primary food production in the UK.
- The Union Flag in the logo tells consumers that the food has been produced, processed and packed in the UK.

MORE INFORMATION

Assured Food Standards, P.O. Box 30773, London WC2H 8AW. Tel: +44 (0)20 7331 7660. Fax: +44 (0)20 7331 7626. E-mail: enquiries@redtractor.org.uk Web: www.redtractor.org.uk

PUBLICATION

Agriculture in the United Kingdom 2004

On behalf of the Agricultural Departments of the United Kingdom, the Department for the Environment, Food and Rural Affairs (Defra) has published *'Agriculture in the United Kingdom 2004'*, which describes the situation in agriculture during 2004. It reports on farm incomes, the structure of the industry, prices, each of the main agricultural commodities, the economic accounts for agriculture, productivity and subsidies. It also contains information on overseas trade, organic farming, conservation and land management, agriculture's impact on the environment and key statistics for EU Member States.

Key findings for 2004 are:

the value of gross output from the agricultural industry including subsidies directly linked to product, increased by 2.5% to £16.9 billion while intermediate consumption rose by 5.4% due in part to the rise in the oil price, to £9.0 billion;

total subsidies (less levies) paid to farmers rose by 4.5% to £2.8 billion;

the United Kingdom's self-sufficiency in indigenous type food is estimated to be 74% and that for all food is estimated to be 63%; and,

the average producer price of agricultural products rose by 3.3% while the average price of agricultural inputs rose by 6.8%.

MORE INFORMATION

'Agriculture in the United Kingdom 2004' is the 17th volume in an annual series. It is available (price £22, ISBN 0-11-243086-4) from The Stationary Office (TSO). Tel: +44 (0)870 600 5522. Web: www.tso.co.uk/bookshop. It is also available on the internet at http://statistics.defra.gov.uk/esg/publications/auk/default.asp

FOOD POLICY

Buy local food to save the planet

If people bought and consumed more local and more organic produce and if their journeys to and from food shops were made on a bus, by bike or on foot rather than in a car, there would be more than £4bn in environmental savings to the British economy. This is the principal claim of a groundbreaking new economic study of the environmental impact of our weekly shop conducted jointly by the University of Essex and City University. The study will be published in the next edition of Elsevier's journal *Food Policy*.

Principal authors Professor Jules Pretty (Essex) and Professor Tim Lang (City) found that Britons typically spend £24.79 on food each week, £7.53 of which is spent on eating out. Their analysis found that the environmental impact of this typical weekly shop was an additional 81p per person through farms not using organic farming methods, 76p per person through transportation from farms to retail outlets, and 41p per person through consumers travelling to and from the shops. They conclude that these environmental costs – combined with government subsidies to farmers of 93p per shopper per week – undervalue the true cost of the weekly shop by nearly 12%.

Looking for strategies to minimise the environmental impact of food production and transportation, Pretty, Lang and colleagues make the following stark claims, based on the most authoritative econometric assessment yet conducted in this crucial policy area:

- if all farms in the UK were to turn organic, then environmental costs would fall from £1.5bn to less than £400m, saving the country £1.1bn annually;
- if all food were sourced from within 20 km of where it was consumed, environmental and congestion costs would fall from more than £2.3bn to under £230m, a further saving of £2.1bn; and,
- if shopping by car were to be replaced by travel by bus, bicycle or walking, environmental and congestion costs would fall by a further £1.1bn, from £1.3bn to just over £100m.

Lead researcher, Professor Jules Pretty, said: "The most political act we do on a daily basis is to eat, as our actions affect farms, landscapes and food businesses. These choices matter enormously, as different productions and transport systems have different effects on the environment. Food miles are much more significant than we previously thought, and much now needs to be done to encourage local production and consumption of food."

Co-researcher, Tim Lang, Professor of Food Policy at City University, added: "How far food travels is becoming more important for policy-makers and consumers alike. They are rightly becoming more conscious of food and health, but the environmental costs of food choice also matter. For example, fruits and vegetables travelling long-distance or short-distance may deliver similar nutrition or look the same, but environmentally they are poles apart."

Contrary to the frequent claims of anti-globalisation campaigners, the environmental impact of global 'food miles' was found to be trivial, since most people's weekly shop is made up of food grown somewhere in the UK and Europe but extensively transported across it. However, if food production were to cease on UK farms and all food were to be transported by air from global sources, the authors show that the environmental costs would rise by a staggering £19.7bn each year.

This research will be published shortly in Elsevier's journal *Food Policy,* volume 30, number 1. The paper is titled 'Farm costs and food miles: an assessment of the full cost of the UK weekly food basket'. *Food Policy* is the leading international journal publishing original research and critical reviews on issues in the formulation, implementation and analysis of policies for the food sector in developing, transition and advanced economies.

Ten things about the true costs of food transportation and the environment

The average person consumes 11.68 kg of food per week (10.02 kg at home). The typical weekly shopping basket costs £17.26.

- Eating out costs £7.53 per week, some 30% of total food expenditure.
- Each person makes 221 shopping trips per year, with an average length of 6.4 km (up from 4 km in 1985).
- Agri-food products now account for 28% of all freight transport in the UK (up from 25% in the 1980s).
- The amount of freight carried in the UK is some 1580 million tonnes (up by 23% in 20 years), which is carried some 149 billion t-km (up by 65% over 20 years). So freight, including food, is travelling further on UK roads.
- The external costs arising from the raising and cultivating of 12 commodities were calculated. On a per kg basis, livestock impose the most environmental costs:
  beef/veal 64.8 p/kg
  mutton/lamb 43.6 p/kg
  pork 12.8 p/kg
  poultry 5.7 p/kg
- Oil seed rape imposes the highest arable costs at 3.45 p/kg; vegetables (0.61 p/kg) and fruit (1.44 p/kg) impose low costs.
- The 1.72 p/kg costs for cereals represents 18% of the value of the price of wheat in 2004.
- Some food miles arise from an extraordinary food swap between the UK and the continent. Each year, some 12.2 Mt of food are imported, and 7.4 Mt exported. Some produce is simply swapped. Each year,
  0.48 Mt of pork is imported, and 0.21 Mt is exported;
  0.41 Mt of milk is exported, and 0.43 Mt is exported;
  some 130,000 sheep are exported and 120,000 are imported.

VEHICLE PERFORMANCE COMPETITION

The Young Engineer's Vehicle Performance Competition, run by the Institution of Agricultural Engineers, is designed to stimulate an awareness of the engineering process from concept to prototype and is open to all land based colleges. In addition to regular entrants, this year we also welcomed Ludlow Sixth Form College.

Time for some last minute adjustments before the competition begins

Entrants were given full details of the objective of the competition, together with the vehicles requirements and outline plan of the test track - from this came very individual prototypes

Object

The object of the competition is to create a remote or radio controlled vehicle, given a set of standard wheels, a battery and maximum dimensions, from which the competitors attempt to produce the best performance on a standard race track.

Equipment

A kit of wheels and a battery were supplied by free of charge (FOC) to registered groups, from any discipline, together with a drawing of the test track, donated by Autoguide Equipment, made from two sheets of pegboard and a wooden frame. A free battery charger was made available to the first 30 entries.

Details of vehicle

The vehicle had to:

- use up to four of the supplied wheels – any modified wheels will be replaced with standard ones for the competition;
- allow replacement of all of the tyres (either by changing wheels or tyres) in two minutes
- derive all power (for traction and or any actuators) from the FIAMM FG11201 6V, 12 Ah battery supplied FOC - additional batteries may be purchased but only one used per vehicle; and
- derive power for any devices to increase traction (ground effect modifiers, etc.) from the same onboard battery.

Details of test track

Each entrant was given a drawing of the test track, essentially two sheets of pegboard, arranged on a wooden frame, to give a quarter circle of 1.55 m radius. On it were drawn two diagonal lines from the lower to upper corners before forming the pegboard into shape. Additional vertical and horizontal lines at ten hole pitches were marked to simplify hole identification.

Details of test

The vehicle was driven above each diagonal line as far as possible. The point at which the first front wheel crossed the line was taken as the failure point and scored as the number of horizontal holes covered from the start point. This test was repeated along the opposite diagonal.

Awards

Prizes of £600, £400, £200 and £100 were awarded, with

BIO NOTE

Report by Will Turner AIAgrE, Senior Lecturer at Harper Adams University College

additional sponsorship covering prizes for additional classes.

Kit availability

Entrants registered directly with the IAgrE secretariat at IAgrE, West End Road, Silsoe, Bedford, MK45 4DU. E-mail: yecompetition@iagre.org. Kits were dispatched directly with a maximum lead time of seven days.

Sponsors and event

For the second year running, Autoguide Equipment kindly agreed to sponsor the competition. Organised by Richard Robinson of Autoguide Equipment, with assistance from Andy Scarlett of SRI, the event was ably compered by Chris Whetnall. Thanks were also due to Liz Dower, design engineer with Autoguide who built the laser system. Both Richard and Liz were very busy setting up with lifting and handling guidance from Nick Handy of T H White Crane Division. All assisted in assessing each entrant's performance.

This year it was generously hosted by Caterpillar Ltd's Desford plant. The Human Relations (HR) manager was Dave Archer, who provided excellent facilities and a most welcome lunch. Someone must have warned the caterers about the prodigious appetite induced by such a competition! There followed an exciting demonstration of CAT's diversity of products, finished off by a most interesting factory tour.

Some competitors elected to present radical solutions and to the organisers' credit, they did not immediately exclude them but allowed them to run. Having reviewed the 'paddock practice' they then elected to divide the field into two classes, *'Regular'* and *'Unlimited'*.

Regular

1st Brooksby Melton College - 'Massey'

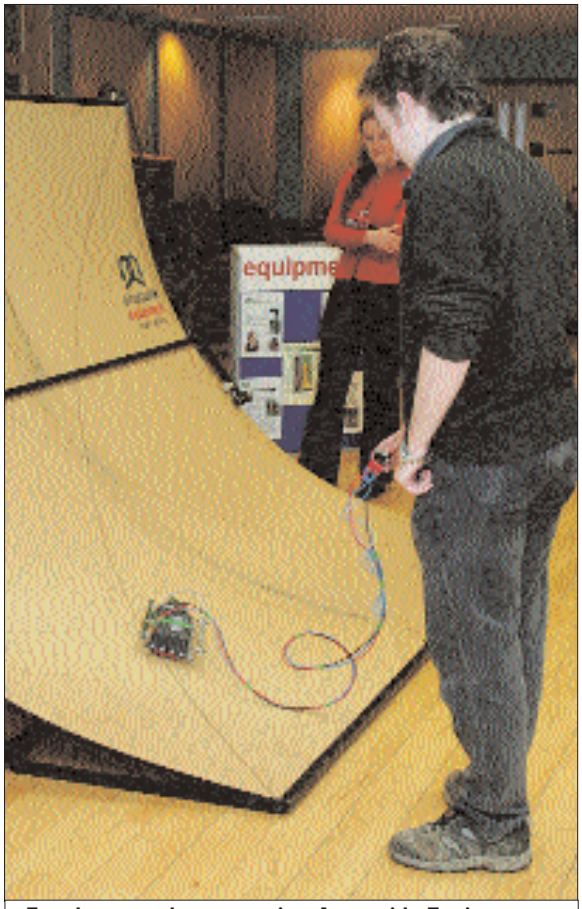
R/C Buggy based, wide track, high centre of gravity, very short wheelbase. The body gave a good impression of a wide body tractor cab even though made from ice cream and margarine cartons. The high centre of gravity could ensure good weight transfer onto the rear wheels, but demanded careful throttle control.

