Agriculture • Horticulture • Forestry • Environment • Amenity

LANDWARDS

Autumn 2003

Society for the ENVIRONMENT

- Biogas Energy
- Nursery Robotics

IAgrE JOURNAL Volume 58 No.5 www.iagre.org

DIARY of EVENTS

NOVEMBER 2003

Monday 3 November 19.30 h – Wrekin Branch
State of the Countryside 2020
Speaker: Mike Grace, Regional Director, Countryside Agency
Venue: Harper Adams University College

Monday 10 November 19.30 h – South East Midlands Branch
Quality Standards in Potato Industry and Potential Implications for Agricultural Engineering Developments
Speaker: Professor E Allen, Cambridge University
Venue: Conference Room, SRI, Wrest Park, Silsoe

Monday 10 November 19.30 h – West Midlands Branch
Tractor Manufacturing in Coventry 1946-2003
Speaker: Roger Reed
Venue: AGCO, Banner Lane, Coventry
For more information email: westmids@iagre.biz

Thursday 13 November 19.30 h – Herts & Essex Branch
Modern Combine Harvester Technology
Speaker from CNH UK Ltd
Venue: CNH Basildon

Friday 14 November 19.30 h – East Anglian Branch
Branch Annual Dinner
Venue: Brome Grange

Wednesday 19 November 14.30 h – Northern Ireland Branch
Visit to two working Carier Slurry Separators on farms in the Omagh area followed by 'Ulster Fry' (approx. 17.00 h) and discussion of the theory and practice of separation.
Arranged through Trevor Linton, NI Carier Agent

Wednesday 19 November 19.30 h – Scottish Branch
Electronics and Communications in Rural Industries
Speaker: Derek Smith, Forestry Commission – Radio and Electronics Branch
Venue: Lomond Hills Hotel, Freuchie, Fife

Thursday 20 November 19.30 h – Southern Branch
Recent Developments in Oil Technology and the Outlook for the Future
Speaker: Colin Middleton, General Manager, Sales & Marketing, Morris Lubricants
Venue: Sparsholt College, Winchester, Hampshire

Tuesday 25 November – Western Branch
Welding – demonstration of the latest welding technologies, techniques and approaches
Venue: Royal Agricultural College, Cirencester
There will be two sessions - one in the afternoon and then repeated in the evening.
Pre-booking required - £2.50 members, £5.00 non-members. Please contact: Nick Paul, Branch Secretary
E mail: nicholas.j.paul@btinternet.com or telephone: 01225 782347

DECEMBER 2003

Monday 8 December 19.30 h - South East Midlands Branch
Providing the Tools for a Future Farming Industry
Speaker: Caroline Drummond, LEAF
Venue: Bar Function Rm, Cranfield University Silsoe

Tuesday 9 December 19.30 h – Scottish Branch
Recent Developments in Grass Machinery for the Farm
Speaker: Jim Campbell
Venue: SAC, Auchencruive by Ayr

Tuesday 9 December 19.30 h – West Midlands Branch
Castrol/BP – Environmental Issues/Technical Update
Speaker: Russell Cherie
Venue: Friends Meeting House, Stratford upon Avon
For more information email: westmids@iagre.biz

Thursday 11 December 19.30 h – Wrekin Branch
Young Engineer's Challenge
Organised by Kevin Scrivens and Denis Cartmel, Wrekin Branch Representatives
Venue: Harper Adams University College

JANUARY 2004

Monday 12 January 19.30 h – Wrekin Branch
Land Rover Special Vehicles
Speaker: Bob Honnor, Commercial & Utility Business Manager, Land Rover
Venue: Harper Adams University College

Monday 12 January 19.30h – South East Midlands Branch
Precision Livestock Husbandry
Speaker: Professor Christopher Wathes, Silsoe Research Institute
Venue: Conference Room, SRI, Wrest Park, Silsoe

Thursday 15 January 19.30 h – Herts & Essex Branch
Inspirations in Engineering
Speaker: Eric May, Countytrac
Venue: Writtle College

January 14 or 15 - Northern Ireland Branch
Visit to Mothers Pride Bakery
Speaker: Lynne Gowdy
Venue: Mothers Pride Bakery, Apollo Road, Belfast
Date and time to be confirmed.

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Dr Dan Mitchell, President

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Front cover: *Extended range of combine harvesters (Courtesy: New Holland UK)*

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Centralised anaerobic digestion system at Holsworthy Biogas plant in Devon (Photo: Holsworthy Biogas)

ANAEROBIC DIGESTION WITHIN THE UK

Duncan Child

BIO NOTE

This paper was presented at the IAgrE Annual Conference entitled 'Energy and the Land-based Industries' and held at Silsoe Research Institute on 13 May 2003. Dr Duncan Child is a Director of an independent consultancy that provides feasibility studies, services and solutions for sustainable technologies with the renewable energy, waste management and manufacturing industries. Prior to this Dr Child was a Senior Research Fellow at De Monfort University, Leicester. Sustainable Technologies Solutions Ltd. Tel: +44 (0)1509 267817 E-mail: duncan@sustainabletechnology.co.uk Website: www.sustainabletechnology.co.uk

Summary

Anaerobic Digestion (AD) has recently been undergoing a state of revival within the European Union (EU), most notably in Germany, where more than 50 AD plants, each treating at least 2500 tonnes per year of biowaste, are now installed. It has also been receiving increasing interest within the UK, though the actual development and installation of AD systems between the two countries is very different.

Although AD in the UK is well established within the wastewater treatment industry, it has a very chequered past within other UK industrial sectors, most notably the agricultural sector where AD is still perceived as being unreliable, time consuming and uneconomic.

New technology and methods have increased the reliability of AD systems and there is a growing interest in the technology especially within the food supply chain where the effects of the EU Landfill Directive are beginning to be felt.

This article gives a brief overview of AD within the EU and then examines the legislation and drivers that will impact on the development of AD within the UK. It also examines the resource that is accessible and the different AD systems and emerging technologies which are now available for AD, to be considered as a viable option within an integrated resource (waste) management supply chain.

Anaerobic digestion within the European Union

Interestingly, the development of the AD market within the EU has somewhat mirrored the development of the EU wind energy industry. For example, Germany which does not have the highest wind regime in the EU but does have the highest installed wind power capacity (Fig. 1), [European Wind Energy Association].

This rapid growth in recent years has been assisted by government subsidies, as part of its strategy to bring down greenhouse gas emissions. This proactive stance from the German government is also true for their support for the development of the AD market within their country. This is illustrated in Fig. 2 which shows

the number of commercial AD plants, per EU country, that are processing more than 2500 tonnes/year of biowaste and/or organic industrial waste [IEA Bioenergy Task 37].

Within Germany, a Renewable Energy Law now provides a minimum price for electricity generated from AD systems as detailed in Table 1.

Of significance is that these prices are fixed for a period of 20 years. There are also grants available of up to 30% in interest reduced loans [Köttner, 2003]. These fiscal measures have led to the rapid development of the AD market in Germany, where there are now more than 1200 farm based AD systems.