2nd Harper Adams - Kevin Scrivens

A sophisticated vehicle with a high home based engineering content. We thought that Kevin had built in some sophisticated wheelspin limiting programme but we were assured that the motor was just not getting enough power

3rd Harper Adams - Adeola Adedoyin

Her approach was conventional, relying on a high ratio gearbox to provide the torque at low speed. Traction and weight transfer were the issues and Adeola tried several configurations.



For the second year running, Autoguide Equipment sponsored the competition and also provided the track and a laser beam 'high jump style' measuring system; prototypes could be either remote or radio controlled

Unlimited

1st Plumpton College

Tracked vehicle, with robust formed alloy body, and aerodynamic devices, looked like an escapee from Tracy Island. Performed well, until a track broke.

2nd Ludlow 6th Form College

Belt/track drive around competition issue wheel/tyres, accredited itself well until loud clicking noises were heard, from the final drive.

3rd Harper Adams - Toby Gold

Toby was not at all impressed by the tractive potential offered by the competition issue wheel/tyres. He elected to create a walker, to gain a purchase on the hardboard track surface, the feet and belly benefitted from arrays of drawing pins. When pin and pegboard hole engaged, there was good progress, although this could not always be guaranteed.

Unclassified

Brooksby Melton College

Very compact package, battery nested tightly within the wheelbase and track. The entrant's repeated warning to keep clear, may have had more impact if the nature of the beast had been made more obvious. An illegal device from the more exotic and extreme regions of the aero modelling world had augmented the modest electric motor performance. The package proved to have a thrust well in excess of vehicle weight by travelling in a distinctly uncontrolled manner, narrowly missing organisers and adjudicators. When the dust settled, the adjudicators were left with the difficult task of assessing a rather brief performance. That is, those that saw it as, if you blinked, you might have missed it! I think you probably will have missed it anyway because I suspect the rules will preclude such devices in the future.

Performance and results

After the first round of attempts there was fervent activity in the 'pits', with some reconfiguring centres of gravity, others pondering ways of getting more grip. This frustration was too much for some competitors, who returned to the hill with high grip tyres, even if this resulted in being reclassified as 'unlimited'.

At the end of the event there was a tough time for the judges, who made, what seemed to be a well received distribution of prizes. There were certainly plenty of happy faces at the end of a demanding event requiring innovation, balancing practical skills and materials with desires and aspirations.

The end results might seem to be the vehicles and the prizes but far more important is that all these young people have been engineers in the broadest sense. Namely, taking a concept through to the development of a successful working prototype.

Young Engineers Vehicle Performance Competition 2006

Colleges interested in taking part in the 2006 competition should email IAgrE at yecomp@iagre.org to register. Rules will be available soon.

Bimonthly EARLY SUMMER 60(3)

MEMBERSHIP MATTERS

THE NEWSLETTER OF THE INSTITUTION OF AGRICULTURAL ENGINEERS

Award for Contribution to the Land Based Industries Sector 2005

The Award is offered in recognition of an IAgrE member who has made a sustained contribution to the land based sector throughout their career, and is presented for the first time in 2005.

Dr Mike Hann

Dr Mike Hann FIAgrE (left) receiving his Award from IAgrE President, Peter Redman at the ceremony held at the Annual a

A stalwart of the Agricultural Engineering profession since his days as an ND Engineering student at Writtle in 1965, Mike graduated with a BSc Engineering from the Open University and MSc (1983) and PhD (1994) from Cranfield University at Silsoe. He has served in industry as a drainage/civil/waste engineer, and lectured at Plumpton College, Rycotewood College and Cranfield University at Silsoe.

He has always supported the IAgrE in a range of capacities as Book Reviewer, Member of Editorial Panel, Conference Committee member, Soil and Water Specialist Group 'fixer' for activities at Cranfield University at Silsoe. As such he is rather an unsung hero but is always keen to help and support activities.

As a teacher at Plumpton, Rycotewood and Silsoe he has been (and is) well liked by his students. He will have influenced the careers of hundreds of students from City & Guilds through to PhD and EngD. His practical approach to Soil and Water Engineering is sound and well respected both in the classroom and with a broad-base of clients ranging from BP to the Environment Agency and the RSPB. His international reputation is strong in Africa, Europe, China and the USA.

Mike is a dedicated, talented, hardworking and practical agricultural engineer who has unstintingly served the 'academic' base in the UK and is worthy of the status of this Award.

Institution of Agricultural Engineers

Douglas Bomford Trust Award

The Douglas Bomford Paper Award is presented to the author(s), at least one of whom is an Institution member, who demonstrate originality and technical excellence in a scientific paper published during the previous year in either the Institution Journal *Landwards* or in *Biosystems Engineering*. Assessment criteria include: engineering content; potential for practical and commercial use; relevance to the current problems and needs of industry; as well as quality of presentation and the authors' authority in the subject material.

There are two winners of the Award this year, namely:

Paul Mudway
AIAgrE
for his paper entitled 'Engineered Forest Recreation' which was first presented at the Annual Conference last May, and published as a first class, well illustrated, popular article on a highly topical subject of amenity engineering in Landwards, **59**(4), 2-6;

Dr David Pullen
MIAgrE
for a two-part paper entitled 'Injecting Bio Solids into Grass and Arable Crops' both co written with Dick Godwin, and Peter Grundon, whilst Peter Moseley was also involved with 'Part I: Design and Evaluation of a Shallow Injector' and Mike Hann also involved with 'Part II: Development of a Shallow Application Technique' published in Biosystems Engineering **87**(3), 285-297 and **87**(4), 393-406, respectively; these comprehensive research articles describing an innovative engineering solution to a topical environmental issue.

Paul Mudway (centre left) and Dr David Pullen (centre right), respectively, both receiving (on the blink!) the Douglas Bomford Paper Awards from Jonathan Bomford, Chairman of the Trust.

Johnson New Holland Trophy and Award

The Award is presented annually, with the object of encouraging and recognising innovation by younger students, to the best final year project submitted by a student or group of students, as part of a First Degree, Higher National Diploma or Higher National Certificate course in Agricultural Engineering. The College submitting the prize-winning project will receive the trophy to hold for one year.

Ross Pearson
Harper Adams University College

Originally from Boston, Lincolnshire, Ross Pearson (23) is from a vegetable farming background and has always had a keen eye for precision and an aptitude for machinery design.

A student at Harper Adams between 2000 and 2004, Ross studied for a BEng in Agricultural Engineering and was the only student in his year to obtain First Class status. Along with this, he was also presented with two college awards for Best Dissertation and Best Final Year Engineering Student.

During the course, Ross worked at L W Household, building and developing crop sprayers, before designing and developing the track width

MEMBERSHIP CHANGES

Admissions

A warm welcome to the following new members

Member

A W J Barrett (Devon)
T G Jones (Essex)
W C Milne (West Yorkshire)

Associate Member

O D Hassan (Northampton)
D C Preece (Nottingham)

Associate

J C Archer (Stafford)
Y O Bankole (Nigeria)
S-A Barclay (Rutland)
S C Bull (East Sussex)
I M Lea (Lincolnshire)
W S Turner (Wrexham)

Student

Askham Bryan College:
J M Douglas
B Egginton
B G Frankland
G Hannam-Clark
J Kemp
G J Lister
E H Maude
J Spink
S R Turkington
C Vicary

Barony College:
S Bax
D Blackstock
K Carruthers
J Connolly
G J Cook
A Durie
C Erskine
R Holmes
A J Hutchinson
R Kincaid
G Lamont
M R Lockhart
D R Marsh
G Mitchell
D S Muir
G Murray
R W Ryle
L S Scott
G Smith
C Sorrie
M J Teasdale
P Threlkeld
D R Watson

Coleg Sir Gar:
E G Clements
E Evans
G W Evans
G Forsyth
L T Griffiths
R Griffiths
L L Helmick
J Inglesant
G J Jenkins
D R John
M R John
G C Johnson
C I Jones
R C Jones
J Logan
R Mogford
W J Morgan
G Morris
T L Morris
O Rees
M Rudd
D A W Thomas
D W Thomas
W Turner
T Webb

Cranfield University:
D Ansorge
M D Bartlett

Upper Bann Institute, Northern Ireland:
R J Campbell
N D Greene
P McCaul
P McGrath
R Muldoon
D J Napier
S Ruddy
S Waddell

Transfers

Congratulations to members achieving a further phase of their professional development

Member

S G Minter (Nottinghamshire)
P E Naylor (Staffordshire)
N R Perera (Essex)
D C Preece (Nottinghamshire)

Associate Member

A Dunne (Essex)

Engineering Council

Congratulations to the following member who have qualified as a Chartered Engineer, entering them to use the designatory letters CEng after their name

Registrations

CEng

G A Walker (Suffolk)

Society for the Environment

Congratulations to the following members who have met the criteria for Chartered Environmentalist, entitling them to use the designatory letters CEnv after their name

Registrations

R Alcock (Staffordshire)
C L Cook (Essex)
W J Cracknell (Uzbekistan)
M Mutema (Berkshire)
S J Scoones (China)

system on which he based his dissertation.

Once graduated, Ross began work at Chafer Machinery, a crop sprayer specialist based in Gainsborough. Here, he currently enjoys the role of Design Development Engineer, creating new concepts, improving existing machines and testing prototype equipment.

Ross Pearson was presented with the Johnson New Holland Award by Trevor Jones of CNH UK, the sponsors, and also received the Trophy on behalf of Harper Adams University College.

Phil Metcalfe MIAgrE, David Pullen MIAgrE and Bob Voss MIAgrE, respectively, each receiving their Branch Meritorious Service Awards from IAgrE President Peter Redman during the Awards Ceremony at the Annual Conference

Branch Meritorious Service Awards 2004

The Awards are made to members who have consistently rendered outstanding service to a Branch of the Institution over a number of years.

Philip Metcalfe
Wrekin Branch
David Pullen
South East Midlands Branch
Bob Voss
West Midlands Branch

Philip Metcalfe has been an active member of the Wrekin Branch of the Institution since 1983 having moved to work within ADAS as a Mechanisation Officer at the Wolverhampton office. During these 22 years, he has served as a committee member of the branch for 21 of them.

During these years, Phil has held a number of officer posts on the committee:
Information & Press Officer 1985 - 1998
Secretary 1989 - 1991
Vice Chairman 1996 - 2001
Chairman 2001 - 2004

Throughout this time, Phil's range of contacts within the industry has been of immense use in arranging a number of branch meetings. His particular interest in buildings and environmental engineering has been a good foil to balance the influence of the 'tractor and machinery men' within the branch, constructing balanced programmes of meetings.

Whilst many members' interest and commitment to the activities of the branch tend to wax and wane, Phil has been a constant contributor and active branch member over a considerable number of years and fully deserves to receive a Branch Meritorious Award.

Dr David Pullen has been a stalwart and dedicated member of the South East Midlands Branch committee on two occasions since 1996. In 1996, he took over as secretary/treasurer and was largely responsible for turning a dwindling attendance at Branch technical meetings into many overcrowded rooms. He was at that time an enabling force that contributed significantly to keeping the Branch going as a viable and thriving organisation with key well organised and attended meetings.

David assisted the revival of the Branch by embracing the relatively new technology of electronic communication and using it to full effect. This was only achieved by significant effort and attention to detail. He introduced the 'electronic poster' and initiated its circulation to all possible interested parties. His dedication to the task in hand ensured that all details were in place for each element of the programme, including the vital last minute publicity for each event that ensured a thriving, interested and participatory audience.

In his second period of office, David was instrumental in the rationalisation of the Branch's financial arrangements, bringing the Social Committee and Branch accounts under the same banking umbrella. This was at a time when significantly more rigour and procedural details were required, necessitating dedication to the task.

Despite being coerced into this second period of office, David embraced the job with good will and considerable enthusiasm. He constantly challenged the committee with new ideas that brought more order and efficiency to the procedures involved in organising the Branch technical programme. He initiated the drawing up and design of a protocol for the organisation and running of meetings. This introduced inclusiveness and participation by all members of the committee. As a result, the programme is now put together co-operatively with tasks shared out equally to all committee members. This ensures involvement from initial contact with speakers, arranging for all their needs and participating in their reception and the presentation itself. This new protocol and participation means that the task of secretaries now and in the future will be less onerous than in the past.

Not only did David update and revise instigation and management of the programme, but he also brought new ideas to the technical programme that included the idea of a 'Mini Conference'. This resulted in a highly successful event in Cambridge on the subject of Water Use in Eastern England in 2004 and is being followed in 2005 by the subject of Restoration Engineering. These events are helping to elevate the standing of the Institution, are involving a wider audience and demonstrate the level of leadership that David has in new ideas.

David has also carried out other tasks for the Institution as a Branch member showing his dedication to the profession and in helping others to gain the most from their membership. These activities have included secretary/treasurer of two Specialist Groups and membership of the Newsletter editorial panel.

The South East Midlands Branch committee were unanimous in recommending that Dr David Pullen be put forward for this Award and that it would be fitting recognition for the considerable work that he has done for the Branch and Institution over an unbroken period from 1992 to the present.

IAgrE West Midlands Branch nominated **Bob Voss** to receive the Branch Meritorious Award.

Bob has been a member of the Institution of Agricultural Engineers since 1972. During most of this time he has been an exceptionally dedicated supporter of the West Midlands Branch. In addition to attending almost every Branch meeting, he has always been on the Committee and served in a variety of roles.

Principally he has been Treasurer from 1986-1988 and again from 1995 to date, where he has always been meticulous in the accounting and managing of money. He was also Secretary from 1983-1988. Currently, he is serving as Branch Chairman a role he has held since 2002.

He also holds on behalf of the Branch a collection of archived training slides (see *Landwards* Summer 2004).

Bob stands out as being one of the stalwarts of the West Midlands Branch, and of the Institution, and is a very worthy winner of the Branch Meritorious Award

Michael Dwyer Memorial Prize 2005

The prize is to a mid-career engineer who has made outstanding progress in the agricultural engineering industry.

Ian Sayers

Following the award of an Honours degree in Agricultural Engineering from Newcastle University in 1994, Ian spent two years working in North America, the first of which was spent custom combining and the second working for a John Deere dealer as a service engineer. This experience gave Ian an excellent understanding of the agricultural customer and how best to support him.

On returning to the UK in 1996, Ian joined JCB excavators as a design engineer working within the Telescopic Handler business unit. His customer focus resulted in his move into the customer support area as Product Specialist and then Technical Service Manager within the same business.

In 2000, Ian moved into the JCB Service organisation to take on the role of UK Product Support Manager responsible for the field staff supporting all JCB construction machines within the UK. During this time Ian finalised the development of the JCB Techweb system a project which he had started some 2 years earlier. Techweb is an internet based technical information tool which allows rapid transfer of technical information by JCB to and from its dealers world wide. This project was broad ranging in its scope and finalised only with a very high degree of perseverance. Today it is the main tool by which JCB communicates with its dealers on matters technical.

Ian's responsibility within JCB Service moved on to embrace co-ordination of Field Service worldwide and the Technical Publications department.

In 2004, Ian was appointed General Manager of JCB Landpower, responsible for design, manufacture and sales of the JCB Fastrac range as well as sales of other JCB machines into the agricultural market worldwide.

Ian is a highly focussed and committed individual who has made, by any standards, exceptional progress within his career to date.

Ian Sayers AMIAgrE receiving the Michael Dwyer Memorial Prize from Mrs Brenda Dwyer during the Awards Ceremony at the Annual Conference.

MEMBERSHIPS

Academic Members

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Cranfield University
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Duchy College
Rosewarne
Camborne
Cornwall
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Greenmount Campus
CAFRE
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Harper Adams University College
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Institute of Technology, Tralee
Clash
Tralee
Co Kerry
Ireland

Myerscough College
Myerscough Hall
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Oatridge Agricultural College
Ecclesmachan
Broxburn
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EH52 6NH

Pallaskenry Agricultural College
Co Limerick
Ireland

Pencoed College
Pencoed
Bridgend
CF35 5LG

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Ditchling Road
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BN7 3AE

Reaseheath College
Reaseheath
Nantwich
Cheshire
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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

Writtle College
Chelmsford
Essex
CM1 3RR

COMMERCIAL MEMBERS

Autoguide Equipment Ltd
Stockley Road
Heddington
Calne
Wiltshire
SN11 0PS

Douglas Bomford Trust
Springhill House
Salters Lane
Lower Moor
Pershore
Worcestershire
WR10 2PE

Bomford Turner Limited
Salford Priors
Evesham
Worcestershire
WR11 5SW

John Deere Ltd
Harby Road
Langar
Nottinghamshire
NG13 9HT

FEC Services
NAC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2LS

G C Professional Services
for land-based and related industries
Highdown Cottage
Compton Down
Winchester
Hampshire
SO21 2AP

Law-Denis Engineering Ltd
Millstream Works
Station Road
Wickwar
Wotton-under-Edge
Gloucestershire
GL12 8NB

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

Shelbourne Reynolds
Shepherds Grove Industrial Estate
Stanton
Bury St Edmunds
Suffolk
IP31 2AR

Silsoe Research Institute
Wrest Park
Silsoe
Bedford
MK45 4HS

White Horse Contractors Ltd
Lodge Hill
Abingdon
Oxfordshire
OX14 2JD

LONG SERVICE CERTIFICATES

Name	*Grade*	*Date of Anniversary*
50 years		
John Vaudrey **Fox**	HonFIAgrE	29 Mar 2005
William James **Pratt**	IEng MIAgrE	29 Mar 2005
35 years		
James George **Shiach**	HonFIAgrE	16 Apr 2005
James Macaulay **Swanson**	MIAgrE	16 Apr 2005
Lionel Stephen **Foreman**	IEng MIAgrE	16 Apr 2005
Shiraz Husein **Jeevunjee**	MIAgrE	16 Apr 2005
Alastair James Hendry **Tulloch**	AIAgrE	16 Apr 2005
25 years		
Frederick **Powell**	IEng MIAgrE	12 Mar 2005
Neal Alexander **Dodd**	IEng MIAgrE	12 Mar 2005
James Wilson **Prentice**	MIAgrE	20 Mar 2005
Robert Charles **Newton**	EngTech MIAgrE	20 Mar 2005
Simon **Westwood-Bate**	IEng MIAgrE	3 Apr 2005
Michael Edwin **Bowen**	FIAgrE	10 Apr 2005
Nicholas John **Ruston**	MIAgrE	30 Apr 2005
Lawrence Milford **Knox**	IEng MIAgrE	30 Apr 2005
Michael Francis **Ryan**	AMIAgrE	22 May 2005
Michael Albert **Zoebisch**	CEng FIAgrE	12 Jun 2005

Half a century of membership

Opening an envelope handed to me by the President, I was confronted by a very fine Certificate in recognition of my 50 years as a member of the Institution. Immediately my mind went back to 1955 and a student at Writtle, part-way through one of the earliest of the NDAgrE Courses, sponsored by IAgrE. At that time, there was no first degree course in Agricultural Engineering anywhere in the country, the National College of Agricultural Engineering (now part of Cranfield University) did not exist and the Institution itself, founded by Colonel Johnson just before the Second World War and marking time during the 1940s, was only then, with Douglas Bomford as President and Ron Slade as Secretary, really getting into its stride.

Little did I realise, when I joined as a Student Member all those years ago, that I had taken a step which would change my life and open the way to a successful and fulfilling career as an Agricultural Engineer, a job description I use with pride to this day. It started with the Institution's National Diploma, which provided the basis, and continued with the appointments service – a call to the Secretary put me in touch with a company looking for a Technical and Production Manager. I was serving with REME in Cyprus at the time, on National Service. I wangled a lift home with the RAF for Christmas 1956 and on Boxing Day visited Bomford & Evershed Ltd where I was introduced to the great Douglas Bomford himself, and was offered and accepted the job.

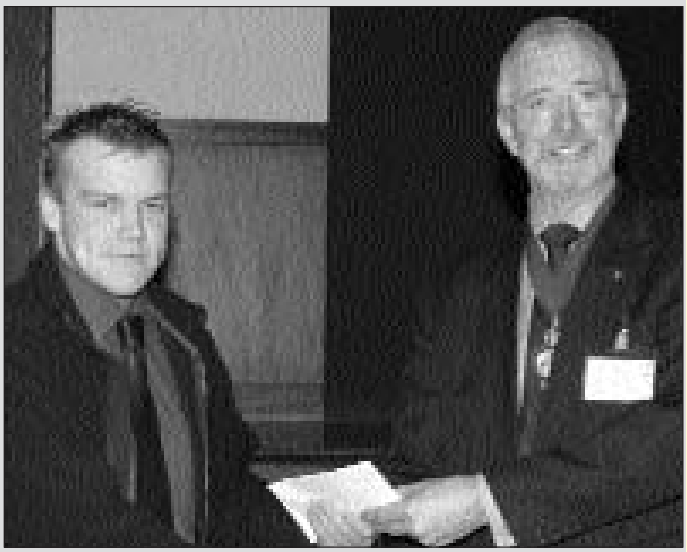
The next vital benefits of membership came with Branch and National meetings and conferences, and the personal contacts and broadening of knowledge and experience that went with them. The 'networking' between members – "If I don't know the answer, I know someone who will" is indispensable to the effective management of any enterprise and the Institution provides it *par excellence*. Even my attempts to 'put something back' have produced yet more benefits: the privilege of serving the Institution as its President (I believe the only one to hold the National Diploma in Agricultural Engineering) and that most cherished of all awards – Honorary Fellowship.