The EU AD market is predicted to reach 38.4 TWh_e by 2010, though a recent estimate suggests that it will only reach 21.8 TWh_e [Frost & Sullivan, 2003]. This is partly due to reduced or lack of government support for such systems. In contrast to the German fiscal support for AD systems, the Danish government has recently voted to remove state support in the form of capital grants for AD systems. Though a premium price is being paid for the electricity – 0.6 DKK/kWh (£0.056/kWh), the Danish government want to reduce quite considerably this premium. This has therefore had the effect of putting on hold any new AD developments [Köttner, 2003].

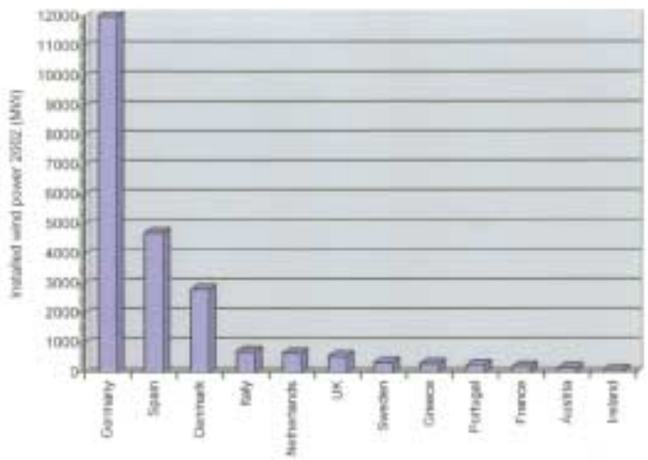

Fig. 1 EU installed wind power 2002

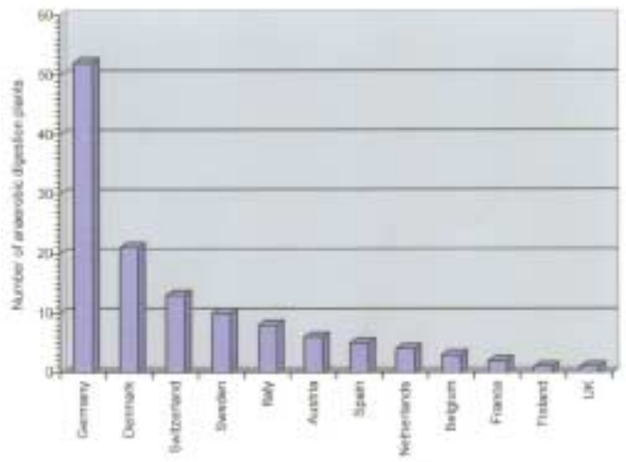

Fig. 2 EU commercial anaerobic digestion plants processing > 2500 tonnes/year of biowaste

Table 1 Electricity prices from anaerobic digestion systems in Germany

Size, MW	Guaranteed electricity price	
	€/kWh$_e$	£/kWh$_e$
Farm based < 0.5	0.102	0.071
0.5 - 5	0.092	0.064
5 - 20	0.087	0.061

Anaerobic digestion in the UK

Though AD in the UK is well established within the wastewater treatment industry, it has a very chequered past within other UK industrial sectors, most notably the agricultural sector where AD is still perceived as being unreliable, time consuming and uneconomic. New technology and methods have increased the reliability of AD systems and there is a growing interest in the technology especially within the food supply chain where the effects of the EU Landfill Directive are beginning to be felt [TV Energy, 2002]. However, against this upsurge in interest, AD does not appear to receive the same level of support within UK government circles as in other EU countries. This is evident by the distinct lack of discussion on AD within the recently published UK Energy White Paper [DTI, 2003].

Interestingly the reference count for renewable energy technologies within the paper is: wind 56; hydrogen 48; biomass 31; solar 21; tidal 17; wave 15; AD 1 and biogas 0. The one reference to AD refers to the review into the delivery of Waste Strategy 2000: "…ensure that there are financial incentives to develop new waste technologies such as pyrolysis, gasification and anaerobic digestion."

Likewise recent waste strategy reviews do not seem to be too positive about the future for AD within the UK either. The recently published Cabinet Office Strategy Unit report 'Waste not, Want not' reviews the implementation of Waste Strategy 2000 for England and Wales [Strategy Unit, UK Government Cabinet Office, 2002], regarding AD, merely states "Whilst trialed, not yet commercially proven in the UK on municipal solid waste (MSW)." There is no mention of either agricultural waste or food waste which is of concern as there is enormous potential for the development of these two sectors, as evidenced by UK companies working within these sectors. As evidenced in other EU countries, the involvement of a proactive government and supportive energy rates greatly assists in the development of the AD market.

Drivers

A range of EU and UK legislation provides the main drivers for the UK AD market:

EU Landfill Directive

By 2020 the quantity of biodegradable municipal waste, being sent to landfill, must be reduced to 35% of the amount produced in 1995. AD is seen as vital for achieving this target [Köttner, 2003].

EU Animal By-products Regulation

The recent EU Animal By-products Regulation provides the legal framework for the collection, transportation, storage, handling, processing and disposal of animal by-products across all sectors of the animal by-products supply chain [Department for the Environment, Food and Rural Affairs (DEFRA)]. The method

of treatment depends on whether the material is classified as animal by-product or catering waste. For material classified as an animal by-product the options available are detailed in Table 2.

EU Biowaste Directive

By 2009 all member states should have separate collection schemes for biodegradable waste (biowaste), such as kitchen waste [Green Party].

Renewables Obligation

The Renewables Obligation requires that power supplier's source a defined amount of the electricity that they supply to their customers from renewable energy sources. The required targets are 3% by 2003 and 10% by 2010, subject to the costs being acceptable to the consumer.

Climate Change Levy

The Climate Change Levy is a tax on the use of energy in industry, commerce and the public sector and forms an integral part of the Government's Climate Change Programme. The attraction is that electricity generated from new renewable energy is exempt from the levy.

Table 2. Animal By-product treatment options

Material	Category	Risk	Examples	Anaerobic digestion (AD)
Animal by-product	1	High risk	Carcasses of animals suspected or confirmed as having transmissible spongiform encephalopathies (TSE). Carcasses of zoo and pet animals	Cannot be treated in an AD system
Animal by-product	2	High risk	Diseased animals. Animals that die on farm and which do not contain specific risk material (SRM) at the point of disposal	Can be treated in an AD plant, if it is first rendered to the pressure-cooking standard (133°C and three bar).
Animal by-product	3	Low risk	Material which is fit for human consumption.	Can be treated in an AD plant to the EU standard of 70°C for 1 hour, with a maximum particle size of 12 mm in a closed vessel on approved premises. The residue can be spread as a fertiliser on non pasture land (i.e. land not grazed by animals for at least two months after the residue is applied).
Catering waste		Low risk	All waste food originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens	Can be treated in an AD plant. For material with a maximum particle size of 5 cm, it must be pasteurised at 57°C for five hours. For material with a maximum particle size of 6 cm, it must be pasteurised at 70°C for 1 hour.