To all our Student Members of today, I have this message – your membership of our Institution will open many doors, and it will open your mind. It is a passport to success in your chosen profession – hold it with pride, treat it with respect and do not let it go.

John V Fox

IAgrE Wrekin Branch Awards 2004

These Awards are given annually by the IAgrE Wrekin Branch for the best First Year AgEng students at Harper Adams University College, and were presented to ***Dan Coates*** *(top) and* ***Tom Reeve*** *(bottom) by IAgrE President Peter Redman during the Awards Ceremony at the Annual Conference.*



Harper Adams welcomes leading engineering company

Harper Adams University College was pleased to show its new and improved facilities to two distinguished visitors from the Claas Company Group Headquarters in Harsewinkel, Germany.

Mr Helmut Claas, Group Chairman, and Dr Hermann Garbers, Director of Research and Development, were welcomed by Principal, Professor Wynne Jones, before being taken on a tour of the new farm buildings, the Engineering Department, and library. They also took a ride round the university college's off-road track.

Dr Peter Darkins, from the Engineering Department, said the visitors had both enjoyed the four-hour visit. "Mr Claas expressed great interest in the diversity and quality of the work undertaken by the engineering students at Harper Adams. While there is a strong link with the UK Marketing Division of Claas based at Saxham, both he and Dr Garbers are looking forward to developing a closer working relationship with the Harper Adams Engineering Department in the future.

"Despite being the Easter holidays, many of the final year students attended and had an opportunity to present their final year projects to Dr Garbers and Mr Claas. Also present were students who had been awarded prizes in 2003 and 2004 at the annual Helmut Claas-Scholarship which is aimed at encouraging young engineers to develop deeper interests in agricultural engineering as well as developing further stimulating contact with this leader in the field of agricultural engineering."

Dr Helmut Claas FIAgrE receiving a commemorative plaque of Ironbridge, the nearby World Heritage site, from Harper Adams Principal, Professor Wynne Jones

The visitors were particularly interested in new facilities within the Engineering Department and developments on the College Farm, added Dr Darkins. "The Engineering Department has incorporated several new facilities over the past two years to accommodate the new courses such as Off Road Vehicle Design (ORVD) and to address problems from industry that have arisen from product development and from European legislation such as whole body vibration.

"The farm has been working for some time on a biomass fuelled combined heating and power system and a new unit is scheduled for next year. There is also a new anaerobic slurry tank that has been designed to cope with proposed changes in legislation. The unit is the first of its type in the UK and has a capacity of 5000m^3.

Environment Agency Chairman honoured

Sir John Harman, Chairman of the Environment Agency, was presented with the Society for the Environment's highest Award, Honorary Fellowship of the Society (HonFSEnv) for his outstanding contribution to the goal of a sustainable environment. The Award citation highlights Sir John's distinguished contribution to the environment, including his:

unique leadership role in environmental affairs over many years;

important work in ensuring that the environment is high on the political agenda;

commitment to the maturing profession of environmental management; and

his advocacy of the highest standards of professional practice.

Will Pope, Chair of the Society for the Environment, said, "The Society is delighted to award Sir John Honorary Fellowship. He has demonstrated exemplary leadership at a time when we face some of the most significant and difficult environmental challenges in recent history".

Sir John Harman said, "I am proud to accept an Honorary Fellowship of the Society for the Environment. Chartered Environmentalists are key individuals at the forefront of dealing with the spectre of climate change and achieving the goal of a sustainable world. To have their recognition and support is a tribute indeed".

The recently Chartered Society for the Environment (SocEnv) was originally established in 2000, and is the leading co-ordinating and regulatory umbrella body in environmental matters and a pre-eminent champion of a sustainable environment. The Society's membership comprises twelve leading environmental institutions and learned societies, representing individual memberships of over 125,000 practitioners, and known as 'Constituent Bodies', namely:

Chartered Institution of Wastes Management (CIWM)
Chartered Institution of Water and Environmental Management (CIWEM)
Institute of Ecology and Environmental Management (IEEM)
Institute of Environmental Management and Assessment (IEMA)
Institute of Fisheries Management (IFM)
Institute of Professional Soil Scientists (IPSS) (associate member)
Institution of Agricultural Engineers (IAgrE)
Institution of Chemical Engineers (IChemE)
Institution of Civil Engineers (ICE)
Institution of Environmental Sciences (IES)
Institution of Water Officers (IWO)
Royal Meteorological Society (RMetS)

Produced by: Land Technology Ltd, Edinburgh Printed by: Barr Printers, Glenrothes

Gully erosion (penetrates subsoil), Berkshire

SUSTAINABLE SOIL USE IN THE UK

Nigel W Hall, Quanzhong Huang, Kadir Yilmaz, Yucel Tekin, Matthew S Shaw, Mark J Howard-Smith, Prudence W-R Ncube and James J Osman

In 2003, the Environment Agency concluded that there was insufficient quality information on soils needed for policy and program design and implementation. In the UK, there is a substantial soils database and many quality thresholds globally, however, management thresholds are needed.

In order to achieve robust scientific recommendations, scientists and policy makers need to communicate more effectively in order to focus on dynamic management tools with evaluation and review. These reflect individual and societal priorities in order to move towards sustainability. A global perspective is needed and this article compares soils in the UK, China, Turkey and Zimbabwe and concludes that all the countries have soils with similar opportunities to become more stable through management tools aimed at improving resilience and resistance to change, in order to maintain functional integrity during periods of stress.

In the last five years, soils have become a key resource in policy. Farmers will need to meet cross compliance conditions and achieve 'Good Agricultural and Environmental Condition' (GAEC). Soil Management plans will be needed in 2006, following the 'Guidance on Soil Management' documentation produced by the Department for the Environment, Food and Rural Affairs (DEFRA) in 2005. These developments seek to deal with EU budget, EU enlargement, World Trade Organisation (WTO) rounds and Sustainability but this article explores whether the measures are scientifically sound and explores the commercial opportunities and challenges for the agricultural engineering sector.

The 'Guidance on Soil Management' documentation

BIO NOTE

This paper was presented at the IAgrE Annual Conference entitled 'Sustainability in Engineering Design' and held at Harper Adams University College on 9 March 2005. Nigel W Hall, Matthew S Shaw, Mark J Howard-Smith, Prudence W-R Ncube and James J Osman are at Harper Adams University College, Newport, Shropshire, UK. Quanzhong Huang is at China Agricultural University, Beijing. Kadir Yilmaz and Yucel Tekin are at the Universities of Kahramanmaras and Uludag, Turkey, respectively.

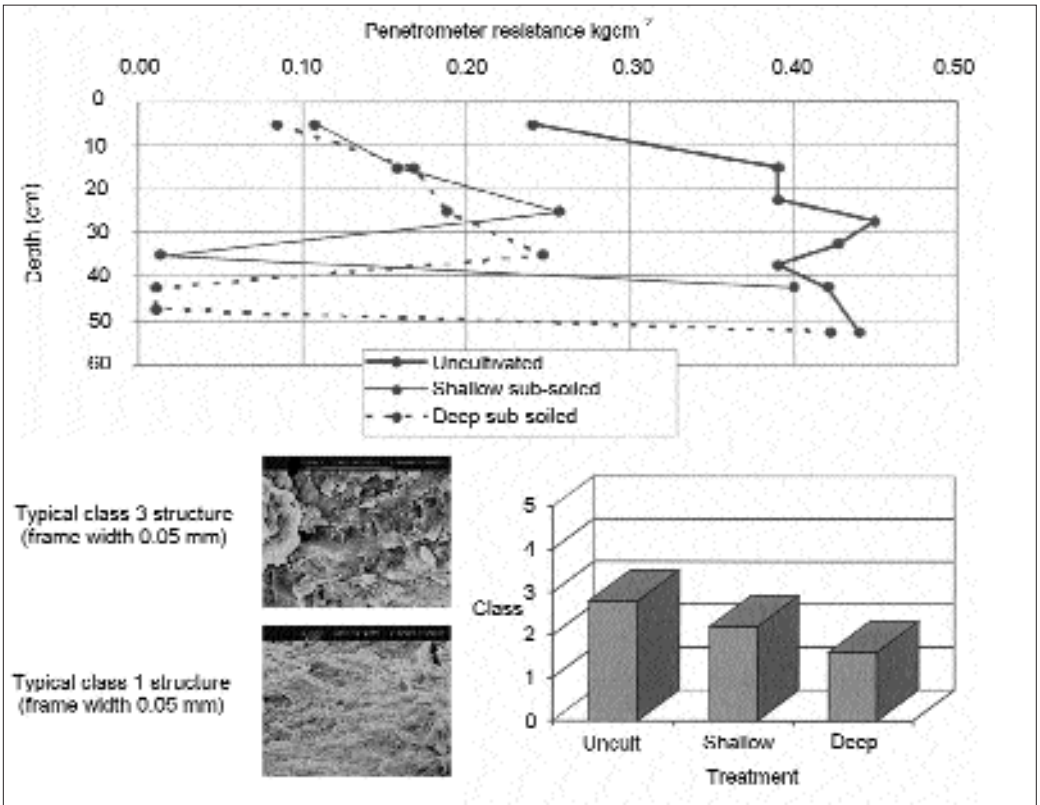


Fig. 1 Penetrometer resistance graphs and scanning electron photomicrographs for sub soiling experiment at Bursa, Turkey. (Top) Penetrometer values for untilled (uncult), shallow sub-soiled (shallow ss, true working depth 40 cm) and deep sub-soiled(deep ss, true working depth 50 cm), where class 1 is loose and class 5 is dense).
(Bottom) Mean microstructure quality score per treatment. Scanning electron photomicrographs (SEM) where classified into five 'naturally' occurring classes by two semi independent workers. A total of sixty images were classified, all taken from a depth of 35 cm for the three treatments: untilled (uncult), shallow sub-soiled (shallow ss, true working depth 40 cm) and deep sub-soiled (deep ss, true working depth 50 cm).

has some good features. A broad range of professionals were consulted and the document is due to be updated in the light of comments and feedback. Farmers should comment as a matter of urgency so that they are able to take the requirements on board positively but equally Defra will need to demonstrate how comments have been acted on for a sector that is perhaps rather 'disparate' in terms of the ability of individuals to adapt.