Resource

AD has a very chequered past within the UK, most notably within the agricultural sector where AD has a history of being unreliable, time consuming and uneconomic. Despite these concerns the potential for farm based AD is significant, especially in the dairy and pig sectors as illustrated in Fig. 3 [C-Tech Innovation Ltd, 2002].

This indicates that the available biogas energy that can be derived from a farming unit using AD, typically exceeds, by some measure, the energy requirement of that unit, as demonstrated in equation format below Fig. 3.

The resource potential for AD systems, within the UK, is detailed in Table 3 [British Biogen, 1999]. This suggests that if all the available agricultural and food derived waste resource was utilised, then about 400 MW_e and 600 MW_e could be generated. The separated digestate is likely to consist of 29 Mt/year of fibrous matter and 58 Mt/year of liquid fertiliser.

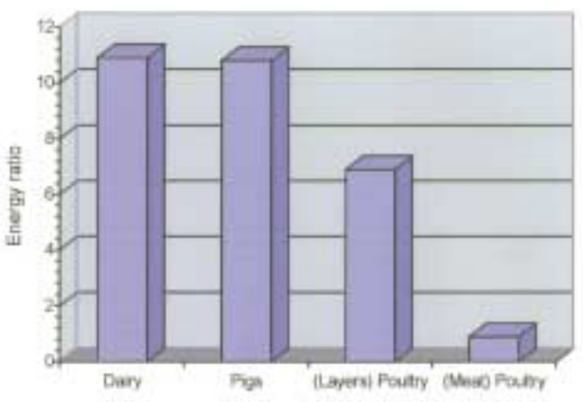

Fig. 3 Energy ratios for agricultural anaerobic digestion systems

$$\text{Energy ratio} = \frac{\text{On site available biogas energy}}{\text{On site energy demand}}$$

Systems

There are two main types of AD system that are being used for the treatment of food waste and agricultural and horticultural waste, namely batch and continuous flow.

Batch digestion

Batch digestion is synonymous with the AD sytems that have been used for centuries with the Far East, notably China and India. It is simply a sealed container in which the organic waste is placed. Biological decomposition occurs (with or without heating) and biogas is produced. In effect it is the same process as within a landfill site.

There has recently been an upsurge of interest within batch digestion for the treatment of agricultural and food processing waste as it is more tolerant of feedstocks with a higher solids content. A recent example of this type of system within the UK is at Arrowe Park, Wirral where AMEC have developed a batch digester for food waste and green MSW (Fig. 4).

The AD system has two novel features in that it is generating electricity and heat using a micro gas turbine and is also integrated with a greenhouse, where the carbon dioxide from the gas turbine exhaust is fed for plant uptake. The modular approach to the batch process allows for maximum biogas extraction from each batch before it is removed and replenished. Careful control of the cycling of the biogas production allows for continuous biogas production.

Another UK company promoting a batch AD system is Sustainable Waste Systems (Fig. 5). This system is able to accept both solid and liquid waste by operating a two phase system. The first phase is digestion of solid waste (e.g. agricultural manure, separated MSW, food processing waste) within a

Table 3. Resource potential for anaerobic digestion systems in the UK

Feedstock	Resource, Mt/year	Energy yield, MJ/t	Potential energy, GWh/year	Thermal power, MW	Electrical power, MW	Fibre, Mt/year	Fertiliser, Mt/year
Cattle	72	360	7200	411	274	22.3	46.8
Pigs	10	359	950	54	36	2.3	7.4
Green municipal solid waste (MSW)	5	607	840	48	32	2	2.8
Poultry	4	1188	1250	72	48	2.4	0.8
Food processing residues	1	607	170	10	6	0.4	0.6
Total	92	3121	10410	595	396	29	58

Fig. 4 AMEC Batch Digestion System (Photo: AMEC Waste Research Station, Wirral)

sealed vessel. The second phase is digestion of liquid waste (e.g. farm slurry, beverage processing waste) within a second vessel. Liquor from the solid phase is drained into the second vessel which can also accept other liquid wastes. The liquid waste is circulated through the contents of the solid phase during the digestion period [Sustainable Waste Systems].

Continuous digestion

A continuous AD process is analogous to a cow eating grass. A cow regularly eats grass and after a period of time produces biogas from both ends of its body and defecates the fibrous non-digestible matter. Likewise a continuous AD process is regularly fed organic material which is converted into biogas and the residual fibrous matter is removed for further treatment. As a continuous AD is regularly diluted with fresh material the biogas production rate is less than for a batch digester.

An example of a small-scale continuous AD system is shown in Fig. 6. The 120 m^3 AD, along with a 25 kW wind turbine and a 50 kg/h gasifier, formed a hybrid renewable energy system developed at De Montfort University as part of an 'EU Joule' project. The AD processed 10 tonnes/day of primarily pig slurry with a mixture of vegetable wastes (typically brassicas, seed potatoes and sugar beet). The biogas was stored in a 50 m^3 biogas storage bag where it was then fed to a Capstone 30 kW micro gas turbine.

An example of a large-scale continuous centralised AD system is shown in the title photograph. It is located at Holsworthy, Devon and is half owned between Holsworthy Biogas (centralised AD operator) and Farmatic (German AD developer). The centralised AD, built with the assistance of European Objective 5(b) Funding, treats cattle slurry and food processing waste within a 30 mile radius.

The centralised AD is designed to treat 146,000 tonnes of animal and food processing waste and produce enough biogas to operate two 1.2 MW gas engines. The surplus heat from the centralised AD is designed to be fed into a district heating system which is intended to heat a local health centre, hospital and school.

Integrated digestion

Leicester City Council have recently awarded a 25 year £300M integrated waste management contract to Biffa to sort household waste from 117,000 Leicester homes [BIFFA]. The sorted organic waste fraction will be fed to a continuous AD system, which will provide 1.5 MW_e.

The system is linked to a local sewage works, which will take the liquor from the AD system. The fibrous matter will

Fig. 5 Portagester System (Photo: Sustainable Waste Systems)

Fig 6. Continuous anaerobic digestion system

be stored for 14 days before being spread on agricultural land as a compost and soil improver. Though not directly processing agricultural and food waste, it does illustrate that forward thinking is taking place within UK organisations in how to maximise the opportunities for electrical and thermal energy generation from multiple resource streams.

Emerging technology

There is increasing interest in the AD market and there are several emerging technologies that are presently looking to exploit the opportunities available.

Micro gas turbines

A recent introduction into the small scale (<100 kW) energy generation market is the micro gas turbine [Bowman Power Ltd]. Though they are typically more expensive then standard internal combustion engine systems, they have lower running costs due to lower maintenance costs. This is primarily due to only having one moving part – the rotor which contains both the turbine and generator (Fig. 7). This allows for smoother operation and, due to it being a continuous combustion process, it provides a more constant power output. They also have lower vibration and emissions and are generally more compact. There are several of these operating on biogas within the EU (e.g. AMEC Waste Research Station, Wirral) and it is anticipated that they will become the primary power generation source for agricultural and food waste AD systems.

Fuel cells

Fuel cells through electrolysis recombine hydrogen and oxygen into water and in doing so produce electricity. The interest in AD by fuel cell manufacturers is that hydrogen can be obtained from the methane within the biogas (Fig. 8). The technological challenge is that extremely pure hydrogen (i.e. no sulphur) is required. The main advantage of fuel cells is that they have very low emissions, long life cycles, low maintenance and high conversion efficiencies of about 45%.

Transport

An application for biogas which is being explored is the use of biogas as a fuel for transportation. Eight European cities collaborated on an EU funded project towards the broad popularisation of energy efficient, environmentally friendly vehicles [Environment and Health Protection Administration, Stockholm]. For use as a fuel, the biogas needs to be purified to a methane content of 97%. At this purity, 1 m^3 of biogas has the energy equivalent of about 1 litre of unleaded petrol. In Stockholm the cost of 1 m^3 of biogas was about £0.06 less than the cost of 1 litre of petrol. The AD plant that is generating the biogas is a sewage treatment works and it is being increased in size from 250,000 m^3 to 4.5 million m^3. When completed it will provide enough biogas to power about 3000 cars (there are already 500 biogas powered cars in Stockholm). The cost of converting a car from petrol to biogas is between £1000 and £3000.

The Future

For AD and other emerging energy generating technologies to become accepted within the UK, key stakeholders within the energy and waste management supply chains need to be educated as to the positive attributes that these technologies bring to the environmental debate. For AD within the agricultural and horticultural sectors, the key stakeholders include farmers, growers, pack houses, processing companies, retail outlets, planners, financial institutions, local councils and regional government.

A step change in thinking about AD is required if it is to overcome the problems

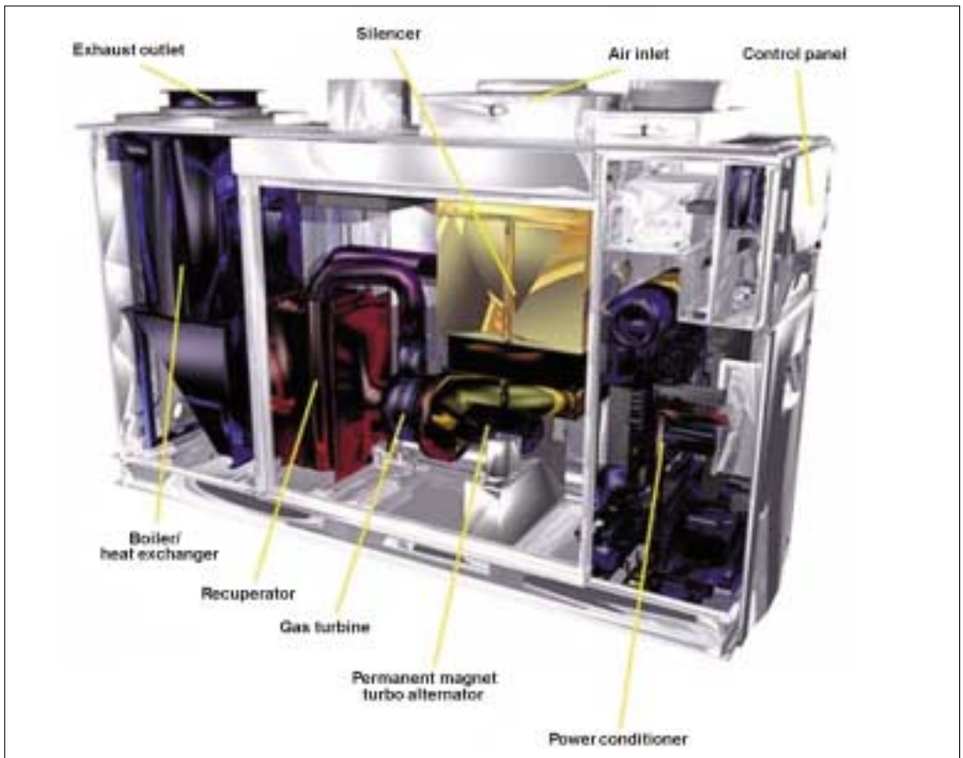

Fig. 7 Micro gas turbine (Photo: Bowman Power Systems)

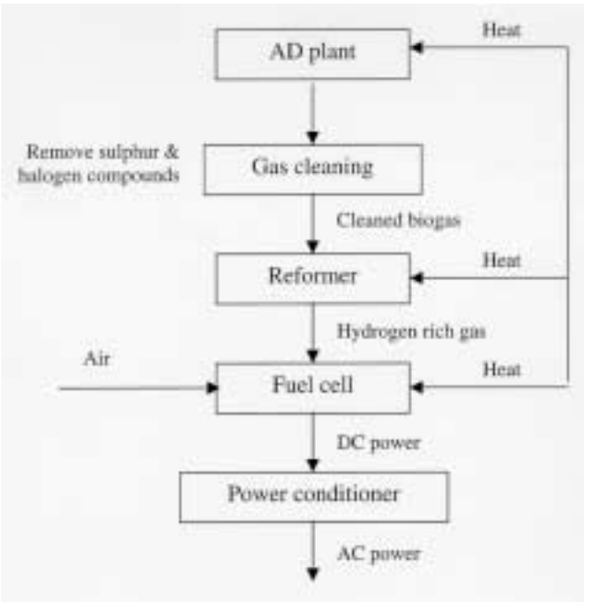

Fig. 8 Typical biogas powered fuel cell

associated with lack of central support and the historical legacy of AD as being unreliable and time consuming. To enable this to occur, AD needs to be viewed as an integral function within the resource management of the whole supply chain, rather than just another waste management technique that is included as an afterthought. There are also ranges of different business models available which do not necessarily put all the financial and operational burden onto the resource (waste) supplier.

AD systems are now being designed and installed within the UK that are not only integrating AD with agricultural and horticultural practices, but also with emerging energy generating technologies [Sustainable Technology Solutions]. By utilising the energy content of the residues in this way, these systems reduce the use of fossil fuels, methane emissions and landfill disposal.

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Dagenham NTI opens for business

Malcolm Carr-West, who for the last ten years had led the Agricultural Engineering department at Writtle College is on the move. He is to take on the role of co-ordinating a New Technology Institute (NTI), the Dagenham NTI, which has opened at the Centre for Engineering and Manufacturing Excellence (CEME) Campus, in East London.

Led by Loughborough University, the Dagenham NTI will work within the CEME partnership to enhance the engineering, business and

entrepreneurial skills being taught there, which have been identified as crucial to the successful regeneration of this part of the Thames Gateway area.