The cross compliance requirements list problems in summary form and identify lists of 'Principles of good husbandry' for soil textural and cropping groups. This article has grouped these lists into general types of recommendations/requirements in order to see where the focus should be and to identify the implications for the agricultural engineering sector. Of the 16 problems listed in 'Summaries', 50% relate to erosion directly, with around 25% of the remainder relating to soil capping, slumping, sealing and compaction. Only one item relates to organic matter, a carbon dioxide 'sink' that probably influences climate change but this is about right given that more grassland and forestry should arise from the requirements and other strategies deal with energy crops etc. A clear focus is therefore apparent.

In the lists of 'Principles of good husbandry' in which there are 104 recommendations/requirements , 76% relate to the prevention of problems and 24% relate to curing problems. This seems appropriate, as soil structure specialist usually believe that 'prevention is better than cure'. Around 92% relate to avoiding soil and water losses in erosion. There is a clear focus of intent to reduce diffuse or off-site pollution and the costs they incur are targeted as well as leaving the soil in GAEC. Only 12% of the recommendations/requirements relate to encouraging 'cross slope operations'. This article evaluates how sound this is for each of the specific types of cross slope activity.

It is concluded that there are very significant opportunities and challenges for the agricultural engineering sector for both existing technologies and newer ones in the UK. These include global position systems (GPS)/precision guidance technologies for many types of cross slope operations, knowing where wheels have been after surface scuffing and field layout. In addition, other technologies are tied ridge systems, minimum tillage, technologies that improve timeliness and technologies that allow the potential erosion caused by growing potatoes, maize or vegetables on slopes to be overcome yet still meet cross compliance requirements. A 14% reduction in farm worker numbers is forecast nationally. This together with incentives towards better timeliness, will mean that there are opportunities for further mechanisation and at greater speed.

Introduction and rationale

A common quotation is that 'the answer lies in the soil'. However, looking at the period 1950 to 2000, there seems to have been very little real regard to the importance of the soil resource. The soil always seemed to be there and produced food and carried agricultural machinery. Looking at other countries for example in the Middle East where agriculture began, any changes to 'The Garden of Eden' seem to have been overlooked. Degraded land became abandoned and then reused after natural recovery possibly associated with changing climate. The countryside stills seemed to be producing and maybe man had become used to eroded landscapes as standard.

In 1993, the Ministry of Agriculture, Fisheries and Food (MAFF) produced 'The Soil Code' which was revised in 1998 and after that date soils dramatically became more important in documents that were going to underpin emerging policies in the UK. The publication 'Best Farming Practices' (Environment Agency, 2001) set the tone that 'good practice equals good environment equals good business finance'. In 2004, the Environment Agency concluded in their report entitled 'The state of soils in England and Wales', that there was insufficient good quality information on soils needed for

Table 1 A comparison between the frequency of occurrence (F)* of an erosion fabric as seen in thin reaction for projects in Berkshire, Oxfordshire, UK and Bursa and Kahramanmaras, Turkey

	UK - Berkshire				UK - Oxfordshire		Turkey - Bursa		Turkey - Kahramanmaras	
	Chalky soils		Clay soils		Loamy sands to clays		Sandy silt loams to clay loams		Sandy silt loams to clays	
	F	%	F	%	F	%	F	%	F	%
In thin sections that have the erosion fabric	2	7	5	29	4	8	9	64	9	16
In thin sections that do not have the erosion fabric	26	93	12	61	47	92	5	36	46	84

* % F is the frequency as a percentage of total for each soil type.

Table 2 Area in square kilometres which are subject to water and wind erosion shows a range of contrasting Provinces in China

Province (location)	Water erosion, km^2	Wind erosion, km^2	Total erosion, km^2
Beijing (E)	4,383	0	4,383
Xingjian (Xinjiang) (W)	115,425	920,726	1,036,151
Inner Mongolia (N/C)	180,219	594,607	744,826
Shanghai (E)	0	0	0
Sichuan (SC)	150,400	6,121	156,521
Qinghai (W)	53,137	128,972	182,109
Total for China	1648,816	1,906,740	3,555,556

policy and program design and implementation (Environment Agency, 2004). This document really expanded the remit on the function of soils far beyond food and fibre production to include:

support of ecological habitat and biodiversity;

- food and fibre production;
- environmental interaction;
- providing a platform (e.g. for building);
- providing raw materials; and
- protecting cultural heritage (e.g. archaeological remains).

The First Soil Action Plan for England; 2004-2006 (Defra, 2004) stated a board remit for soils and it's uses and concluded that better management of agricultural soils would go beyond the 'Single Payment Scheme through agri-environment incentives.

Within the Single Payment Scheme under the Cross Compliance Guidance for Soil Management (Defra 2005), many principles of good husbandry have become subject to updating, after comments 'set in stone' or until review after the 2005 General Election.

At Defra, the pace of clearing the subject matter from desks has accelerated with the possibility that all due consideration may not have taken place as fully as it could have. It is really important that the way the UK and the EU go about this resource allocation is as appropriate as possible and is based on sound science.

A global perspective

This brings us to our role in a sense of global leadership. In recent informal discussions with staff from China Agricultural University, their reaction was to the effect that these plans are what is needed in China. A sense of global leadership is essential. Countries following our lead may be far less able to afford this resource allocation, if it is not based on good science and appropriate to the local area/environment, with or without any link to a single farm payment.

The examples given below illustrate how soil problems and issues in the UK are sufficiently similar to overseas problems justifying other countries' attempts to copy our initiatives. Countries which have become involved in this paper reflect a range of global situations.

Turkey represents a peripheral EU country. It is actively attempting to join the EU in 2015 possibly 2016. China is the world's most populated nation. It has the fastest growing economy and spans many agro ecological zones. Zimbabwe represents Africa where it is thought that a large UK government initiative could follow the 2005 UK General Election.

Soil compaction study in Turkey

The combination of penetrometer resistance values and images from scanning electron microscopy of undisturbed soil from within 10 cm of the tine (Fig. 1), is interpreted as showing that, as is often the case in the UK, subsoiling with poorly set equipment can reduce ultra micro structural quality rather than improve it (magnification x 2000). Soil structure at this scale is concerned with available water storage and less water storage was not an intended outcome in the farmers' decision-making process.

Greater care in implement use is needed and an application of the latest technologies together with appropriate farmer and farm worker training.

Soil erosion in Turkey compared with southern England

The frequency data (Table 1) is interpreted as showing that erosion is active in both UK and Turkey with variations and by soil texture or regions.

Soil erosion China

In China, while all types of erosion occur the most damaging are wind and water erosion (Table 2). The table only shows data for 6 Provinces and the country total for China.

The table shows that not only are some values many times the land area of Britain but in some areas erosion is nil. The role of wind versus water erosion is very variable, such as the comparison between Xinjiang and Sichuan. Erosion has become much more extensive. In the 1950's, water erosion affected 1.16 million km^2. By 2002 this had increased to 1.65 million km^2, a 42% increase with 38.6% of farmland affected by water erosion alone.

Soil quality in Zimbabwe

As in the UK, the soils in Zimbabwe range from well structured soils to very poorly structured soils in different agricultural settings, one where drainage status is crucial. Figure 2 shows landscape and soil characteristics of three contrasting soils. Organic matter contents range from adequate to extremely low (organic carbon is about 62% of organic matter), perhaps similar to highly eroded mineral soils in the UK.

	Red Soils *(Humic Ferralsol)*	Yellow Soils *(Xanthic Ferralsol)*	Black Soils *(Gleyic Solonetz)*
Landscape			
Soil profile			
General notes	Heavy red clay, high natural fertility. Uniform top profile, not prone to erosion. Generally good structure. Can get very cloddy after ploughing. Used for arable horticultural cropping.	Light sandy soils. Low natural fertility. Signs of mottling in the lower horizons. Poor water retention. Currently under forestry.	Heavy black clays. Highly prone to water logging. Very poor drainage. Strong mottling in subsoil and lower horizons. Sticky when wet and prone to cracking when dry. Currently under extensively managed pasture.
Organic carbon (%)	2.13	1.11	1.01
Organic Matter (%)	*3.43 (medium)*	*1.79 (very low)*	*1.62 (extremely low)*
Nitrogen (%)	0.203	0.105	0.121
Sulphur (%)	0.027	0.012	0.006
Phosphorus (mgl^{-1}) Olsen's method.	94 (Index 5, very high)	14 (Index 1, very low)	14 (Index 1, very low)
pH	6.41	5.62	6.07

Fig. 2 Soil Data from the Hale catchment area, North Western Zimbabwe, showing structural and chemical limitations

The research presented shows that the parameters measured are indeed global issues not either absent or common in any one country *per se*. As a result, it is interpreted as likely that countries will copy this approach. The responsibility is therefore quite clear: a global perspective is needed.

All the countries, compared by taking a few areas of research, have soils with similar opportunities to become more stable through management tools aimed at improving resilience and resistance to change in order to maintain functional integrity during periods of stress.

In the UK, there is a substantial soils database and many quality thresholds exist globally. However, management thresholds are needed In order to achieve robust scientific recommendations.

Scientists across disciplines as well scientists and policy makers need to communicate more effectively in order to focus on dynamic management tools with evaluation and review. These reflect individual and societal priorities in order to move towards sustainability. As almost every aspect of modern agriculture is under scrutiny, it has become increasingly important that scientists take on a more proactive role in order to meets societies needs (Schjønning *et al.*, 2004). As a result, it has also become increasingly important to do it well, and respond to changes in perceived values as they occur or are catalysed by the process.

Achieving cross compliance

In the last five years, soils have become a key resource in policy. Farmers will need to meet cross compliance conditions and achieve 'Good Agricultural and Environmental Condition' (GAEC). Soil Management plans in 2006, following the 'Guidance on Soil Management' documentation produced by DEFRA in 2005. These developments seek to deal with EU budget, EU enlargement, WTO rounds and Sustainability but this article explores whether the measures are scientifically sound and explores the commercial opportunities and challenges for the agricultural engineering sector.

Appraisal of 'Guidance on Soil Management'

The consultation process

The 'Guidance on Soil Management' documentation contains very useful information. A broad range of professionals were consulted and the present document will be updated in the light of comments and feedback. Farmers should comment as a matter of urgency so that they are able to take the requirements on board positively. Equally, Defra will

need to demonstrate how comments have been acted on for a sector that is perhaps rather disparate in terms of the ability of individuals to adapt.

Summaries and principles of good husbandry

The cross compliance requirements as stated in the Cross Compliance Guidance for Soil Management (Defra, 2005), list problems in summary form and identify lists of principles of good husbandry for soil textural groups and crop types. The groups are;

- sandy and light silty soils;
- medium soils;
- heavy soils;
- chalk and limestone soils;
- peaty soils;
- managing soils when growing cereals and other combinable crops;
- managing soils when growing potatoes, vegetables and salad crops;
- managing soils when growing sugar beet, maize, and other fodder crops, fruit and bulbs, and when keeping outdoor pigs
- energy crops; and
- managing soils in the landscape.

While other factors play a role such as length of time tilled (Yilmaz *et al.,*2003), rotational history and grass/manure use, slope and field size, these additional factors have also been allowed for, enabling their inclusion in a management plan which is entirely appropriate.