As well as offering courses in advanced engineering at CEME, the Dagenham NTI will play a vital *backroom* role, developing leading edge e-learning technologies, supporting students wishing to progress to higher education, and working with local industry, from Ford down to the smallest companies, to build manufacturing and business capability in the area.

Malcolm brings a wealth of experience in education and engineering to the post, and is relishing the challenge that lies ahead.

"This is the probably the most exciting development in engineering education in the Thames area for a generation", says Malcolm. "The work that the Dagenham NTI will contribute to can make a real difference in establishing London as a world city for advanced technologies, enhancing its present status as a centre for the finance and service sectors."

Chris Backhouse, Loughborough University's Dean of Engineering says: "The Dagenham NTI is going to help break down the divide between the vocational and the academic in the education and skills debate, a distinction which CEME considers to be mostly artificial and outdated."

Described by London's mayor Ken Livingstone as "a vital landmark in securing a successful and sustainable economic environment in the Dagenham region", CEME's first students are enrolled, and taking the first steps in realising the vision of its public-private partnership to regenerate the Thames Gateway area.

CONTACT

Contact: Richard Newbold, Loughborough University Business Partnerships. Tel: 01509-228692 Email: r.w.newbold@lboro.ac.uk

Fred Milbourn (third left) with some of the visit group from the Horticultural Engineering Specialist Group and the South Eastern Branch, in the Newlands loading bay, against a background of 'Danish trolleys', filled with end-packs of bedding plants awaiting onward delivery

ROUNDSTONE NURSERY

Horticultural Engineering Specialist Group and South Eastern Branch visit

John A C Weir

The Horticultural Engineering Specialist Group and the South Eastern Branch jointly visited Roundstone Nursery recently.

Those who are old enough will remember UK bedding plant production, in the late 1950's and early 1960's, as little more than a 'cottage' industry. At that time the remaining post-war austerities had finally been shaken off; our economy was beginning to improve and this was one of the nascent sectors of horticulture which was about to take off. As it turned out, we witnessed a firm gradual expansion of the bedding plant industry which, in many respects, is still in progress today. The transformation from a low technology and highly labour intensive operation to what exists today, has largely resulted from successfully balancing the 'supply' and 'demand' sides of the business. Plant breeding programmes, seed production technology, specialist subtrates, modular handling, mechanisation and automation, have all played a key role in both creating and satisfying this expanding market.

There could hardly be a better example, of how a bedding plant producer has progressed from small beginnings to capture a significant slice of this market, than Roundstone Nursery, based in Angmering, West Sussex. Originally established in 1985, they set up as a specialist bedding plant production unit, supplying local retail outlets. Fred Milbourn, the first manager (now Managing Director), is always a keen exponent of exploiting new technology to meet the growing demand for quality bedding plants. He has been primarily instrumental in taking the Roundstone enterprise from an original glasshouse area of less than 1 ha, employing a workforce of ten, to its present production area of approximately 12 ha, employing almost 100 full-time staff.

The most recent development in this expansion has been the opening of a new 7.5 ha production unit (Newlands Nursery) near Chichester which has involved a substantial investment in engineering technology.

Roundstone Nursery

Our visit commenced at the Roundstone site which has been gradually developed and expanded over the years, by increasing the glasshouse area on the land available. Fred Milbourn explained that the addition of the Newlands unit had given them the opportunity, not only of achieving the substantially increased output target but also reorganising their production operation into two separate phases. Roundstone has now been devoted entirely to the initial plant and propagation, in which seed-sowing and germination takes place in multi-cell trays; being grown on to a point at which the 'plugs' are ready to transfer to the second, final phase, of the production process at Newlands.

Transforming the seed sowing and pricking out of seedling plants, arguably the most labour intensive manual operation in commercial horticulture, into a fully mechanised and, more recently, virtually automated process has taken three decades of development. At Roundstone, we were given a graphic demonstration of the latest production line systems. These are designed to minimise labour input using high speed precision sowing and robotic plant plug transfer. Labour input is now largely supervisory in the hands of skilled operators. The key to mechanised or automated seed sowing, has been in the development of pelleted and coated seed which enables seeds, irrespective of shape or size, to be handled mechanically.

INFORMATION

John Weir is Vice President of the IAgrE and Chairman of the Horticultural Engineering Specialist Group. E-mail: Putney.john@virgin.net

This has paved the way for the development of precision seeders, most of which operate by holding individual pelleted seeds by vacuum on a rotating perforated drum or nozzles placing each directly into its own compost plug, contained in multi-plug trays.

At Roundstone, an automatic seed sowing line is capable of sowing at a rate of 1200 trays per hour. The Roundstone propagation system has been standardised by using expanded polystyrene trays each containing 264 or 405 plug cells for production from seed and 126 cells for cuttings (a smaller and less automated part of the business). These reusable trays are purpose designed for the completely automated sequence of compost filling, sowing, watering, plug removal and stacking.

In the greenhouse, the tray are laid out either on benches or the floor and covered with an unwoven polypropylene mulch which is removed shortly following onset of germination. At a later stage, when defects such as failure to germinate or necrotic growth can be spotted in individual plugs, each batch of trays is put through a processing lines where the defective plugs are removed and replaced with healthy ones, using robotic 'finger' transplanters. This is an entirely automatic process, controlled by image analysis which has proved to be one of the most successful recent developments for increasing productivity, in what would otherwise be an extremely labour intensive and tedious operation; ensuring approaching 100% occupancy of viable plants in each tray. The 'replenished' trays are returned to the propagation area where they remain until the young plants have developed a root, stem and leaf system sufficient for their final transplanting into 'end packs' and this is the point at which the plug trays are transferred to Newlands Nursery.

Newlands Nursery

The one factor which singles out Roundstone's enterprise is the high proportion of its capital investment devoted to mechanisation and automation. Fred Milbourn remarked on how important maintaining a close liaison between himself and the contractors (Brinkman UK – agents for Visser, the equipment manufacturers) had been, both at the planning and construction stages. This was particularly true at Newlands, where very large numbers of plants had to be transplanted and transported, achieving maximum space utilisation, of great importance at this site, while minimising the handling of batches within the production area.

The 12 ha Newlands site, approximately 15 miles from the Roundstone Nursery location, was required to implement the decision of increasing Roundstone's annual output target to 60 million plants. A 7 ha block of Venlo glasshousing, provided with a 2 ha service area, accommodating:

- compost preparation and storage site;
- plug transplanting equipment;
- loading bay;
- offices and
- 7 million litre water storage reservoir nearby.

This has been the culmination of a rigorous planning programme, to create a highly mechanised production system.

The stacked plug trays, transported by truck from Roundstone Nursery, are unloaded and transferred to lines incorporating robotic 'finger' transplanting systems, capable of working at a rate of 40,000 plugs per hour. Here the rooted plugs are removed from their original trays and transplanted into 'end packs' filled with compost. These are multi-celled expanded polystyrene plant packs which will be familiar to all those who buy bedding plants for garden centres. Compost preparation or 'mixing' and tray filling is carried out automatically on separate lines, feeding directly into the transplanter lines. The transplanted end packs are then automatically stacked in preparation for transfer to the new glasshouse: where they stand, until ready for dispatch some weeks later.

This 7 ha Venlo glasshouse provides a single area capable of holding up to 24 million plants at any one time! With an eaves height of 4.5 m, it can accommodate thermal or shade screens, overhead irrigation and production lighting. But, undoubtedly, its most interesting feature – particularly from an engineering viewpoint – is its unique plant handling and transportation system. Clearly an operation of this magnitude, with the prime objective of minimal labour input while providing maximum flexibility, can only be achieved by a fully mechanised system. It is essential this system is standardised on a modular basis, capable of handling the complete range of plant species produced at Roundstone. In the planning of Newlands, it was decided to depart from container benching, more generally accepted for bedding

A rotating-drum vacuum seeder; the pelleted seeds are held at each suction orifice as the drum rotates, releasing each row of seeds in the appropriate cells as the plug tray passes below

Healthy seedling plugs being inserted by a robotic 'finger' transplanter into the gaps left by the removal of defective plugs. Note: each cell in the plug tray has four vertical channels arranged around its internal wall (see first row) which allow the four transplanter fingers to penetrate to the bottom of the plug without disturbing the compost.

The 'robot', working in one of the bays, running at right angles to the central tramway

plant production and adopt an 'on the floor' system. Apart from lower cost, it provides the facility for the rapid transporting of batches of plants, within the 'standing out' area, using travelling gantries

The 'standing out' area, consisting of 52 bays, has an overall maximum capacity of 70,000 carrier trays exclusively handled by a system of three gantry transporters. The first – known as the 'robot' – operates

Carrier trays loaded beneath the robot and suspended by hooks, two per tray handle; in the lifted position, about to be placed on one of the shuttles; the spray lines and nozzles can be seen attached to the gantry frame

handling purpose-designed carrier trays – absolutely essential for this scale of operation. The carrier tray dimensions (1270 mm x 560 mm) are based on the universal module of the Danish trolley tray, used throughout the horticultural industry. This, easy to handle, carrier tray also maximises space utilisation at the final 'standing out' stage, while providing a carrying capacity of eight (4 x 2) standard Euro end packs.

within the bays, actually running on track laid along the edges of each bay and powered by its own internal combustion engine. It has a primary role of transporting batches of carrier trays, a maximum of 48 at a time, within the 'standing out' area. This semi-automatic transporter, works in conjunction with the other two electrically motorised 'slave' shuttle transporters. The robot is also equipped with a built-in spraying system for fulfilling its secondary role of liquid fertiliser and pesticide application.

The robot does have an operator controlling its various tasks but the shuttles work in an entirely automatic mode, being controlled by the robot. Running on a central gangway, at right angles to the bays, each shuttle transports newly filled batches of trays from the loading area, to a point opposite the bay, wherever the robot is located. The robot then removes its batch of trays (by running over the top of the shuttle) and transports them to their designated location; the reverse process takes place when transporting the packs onwards.

Driverless shuttles, travelling backwards and forwards, present a potential hazard to any obstacle; particularly working staff using the central gangway. Both shuttles have been equipped with proximity sensors which sense such an obstruction and halt the shuttle until it is removed. This was inadvertently put to the test during our visit where one of the shuttles fortunately sensed an obstruction of a human nature!

The importance of mechanisation to the Roundstone enterprise

From seed sowing through to delivering the end product to their retailing destinations, at this scale, is a daunting logistical operation. Roundstone has applied an industrialised approach to their entire production system, with a substantial investment in this programme of mechanisation, automation and information technology. Using this approach, it has been possible for them to achieve their ambitious annual output target of 60 million plants at a consistently high quality which the bedding plant trade currently demands. One of the most significant benefits accruing, has been the dramatic improvement in labour productivity which has increased 40-fold since originally setting up business in 1985!

Central shuttle tramway showing the two shuttles (right hand foreground fully loaded with 48 carrier trays; right hand background in left hand lane, parked in loading station)

Fred Milbourn gave us a first hand account of the planning which had gone into the project from its inception. We were particularly fortunate in that his managers from both sights accompanied, Ian Frame and Sean O'Sullivan, as our guides, taking us through a very interesting day.

SOCIETY FOR THE ENVIRONMENT

(Soc Env)

The Society for the Environment is an independent umbrella body for environmental professionals. At present, it is made up of nine professional bodies and learned societies involved in the environmental sector, representing approximately 30,000 environmental practitioners drawn from a wide range of professions.

Formally launched in October 2002, the Society aspires to be the leading and co-ordinating professional body in environmental matters and a pre-eminent champion of a sustainable environment. The internationally recognised professional qualification for environmental practitioners of *Chartered Environmentalist* will be conferred on suitably qualified members of the participating professional organisations.

Introduction

Since the early 1990's, representatives from a number of professional bodies with environmental interests have been meeting to discuss matters of common interest and to exchange views and information. The discussion group was known as the Forum for Environmental Professionals (FEP).

The transition of this discussion group into a new umbrella body for environmental professionals was initiated by two past presidents of the Chartered Institution of Water and Environmental Management, Professor Peter Matthews and the late Dr Geoff Mance, who proposed the need for such an umbrella body and for a new Chartered designation for environmental professionals. As a result, after a short initial period operating as an umbrella body known by the acronym CUBE, nine professional bodies with a shared aspiration to promote a sustainable environment have come together to form an umbrella body called the 'Society for the Environment'.

Other professional bodies including the Royal Meteorological Society have taken part in the preliminary discussions to form the umbrella body and are expected to remain connected with the activities of the Society in the future.

"the start of something big… [which] could make a significant contribution to regulating standards for the environmental profession".
Baroness Barbara Young, Chief Executive of the Environment Agency

The Constituent Bodies represent approximately 30,000 environmental practitioners drawn from a wide range of professions, each with a track record of pre-eminence in its particular field and of particular achievements. This is a substantial and diverse group of people who in their working lives confront a full range of environmental issues.

The Society has been formed to provide an internationally recognised professional qualification for environmental practitioners, the Chartered Environmentalist qualification. More generally, the Society aims to add to the skills of environmental practitioners, thereby enabling them to contribute more effectively to the promotion of a sustainable environment. In time, the Society will also provide an independent and unbiased forum for debate, creating the opportunity for environmental practitioners to speak with one voice on environmental issues.

The Society was launched at the 'Environment UK' conference at Stoneleigh Park, near Coventry, in October 2002. In announcing the initiative Baroness Barbara Young, Chief Executive of the Environment Agency, described it as, "the start of something big… [which] could make a significant contribution to regulating standards for the environmental profession".

The Society was formally incorporated under the Companies Act 1985 as a company limited by guarantee on 13 February 2003 with Registered Company Number 4665882. The Society is now in the process of seeking recognition of its particular role in promoting good environmental practice by petitioning for the grant of a Royal Charter of Incorporation.