Analysis of 'Summaries of the main problems'

This article has grouped these lists into general types of recommendations/requirements in order to see where the focus is and the implication to the agricultural engineering sector.

Of the 16 problems listed in 'Summaries', 50% relate to erosion directly and 25% of the remainder relate to soil capping, slumping, sealing and compaction. Only one item relates to organic matter, a carbon dioxide 'sink' that probably influences climate change but this is about right given that more grassland and forestry should arise from the requirements and other strategies deal with energy crops. Loveland and Webb (2003) suggested that the quantitative evidence for a critical soil organic matter level is slight. There may be a desirable range but quantitative evidence needs considerable development. Considering the large amount of research that has been done on soil organic matter, this is a good example of the lack of good scientific data essential to develop management thresholds. Revell and Oglethorpe (2003) modelled the impact of decoupling for the livestock sector and calculated that there would be a 5% increase in grassland for hay production, in England, for example.

A clear focus on erosion is apparent. This is, not only, designed to reduce diffuse pollution and the costs this incurs but it will also maintain soils in GAEC and support the six functions stated in the rationale.

Jones *et al* (2003) made progress towards management thresholds in identifying soil vulnerability to subsoil compaction that could be used in decision making on farms. This is an example of the increasingly useful data which has appeared in the literature that integrates existing knowledge and cross discipline data sources.

Tillage erosion with approximately one metre of soil lost from fence line in 24 years; this is a hedge bank

Analysis of 'Principles of good husbandry'

There are 104 recommendations/requirements listed and their analysis follows.

Soil erosion

Around, 92% of the recommendations/requirements relate to avoiding soil and water losses by erosion. This supports the focus mentioned above as seen in 'Summaries'.

Is erosion significant in Britain? If erosion events are actually taking place, it is often hard to find them. However, most rivers are sediment laden and the landscape is rich in evidence of previous erosion events. Section 'Soil erosion in Turkey compared with southern England' provides data for the UK compared with Turkey.

Evans (1996) provides ample evidence, past and present with predictions for changing climate scenarios and derived estimated costs of cleaning up pollution and water cleaning, etc.

Almost one third of the arable land in England and Wales has a moderate to very high risk of erosion and flooding has become a greater concern in the application of preventative measures.

In the autumn of 2004, a landslip or soil flow occurred near Craven Arms, Shropshire in association with short sharp showers. Other events involving sudden soil failure are reported by Evans (1996).

The four types of erosion are;

- wind erosion;
- water erosion;
- livestock erosion; and
- tillage erosion or tillage creep.

The last of these is particularly interesting because historically, tillage has been classed as contributing to soil erosion by facilitating water and wind erosion. While some authors have highlighted the direct role of tillage on Chalk

Table 3 Comparisons between untreated and treated waste water at Beijing, China

	Suspended solids (SS), mgl^{-1}	*Total dissolved solids (TDS), mgl^{-1}*	*Total phosphorus (TP), mgl^{-1}*	*Chromium (Cr), mgl^{-1}*
Untreated waste water	1140	1380	65.4	0.054
Treated waste water	25	1300	10.1	0.045
Removal, %	97.8	5.8	84.6	16.7

Table 4 Soil and water losses for cross slope (XS) and down slope (DS) sowings at Kahramanmaras, SE Turkey on a clay soil with a simple slope of 2%.

Crop and slope type		Wheat		Vetch	
		Cross slope (XS)	Down slope (DS)	Cross slope (XS)	Down slope (DS)
1999 (Sown January 1999)					
Soil loss kgha ^{1}					
01.02.99 to 14.04.99*	Mean	27	28	27	26
Water loss $lha^{-1} \times 10^{3}$					
17.03.99 to 22.03.99	Mean	3.4	3.5	2.3	3.6
06.04.99 to 14.04.99	Mean	3.1	4.1	3.7	3.6
2000 (Sown December 1999)					
Soil loss kgha ^{1}					
17.02.99 to 26.04.99	Mean	43	65	38	36
17.02.99 to 23.02.99	Mean	3.3	10.7	4	3.5
	sd	0.2	6.3	2.2	1.8
22.04.99 to 26.04.99	Mean	18.7	22.8	19.3	17.8
	sd	2.9	8	10.6	5.7

* Total soil and water losses were measured periodically on eight plots per crop type; Standard deviation (sd)

land (Hall, 1985), it is only more recently that this process is being regarded as a very important process in itself and sometimes more important than wind or water erosion, where soil losses in irregular terrain often exceeded 10 tha^{-1} y^{-1}, typical soil erosion rates in western Europe (Govers *et al,* 1994). Dabney *et al.,* (1999) showed that tillage erosion accounted for 30 - 60% of soil losses in the USA in an agricultural situation where erosion almost reached 250 tha^{-1} y^{-1}.

Tillage creep is perhaps the wrong term as more recent data shows this to be a serious loss as opposed to a gradual creep. Quine *et al.*, (1999) showed that soil losses can be related to slope and so the cross compliance management recommendations need to include slope thresholds that are simple to use practically.

Prevention or cure?

In the lists of 104 'Principles of good husbandry', 76% relate to the prevention of problems and 24% relate to curing problems. This seems appropriate as soil specialists usually believe that 'prevention is better than cure', such as Alakukku *et al.*, (2003).

The costs of effective remedial action may be unacceptable. Table 3 shows the effect of treating waste water in Beijing. It demonstrates how treatment leaves a high content of total dissolved solids (salinity). The water will either have to be treated further or used in such a way as not to damage the environment. All these increase costs or reduce options for mankind.

Cross slope operations

Around 12% of the 'Principles of good husbandry' relate to encouraging 'cross slope operations'. It is essential to evaluate whether this is based on sound science. The reason this stands out as being of interest is that only in 1997 and 1999, MAFF published booklets and pamphlets on erosion. These booklets, from MAFF, stated that 'poorly planned measures can cause more problems than they prevent' (MAFF, 1997).

MAFF (1999) also state that, "In many parts of the world, cultivating, sowing and planting crops 'on the contour' are recommended for controlling erosion. This has limited applicability for mechanised agriculture under UK conditions where slopes are often complex". It goes on to say "failed attempts at following the contour can result in water being channelled forming rills and gullies. In general, working across the slope is likely to be beneficial on gently sloping land with uniform slopes. In other situations the benefits of working across the slope are more questionable. When ploughing across the slope, the use of a reversible plough to throw the soil upslope will help to counter the effects of erosion".

The 'Guide to managing crop establishment' (Soil Management Initiative, 2002) only appears to mention cross slope operations once in 50 pages. The cross slope operations referred to in the 'Guidance on soil management' are;

- placing tramlines across the slope;
- sowing crops across the slope;
- working the soil across the slope; and
- dividing slopes with ridges and headlands.

The last item is supported by Dapney *et al.* (1999) but an indication of spacing, dimensions and land use are needed for UK conditions. The values can be general but there is a need to avoid making erosion worse through 'failed attempts' or wasting resources.

De Alba (2003) used a computer model to simulate soil movement on complex slopes and concluded that tillage itself was indeed very significant at moving soil. The scenarios, up-down slope ploughing or contouring did not predict which treatment produced the most soil degradation. While down slope ploughing produced the most intense degradation, contouring produced a higher average erosion rate than upslope ploughing, per operation. He questioned the assumption that contouring reduces tillage erosion.

Lobb *et al.* (1999) compared different tillage tools (mouldboard plough, chisel plough, tandem disc and field cultivator) and indicated that slope curvature was important (convex slopes can be particularly vulnerable as shown by Evans (1996)), and concluded that operator response to varied topography and tractor implement set up were key factors in trying to make comparisons between machines.

Table 4 shows results from collaborative research between author institutions using wheat and vetch, with different directions of sowing. It illustrates that sowing direction was inconsistent in its effect on soil and water losses, in the south east Turkish context.

The winter climate at Kahramanmaras is not unlike western Britain, although rainfall totals are higher.

In order to see if this was a rushed addition to the documentation, a measure of the apparent importance attached to cross slope recommendations was obtained by investigating the rank position of the cross slope recommendation in the documentation (Defra, 2005). Cross slope operations are above half way down the list with second from the top out of eight being its highest position and third out of five being the lowest rank position. The documentation does not state that rank is a measure of priority but it is notable that cross slope operations are consistently located towards the top of the lists. This is interpreted as showing that the inclusion of cross slope operations, reflect a reasoned interpretation of the science.

Why have the cross slope recommendations appeared so suddenly? A factor could be an appreciation of changing climate (Evans, 1996) as possibly being more serious than modal model prediction. Alternatively, a belief that cross slope operations must be better, as it stands to reason, could be operating. Clearly, it does not always stand to reason. The authors consider that UK agriculture needs to obtain much better data in the development of management thresholds before contouring, should appear as stated in the recommended practices. In addition, as UK farmers have little experience of these techniques, opportunities for observing the successful application of such techniques is essential. In addition some training opportunities would be an aid to the successful take up of this technology.

Usually the guidelines state that cross slope operations should be used where safe and practical. However, this paper suggests that cross slope recommendations should be deleted until better data is available. If this is the case, Defra can show how the democratic process of consultation has responded to comment. This paper has already urged farmers, etc to make comment and hopefully this area may receive some attention. Cross slope operations could be included later beyond the cross compliance management plans that are mandatory. The terms 'simple slope' and 'gentle slopes' needs some explanation pertinent to the farmer's decision making process.

Landscape character

Contouring will change landscape character and it is not clear whether the changes are regarded as valued changes. In practice, the landscape will probably become more diverse and this would be a good outcome.

Tillage erosion produces 'hedge banks' (Hall, 1985) as seen in 'field systems'. These are ideal features on which to add vegetation diversity, shelter etc., or to produce a beetle bank (Figs 3a and 3d). Hedge banks and associated field margin management often reduce subsequent water erosion and are unlikely to create 'off site' problems.

Opportunities for the future?

The agricultural engineering sector

The conclusion is that there are very significant opportunities/challenges for the agricultural engineering sector for both existing technologies and newer ones for the UK. These include GPS/precision guidance technologies (Chamen *et al*, 2003) that can be applied to many types of cross slope operations, knowing where wheels have been after surface scuffling, and field layout.

In addition, other technologies are tied ridge systems, minimum tillage, technologies that improve timeliness, and technologies that allow the potential erosion caused by growing potatoes, maize or vegetables on slopes to be overcome yet still meet cross compliance requirements.

A specific example of the benefits of minimum tillage would be avoiding bringing up chalk rubble through shallower, non plough based operations. This is recommended in the cross compliance documentation (Defra, 2005) and supported by other research (for example Quine *et al*., 1999; Hall, 1982). This could help preserve heritage on archaeologically rich chalk land (Fig. 3a, b & c; Defra, 2004).