The Society's role

The Society aspires to be the leading and co-ordinating professional body in

The nine founder bodies are called 'Constituent Bodies'

Chartered Institution of Wastes Management	(CIWM)	www.ciwm.co.uk
Chartered Institution of Water and Environmental Management	(CIWEM)	www.ciwem.org.uk
Institution of Agricultural Engineers	(IAgrE)	www.iagre.org
Institute of Ecology and Environmental Management	(IEEM)	www.ieem.co.uk
Institute of Environmental Management and Assessment	(IEMA)	www.iema.net
Institution of Environmental Sciences	(IES)	www.ies-uk.org.uk
Institute of Fisheries Management	(IFM)	www.ifm.org.uk
Institution of Professional Soil Scientists	(IPSS)	www.soilscientist.org
Institution of Water Officers	(IWO)	www.iwo.org.uk

environmental matters and a pre-eminent champion of a sustainable environment. The Society will achieve this by nurturing and harnessing the combined resources, knowledge, expertise and achievements of the professional and learned bodies which are its members.

The Society will foster a culture of inclusivity: the identity of our Constituent Bodies will be maintained and their primacy as the centres of excellence within their fields recognised and enhanced. In addition, the Society will ensure that each individual member of each Constituent Body feels engaged with the Society, whether or not he or she aspires to be a Chartered Environmentalist.

The Society aspires to be the leading and co-ordinating professional body in environmental matters and a pre-eminent champion of a sustainable environment

So what is a sustainable environment? Most of us know instinctively what we mean by sustainability, or rather a society which lives by sustainable means, but it is proving difficult to be precise in how this ideal state should be achieved.

Sustainable Development is the means by which we will achieve this goal, but the pace and style of that development is very much a function of the will and commitment of society and, in particular, organisations and individuals within society. It is about striving for a way of life which has low impact but not low output.

Sustainable development has three interlocking components – the environmental, social and economic. The Society is concerned primarily with the environmental component, which includes the effective protection of the environment and the prudent and efficient use of natural resources.

The Society aims to promote a sustainable environment by building sustainability learning into the professional development programmes of its Constituent Bodies. This will add value to the skills of the individual members of the Constituent Bodies, so that they will be able to contribute more effectively to the development and maintenance of sustainable communities.

Specifically, the Society will license Constituent Bodies to accredit their individual members with the new qualification of Chartered Environmentalist. This qualification will be awarded by a process comparable to that which exists in other organisations awarding chartered status to individuals.

Further, in time, the Society will also provide an independent and unbiased forum for debate, creating the opportunity for environmental practitioners to speak with one voice on environmental issues. Because of the inclusive nature of the Society, where there is no consensus, the Society will publish a range of views.

Sustainable Development is about striving for a way of life which has low impact but not low output.

The Society will add value to the work of the Constituent Bodies by creating the opportunity for them to work together as a team, thus demonstrating one of the most important values of sustainable development – co-operation. The Society believes that individual members of Constituent Bodies will be empowered by this arrangement and by the Chartered Environmentalist qualification.

The Society's Members

Constituent Bodies

The membership of the Society currently comprises the nine Constituent Bodies. Over time, the Society intends to admit more Constituent Bodies. Indeed, several substantial professional bodies have indicated an interest in becoming Constituent Bodies in the immediate future.

In line with the Society's culture of inclusivity, over time the Society intends to admit more member bodies. The work and identity of all the Society's member bodies will be maintained.

The Society intends all Constituent Bodies to seek to become licensed to accredit their individual members with the new qualification of Chartered Environmentalist.

Associate Bodies

The Society also intends to admit to membership other organisations sympathetic to the aims of the Society but who do not meet the criteria for membership as a Constituent Body (these organisations will be known as 'Associate Bodies'). The Royal Meteorological Society has already committed to apply to become an Associate Body if a Royal Charter is granted.

Unlike Constituent Bodies, Associate Bodies will not be eligible to be licensed to accredit their individual members with the Chartered Environmentalist qualification.

The Chartered Environmentalist qualification

Only full voting members of licensed Constituent Bodies will be eligible to be awarded the Chartered Environmentalist qualification. The Chartered Environmentalist qualification will not be conferred automatically or easily and candidates will be required to do something in addition to their Constituent Body membership.

The Society has been formed to provide an internationally recognised professional qualification for environmental practitioners – Chartered Environmentalist

The qualification will be awarded by a process comparable to that which exists in other organisations awarding chartered status to individuals. The criteria are to be based on knowledge of, competencies in and engagement with good environmental practice, ncluding the promotion of a sustainable environment. Also, candidates will be required to agree to comply with a code of practice.

A two-stage approach to qualification has been adopted. *First,* a candidate will have to pre-qualify with appropriate learning in the work of the Constituent Body to which that individual belongs; that learning will be a mixture of knowledge (possibly including academic study) and competence (experience in a chosen environmental discipline). *Second,* the candidate must demonstrate through a Professional Review Interview that he is actively engaged in good environmental practice, including the promotion of a sustainable environment.

Pre-qualification requirements

- The candidate must be a full voting member of a Constituent Body at a grade approved by the Constituent

Body and the Society.
- The candidate must have achieved at least twelve units of learning. For these purposes one year of successful study counts as two units and one year of work experience in the relevant subjects counts as one unit.
- The candidate must have at least four years of relevant work experience.
- The period of relevant experience must include the acquisition of specialist knowledge and the development of skills and competencies needed to practise in a specific area of interest of a Constituent Body; there must be a clear record of progress, certified by a supervisor or mentor.
- Candidates with no accepted academic qualifications will have to demonstrate that they have been employed in work relevant to the senior grades of the Constituent Bodies for at least twelve years.

Board members of Soc Env

Mark Gibson	Professional Services Manager	CIWM
Peter Matthews	Past President	CIWEM
Nick Reeves	Executive Director	CIWEM
Christopher Whetnall	Chief Executive	IAgrE
Peter Redman	President Elect	IAgrE
Alex Tait	Past Vice President	IEEM
Jim Thompson	Executive Director	IEEM
John Brady	Past Chairman	IEMA
Russell Foster	Chief Executive	IEMA
Steve Martin	Vice Chairman	IES
Will Pope	Past Chairman	IES
John Gregory	Vice President	IFM
Robin Welcomme	Secretary	IFM
Lynn Cooper	General Secretary	IWO
Tim Boldero	Vice President Engineering	IWO

Requirements for the professional review

The candidate must:
- produce a written report that demonstrates competence, knowledge and engagement in good environmental practice, including the promotion of a sustainable environment in accordance with the learning syllabus;
- attend an in-depth Professional Review Interview conducted by at least two qualified Chartered Environmentalists;
- be engaged in professional development that must have started at least four years before the professional review and a verified record must be provided (if the Constituent Body does not have a professional development process in place, the candidate may submit a retrospective record, but the Society prefers its Constituent Bodies to have a professional development process);
- give a commitment to continuing professional development and review; and
- sign an agreement to comply with a code of practice.