Other research requirements

Further research into the role of biology is essential. The Environment Agency (2004) reiterates the six functions of soils and top of the list is 'The support of ecological habitat and biodiversity'. The soil as an ecosystem with important micro-organisms is just coming into policy recognition. For example, a contributor to a Soil and Water Protection, EU Life Project (SOWAP) field day in Leicestershire, indicated that work in Germany showed that vertical bio-pores (worm channels) are more stable against compaction than horizontal ones. A number of factors could influence worm foraging patterns or species.

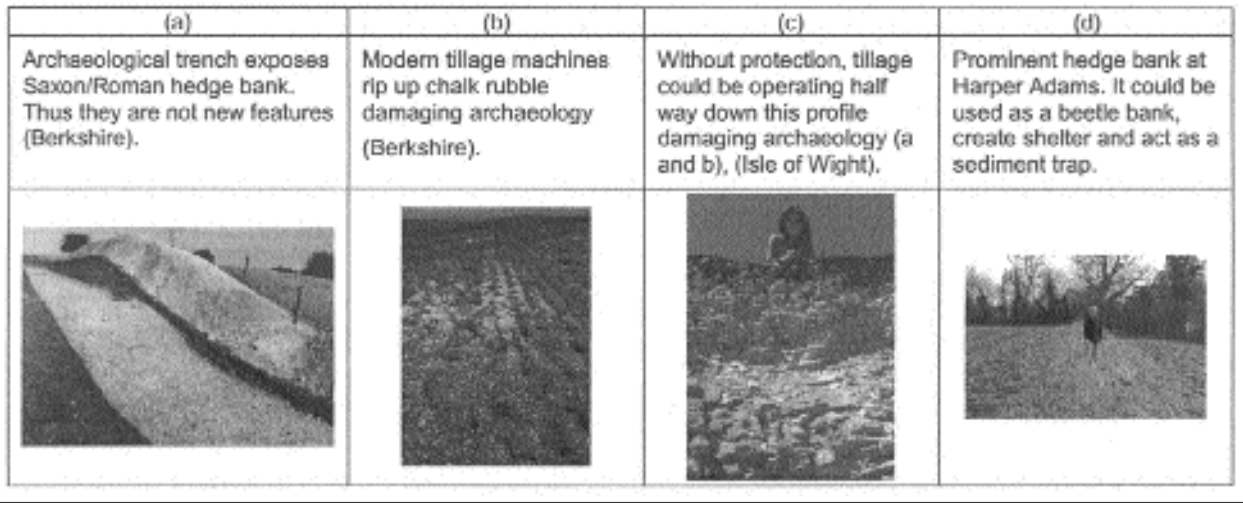


Fig. 3 One of the benefits of minimum tillage would be avoiding bringing up chalk rubble through shallower, non plough based operations. This could help preserve heritage on archaeologically rich chalk land.

Table 5 Mean values for artificially produced vertically and horizontally orientated bio-pores at 25 cm depth in a moist sandy loam subjected to either one pass of either wheeled or tracked vehicle (John Deere 8520 or 8420T). Brackets indicate statistical significance for differences by analysis of variance (ANOVA).

Treatment	*Area, mm²*	*Mean diameter, mm*	*Aspect ratio*	*Radius ratio*
Control	50	8.0	1.19	1.38
Wheel (2 wheels)	35	6.3	1.36	2.65
Track (1 track)	46	7.6	1.22	1.6
	significance (<0.001)	significance (<0.001)	significance (<0.024)	significance (<0.027)
Horizontal bio-pores	46	7.5	1.24	1.9
Vertical bio-pores	43	7.3	1.25	1.69
Mean of treated pores	43	7.1	1.27	1.96

Table 5 shows the results for an experiment in which man made worm channels were subjected to compaction using wheels and tracked tractors. Nylon twine was inserted into the pores to retrace channels if they collapsed totally. Soil cores were freeze dried to remove water without shrinkage and impregnated with styrene containing a fluorescent dye as per the method of Murphy (1986). Images were 'captured' under ultraviolet light and measurements of the bio pores made using image analysis.

While the results from these experimental conditions did not show any statistical difference between vertically and horizontally oriented bio pores, the results do show that tracks and wheels change not only the porosity differently (in line with existing literature, e.g. Chamen *et al.*, 2003), but also the shape of the pores differently. As a result, the radius ratio and aspect ratio of pores show that wheels made pores significantly more elongated and less round. Durability of pore shape varies between wheels and tracks for biologically produced pathways. It is interpreted that these more elongated pores are a stage in the formation of so called 'vughy' structures that are associated with declining soil structure conditions and positively associated with erosion by water (Hall, 1990).

Around 45 cores were used, each cut three times and good sections used. Aspect ratio is the ratio of longest to shortest axis; Radius ratio is the same but for radius.

This is an example of deficiencies in our knowledge of soil biology and therefore our ability to work with it. It is not just a matter of knowing that tracks are beneficial in this respect but how to integrate this knowledge into recommendations regarding where this is beneficial. Thus management thresholds are needed.

A 14% reduction in farm worker numbers is forecast nationally (Revell & Oglethorpe, 2003). This together with incentives towards better timeliness will mean that there are opportunities for further mechanisation and at greater speed.

Reflexive objectivity

Schjønning *et al.* (2004) define 'reflexive objectivity' as the ability to take an objective stance on the consequences of ones actions at the same time being aware of the intentional and value laden aspects of science.

The framework for these reflections is the 'cognitive context' (Alrøe & Kristensen, 2002). This comprises three dimensions, namely:

- the observational dimension (this is the experimental procedure);
- the societal dimension (this is the section of society to which it applies); and
- the intentional dimension (this is the values and goals).

The success or otherwise of soil management plans within the cross compliance requirements will depend to a significant degree on our ability to understand and use the 'intentional' dimension. People need to appreciate the values and goals. Farmers need to feel involved, consulted and valued in the implementation and reflective process. Success will depend on the social aspects rather than the technological ability to meet cross compliance. However the impact of cross compliance needs to be evaluated within the 'observational' dimension and these findings used to demonstrate to farmers the value of their contribution to a larger 'societal' dimension or community. The process needs to be ongoing and the requirements evaluated and modified in the light of changing context within the 'Intentional' dimension. These issues will determine whether the countryside is more sustainable.

Conclusions

In 2003, the Environment Agency concluded that there was insufficient good quality information on soils needed for determining management thresholds in policy and programme design and implementation. These reflect individual and societal priorities in order to move towards sustainability. A global perspective is needed aimed at improving resilience and resistance to change in order to maintain functional integrity during periods of stress. In the last five years, soils have become a key resource in policy. Farmers will need to meet cross compliance conditions and achieve 'Good Agricultural and Environmental Condition' (GAEC). Soil Management plans will be needed in 2006, following the 'Guidance on Soil Management' documentation.

The 'Guidance on Soil Management' documentation has good features such as consulting a broad range of professionals and the present document will be updated in the light of comments and feedback. Farmers should comment, as a matter of urgency, so that they are able to take the requirements on board positively, but equally Defra will need to demonstrate how comments have been acted on for this sector.

An analysis of the 'Guidance on Soil Management' documentation shows a very strong focus on soil erosion and a desire to reduce diffuse pollution and off-site problems and most of all, costs. In addition, adoption will leave the soil in Good agricultural and Environmental Condition (GAEC). Around 12% of the 104 requirements/recommendations

relate to encouraging 'cross slope operations'. The authors consider that the scientific evidence for the value of these measures is insufficient at present for the UK and therefore, the international context unless 'tried and tested' in the appropriate agri-ecological and cultural context. It recommends that an integrated research, evaluation, demonstration and 'reach out' program is needed first with cross slope recommendations being included and perhaps at a later date agri-environment incentives.

It is concluded that there are very significant opportunities/challenges for the agricultural engineering sector in the UK. These include GPS/ precision guidance technologies, knowing where wheels have been after surface scuffing, and field layout. In addition, other technologies are tied ridge systems, minimum tillage, technologies that improve timeliness, and technologies that allow the potential erosion caused by growing potatoes, maize or vegetables on slopes to be overcome yet still meet cross compliance requirements. A 14% reduction in farm worker numbers is forecast nationally. This together with incentives towards better timeliness will mean that there are opportunities for further mechanisation and at greater speed.

Scientists and policy makers need to evaluate the effect of cross compliance on soil quality and communicate effectively with each other and farmers in order to focus on dynamic management tools with evaluation, review and modification to reflect the societal and intentional dimensions (values and goals).

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DATA LOGGING

Big brother Squirrel brings down cost!

The new SQ2040 Squirrel data logger from Grant Instruments boasts the same technically advanced features as its little brother the SQ2020, with the added bonus of additional input channels and100 Hz sampling for increased capability.

Featuring up to 16 differential inputs and 32 single ended inputs the SQ2040 has the capacity to log even more parameters at rates of up to 100 Hz! Sixteen megabytes of on-board memory (capable of taking almost 2 million readings) along with multiple ADC's for sub-second logging and concurrent sampling make the new Squirrel ideal for use in applications such as manufacturing and process industries, science and quality assurance. As well as the 16 differential analogue channels there are two additional high voltage inputs that measure 60 V DC; useful for automotive applications where new 42 V battery systems are used. All this at a much lower cost per channel than other similar systems!

The SQ2040 is portable, lightweight and easy to use. It can be used as a standalone data acquisition system and can be connected via USB or RS232 serial ports for faster download of data. For extra mobility the SQ2040 has an easy access memory slot which accepts standard MMC (multi-media card). This allows any operator on site to download data or reprogram the logger's parameters, by simply swapping memory cards. For convenience and speed of use the new Squirrel has been designed to have up to six pre-configured programmable procedures that can be easily selected from the logger's front panel. Procedures can also be changed in the field, from the front panel by an operator, without a PC.

The SQ2040 supports Ethernet, landline and GSM wireless communications providing global access from any site to a centrally located system for convenient and prompt supply of data.

The new SQ2040 also comes with SquirrelView, an easy to use set-up and analysis software package.

FURTHER DETAILS

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CROP SPRAYERS

Fastrac sprayers retain compact design

Following various changes carried out by JCB to the 3000 series Fastracs, Knight Farm Machinery has re-designed the sprayers that it builds for these vehicles, in order to maintain a compact design and low boom folding height.

To allow for a wider cab on the latest models, Knight has increased the width of the back frame on the sprayer so that the booms can still fold close to the sides of the tractor for maximum safety on the move. Generally, sprayers built for the previous Fastracs will not fit the new models, according to Knights but they can be adapted to do so.

Standard specification for a Knight Fastrac sprayer includes a 2000 l low profile stainless steel tank, booms from 16 to 24 metres, LASER agitation and the Company's advanced plumbing system (APS). A version with a 3000 l tank is available for stretched models and optional equipment includes specially designed 800 l or 1000 l front tanks.

CONTACT

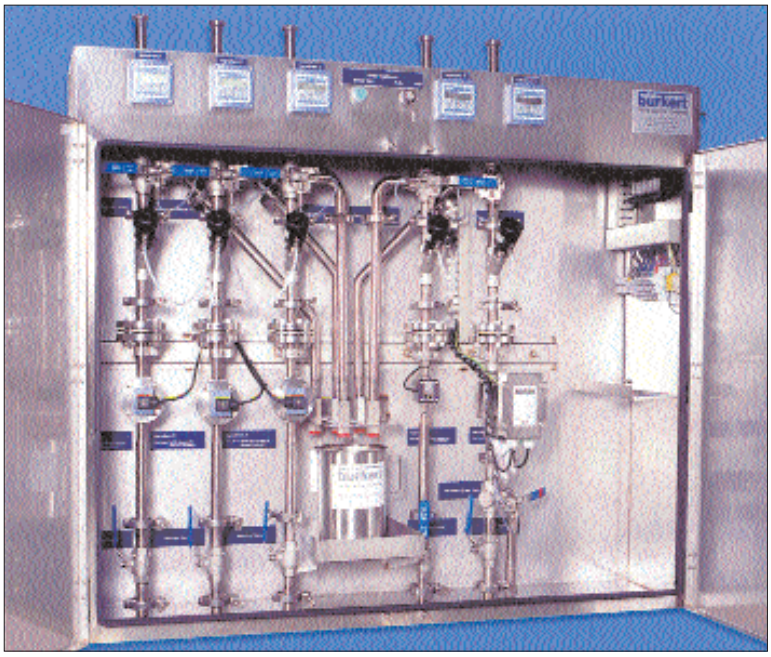
Knight Farm Machinery Ltd, Wireless Hill, South Luffenham, Oakham, Rutland, LE15 8NF. Tel: +44 (0)1780 722200 Fax: +44 (0)1780 722201 Website: www.knight-ltd.com

FLUID CONTROL EQUIPMENT

Packaged fluid controls for new bakery dough dosing system

One of the UK's leading bakeries has specified fluid control equipment from Burkert Fluid Control Systems as part of a new automated dosing system designed to add minor fluid ingredients to the dough making process at the company's UK sites.

The Burkert equipment, which measures and controls the flow of ingredients via a process programmable logic controller (PLC), was specified for its extreme accuracy and Burkert's ability to deliver a complete fluid control system packaged in purpose built stainless steel cabinets. It is expected that a total of fifty cabinets will be installed throughout the UK sites.



From the initial brief, Burkert project managed the installation of the fluid control system from concept to completion which included supplying full documentation and manuals.

The sensor and valve technologies were selected to meet the requirements of both hygienic and high viscosity duties and each batching line was engineered to exactly match the characteristics of the individual fluid ingredient being processed.

To ensure that accurate and repeatable batches are maintained, the IP66 cabinets are equipped with a combination of process and pneumatic valves, sensors and instrumentation and were fully assembled, wired and tested prior to dispatch.

Explaining Burkert's approach to the project, Industry Applications Manager Neil Saunders says: "The flexibility of our sensor range allowed us to specify a number of 'fit for purpose' flow measuring technologies, such as positive displacement and Magflow. This ensured that we met both the cost and operational objectives of the project."

He adds that significant training and after sales support was also included in the proposal.

CONTACT

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COMPANY NEWS

Law-Denis expands and grows

A record year for Law-Denis Engineering, 2004 saw sales up 67% on the previous year. Law-Denis Engineering manufacture grain dryers and related equipment in the UK for the home and export markets.

"The home market was particularly strong for us", a spokesman explained, "With dryers the source of the strength both to farmers and commercial users."

The growth in sales led to an expansion in production facilities with another 14,000 square feet of factory space being added to exisiting facilities, to enable service to the customers to be maintained. This additional space permits Law-Denis to build-up substantial stocks of dryer components, so that delivery times are kept to a minimum.

In addition to the expansion in floor area staff numbers also grew expanding design, engineering and assembly capacity.

As well as a healthy home market, export sales continue to add significant volumes and numerous turnkey drying projects were completed in 2004 boosting the figures.

During the year several contracts were won which were associated with milling plants including a major plant in the Middle East which included dryers, cleaning equipment, elevators and conveyors.

With 2004 being a year of the declining dollar, life was made more difficult in some markets, forcing marketing efforts in different directions. In many respects, this proved to be a bonus as new and exciting prospects developed during the year which turned into orders in the third quarter and provided a record order book level for the start of 2005.

CONTACT

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CROP SPRAYERS

New slant on black grass control

Weeds that are related and structurally similar to the crops they invade do the greatest damage and are the most difficult to control, the classic example being annual grass, black grass in particular, in winter cereals. Black grass is the most difficult weed to control and must be hit at the vulnerable one to two leaf stage. However, at this stage of growth black grass is very small with upright and narrow leaves which are difficult to impact on and cover when spray droplets are released from above.

No other crop-weed situation has received more investment in herbicide research and development; the most brilliant herbicide is of little use, if spray droplets do not land in sufficient numbers on the target weed. Increasing herbicide resistance is making black grass control even more difficult. There is little point in new herbicide development without accompanying improvement in application technique and spray targeting. Selected deposition of spray droplets is just as important as selective herbicide action.

Sprays International has a brand new nozzle tip that puts a new slant on grass weed control in cereals. The Tilt-30 is a 110° Flat Fan nozzle tip that inclines spray pattern at 30° to the vertical, to achieve improved coverage of the slender and vertically displayed leaf targets on black grass plants at the one to two leaf stage of growth. The forward facing and oblique angle of attack ensures more herbicide is deposited on these 'hard to hit' grass weeds than with conventional 110° flat fan nozzles spraying vertically from above.

What's more droplet dimensions are at the fine to medium end of the quality range, now accepted as ideal for optimum coverage of black grass and other annual grass weeds like ryegrass and wild oat. Like all other Sprays International nozzles manufactured from high performance polyacetal, the Tilt-30 inclined nozzle tip has excellent wear characteristics and chemical stability.

The Tilt-3 inclined nozzle tip used alongside established techniques can achieve the most cost-effective black grass control

When faced with difficult weeds and limited chemical advances, spray nozzles and application technique, purposely designed to deal with specific problems related to weed biology, is the sensible way forward.

The Tilt-30 inclined nozzle tip should be used alongside other established techniques to achieve the most cost-effective black grass control. They include:

- ideal spray timing related to stage of weed growth and product used;
- sequencing of sprays - pre-drilling, pre-emergence and post-emergence sprays - to cope with extended dormancy and protracted weed germination over many weeks;
- product selection for different modes of action to minimise resistance and utilise the different chemistry of pre- and post emergence herbicides in a sequence of sprays.

The Tilt-30 inclined nozzle tip retails individually at £3.90 (plus VAT and post & packaging) which is a very small price to pay for squeezing every last ounce of activity and grass weed control from existing herbicide chemistry and products.

FURTHER DETAILS

Sprays International Ltd, Unit 5-7, Gallows Industrial Park, Furnace Road, Ilkeston, Derbyshire, DE7 5EP. E-mail: sales@sprays.co.uk Website: www.sprays.co.uk

TIMBER MACHINERY

Makita log splitter – the wood-burner's friend

The popularity of wood burning stoves requires an increasing log splitting capacity for the producers and users. For timber merchants the new Makita MLS6000 hydraulic log splitter offers a substantial increase in productivity. Horizontal tractor driven beam splitters are slow and difficult to use.

The new Makita vertical ram splitter will handle timber up to 600 mm in diameter and up to one metre tall. The dual height bed can also be set at 600 mm from the splitting wedge to speed production. The wide splitting wedge is pulled down onto the log by the hydraulic ram, which delivers six tonnes of force driven by a powerful 2.2 kW 240 V motor. The ram travel can be pre-set for faster re-cycling, again aiding output.

The all-steel Makita MLS6000 is suitably robust for full-time splitting but is also fitted with small diameter rollers to assist manoeuvrability.

Both hands have to produce pressure on the twin control arms for the ram to move and interlock safety cut-outs instantly stop the ram movement if just one is relaxed. The ram will only re-cycle when both arm controls are again under operator pressure.

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Four-wheel drives harvest benefits

Arable farmers faced a multitude of problems due to the rain during the 2004 harvest. In addition to interrupted progress, the cumulative rainfall meant that, even when the crop did have a chance to dry out, the ground remained too waterlogged to allow combining without the risk of getting stuck, serious rutting or damage to the soil structure.

One group of cereal producers, however, was in a better position than others to get onto the land - those with four-wheel drive combine harvesters. All-wheel drive tractors have been around for many years but the same feature on combine harvesters is not as common.

New Holland has offered four-wheel drive as factory-fit option on its CX and CR Series combine harvesters since they were launched. Now the benefits of greater traction and distributed drive are available for customers wishing to upgrade their existing CX and CR combine harvesters with a brand-approved dealer-fit system.

One grower, who took advantage of adding four-wheel drive this year, was Northumberland based farmer and contractor Pip Robson. Mr Robson, who farms at Chathill and harvests up to 880 hectares of oilseed rape, barley, wheat and beans each year, noticed an immediate benefit from the system when it was fitted to his CR980 halfway through its second season.

"To be honest I would have probably specified four-wheel drive if I had had the chance," Mr Robson says, "but after my previous combine was destroyed by fire last year, I bought a CR980 that Lloyds' Kelso branch had been planning to run as a demonstrator.

"The dry 2003 harvest meant I didn't have any problems with the combine, but one week into the 2004 harvest I had made up my mind that four-wheel drive was a must. Tracks weren't really an option because we do so much road work."

It took just one day to retro-fit four-wheel drive to Mr Robson's combine. "We delivered it to the dealer one evening and it was ready to collect by tea time the next day and was back to work the following morning," Mr Robson says.

The upgrade involves replacing the combine's existing free-turning rear axle hubs with two which are hydrostatically driven. The CR and CX Series combines already feature hydrostatic drive to the front axle, so the oil supply is simply redistributed to drive the new back axle hubs as well.

Mr Robson describes some of the parcels of land that he harvests as deep and peaty. "The soil goes down for about 3 to 4 m and isn't very stable," he says. "And it certainly doesn't carry machinery very well when it's wet.

"Four-wheel drive kept the combine out of difficulty, but I also used it to spread the power and reduce the damage to the fields," he says. "The traction comes from all four wheels so the tyres didn't even break the surface. With so many benefits, the system is a cost-effective option.

"I was able to harvest three fields totalling about 40 hectares that I wouldn't have been able to go near with a two-wheel drive combine. And if it hadn't dried up a bit towards the end of the harvest, a further 20 hectares would have been in the same situation."

Adding all-wheel drive to his CR980 also improved its performance on hills. "There are a couple of slopes that I harvest that I have only been able to cut while going down hill in the past," Mr Robson says. "With four-wheel drive engaged, I was also able to cut going up the hill this year, making the process much more efficient."

The benefits of New Holland's upgrade made a big impression on Mr Robson. "If people realised the difference it makes, everyone would use four-wheel drive combines," he concluded.

New Holland's CX and CR series combine harvesters offer hugely beneficial four-wheel drive option

FURTHER DETAILS

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