The professional review requirements have been framed widely. This should ensure that many other membership-based institutions are able to relate them to their own particular discipline or field of expertise. The challenges of good environmental practice require the combined talents of many different types of practitioners and it is the intention of the Society to offer recognition and guidance on continuing professional development to the widest possible range of people.

Management organisation

Board

The Board has a policy and scrutiny role. It is intended that the Board will meet at least three times a year. Each Constituent Body is entitled to nominate two individuals to act as Board members. Board meetings are chaired by the elected Chair of the Society.

Management Committee

A Management Committee will be responsible for making proposals to the Board concerning the day-to-day management of the Society, including finance and resources, environmental policy, public relations and communications. It is intended that the Management Committee will meet at least once a quarter. It is proposed that the Management Committee be made up entirely of members of the Constituent Bodies.

Chief Executive & Secretariat

It is proposed that the Society will recruit a Chief Executive to lead the organisation, initially on a part-time basis. In time, it is envisaged that such Chief Executive will recruit a small team.

Registration Authority

On the grant of a Royal Charter, a Registration Authority will be created. The Authority will be responsible for issues relating to the grant of the Chartered Environmentalist qualification. It is intended that the Registration Authority will meet at least once a quarter. It is proposed that the Registration Authority be predominantly made up of members of the Constituent Bodies.

General Meetings

The Society will hold an annual general meeting once a year to approve its annual report and accounts and to transact any other relevant business. Extraordinary general meetings will be held as and when required.

Each Constituent Body is entitled to nominate two individuals to act as its representatives at general meetings. However, a Constituent Body may only vote by one of its representatives in general meetings. In contrast, although each Associate Body is also entitled to nominate two individuals to act as its representatives at general meetings, such representatives will not be entitled to vote at such meetings.

General meetings will be chaired by the elected Chair of the Society.

Finance

The Society has been funded initially by contributions from each of the Constituent Bodies. During the calendar year 2003, the Society will also be funded by the Joining Fees payable by new entrant Constituent Bodies.

The Society's educational role

With the increasing importance of high standards of environmental practice demanded by the public, emphasised in such world wide conferences as the Rio Earth Summit and Johannesburg 2002, the education of all those working in the environmental sector will continue to grow in importance. The Society aims to add to the skills of environmental practitioners, thereby enabling them to contribute more effectively to the promotion of a sustainable environment. As a result, the Society believes there is a link between providing education and training for environmental practitioners and creating a benefit for the public at large.

Training

All the Constituent Bodies play an important role in the education and vocational training of their individual members. Some have their own qualification courses, and many encourage, support, and accredit courses at first degree and higher degree levels at Universities and other Colleges of Higher Education.

The Society will encourage the development of academic courses of the highest quality covering a range of environmentally based subjects. Completing certain of these courses will enable candidates to satisfy the academic requirements for the award of the Chartered Environmentalist qualification.

Continuing Professional Development

All environmental practitioners need to keep themselves up to date in their knowledge and understanding both of their own specific area of expertise and of wider environmental matters. All Chartered Environmentalists are required to complete a programme of continuing professional development through their Constituent Bodies. Such programmes require Chartered Environmentalists to satisfy a minimum requirement for continuing professional development activity.

The Society will assist the Constituent Bodies to provide the necessary content for such programmes. Should a Chartered Environmentalist fail to complete such a programme, he or she may be subject to a disciplinary procedure which may ultimately lead to the Chartered Environmentalist qualification being withdrawn.

Dealings with Government and other organisations

The Society will create the opportunity for environmental practitioners to speak with one voice on environmental issues. It will act as the principal focal point for Constituent Bodies when dealing with external organisations where a collective response is required. This would not, however, prevent Constituent Bodies expressing their own views.

The Management Committee will be responsible for the Society's external affairs. The Committee will ensure that the process of handling external affairs is not haphazard but structured.

The environment and how it is managed is a recurring issue for politicians in the United Kingdom, in the European Community, and in other parts of the world.

The Society is committed to providing factual information including relevant advice and assistance to all politicians and political parties with regard to the promotion and advancement of good environmental practice, to safeguard the environment and maintain and enhance public confidence. Such advice and information will include acting as a consultee on draft documentation emanating from government and other statutory bodies. In an early initiative, in October 2002, a response was submitted on behalf of the Society to DEFRA concerning the disposal of sewage sludge.

International links

In time, the Society aims to foster links with environmental bodies based overseas, building upon the strong links that the Constituent Bodies have with such organisations.

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Registered Company No. 4665882

ORGANIC BENEFITS

UK organic fertiliser manufacturer leads the way to environmentally friendly crops in India

Kent-based organic fertiliser manufacturer, Ecosolve Ltd, has opened a subsidiary office in India, Eco-Indorganics (EIO), following advice from Trade Partners UK – the government organisation that provides support services for UK companies trading overseas. The company is also in the process of launching an innovative new product after committing £50,000 to the venture.

The connection with India was developed after participating in a Trade Partners UK supported trade mission. Outward Trade Missions provide an extensive framework of both practical and financial help for UK businesses travelling abroad as part of a group to markets outside Western Europe, to promote UK goods and services.

During the mission, Ecosolve's managing director, Roger King was given the chance to present his ideas at a seminar held in Delhi in front of potential business partners. The Tata Energy Research Institute (TERI) expressed an interest in linking up with Ecosolve and they are now developing together a range of 'designer' organic fertilisers for specific crops. The first of these is one of the tea gardens in Assam.

Mr King said, "The replacing of chemical fertilisers with organics helps to achieve Ecosolve's overall aims of reducing the effect of global warming and of alleviating rural poverty. Avoiding the burning of two tonnes of fossil fuels to produce one tonne of chemical nitrogen fertiliser prevents millions of tonnes of CO_2 being emitted to the atmosphere, and the re-fertilisation of the soil, depleted by decades of use of chemical fertilisers will lead to increased crop yields, improved crop quality and, therefore a substantial raising of farmer's incomes."

Negotiations are at an advanced stage for a significant, million dollar plus, British investment in the Punjab State Organic Farming project. EIO will be able to introduce into India the innovative processes and components developed by Ecosolve in their R&D work in Indonesia over the last ten years. At the same time EIO will assist in the marketing of the final produce by acting as a bridge between the Indian producer and the European food importer.

Bimonthly AUTUMN 2003

MEMBERSHIP MATTERS

THE NEWSLETTER OF THE INSTITUTION OF AGRICULTURAL ENGINEERS

A FIRST FOR IAGRE

IAgrE Fellow achieves Chartered Engineer registration via the 'Special Route to Registration for Senior Engineers'

Recognising the need to accommodate those senior members of the engineering profession who did not have the required academic background currently required for registration as a Chartered Engineer, the Engineering Council introduced the 'Senior Route' to registration.

Intended for those whose responsibilities would make it impractical and inappropriate for registration via the Engineering Council exam or via the Mature Candidate Route, this route requires candidates to demonstrate their fitness for registration by virtue of the competence which enables them to perform their current roles.

The IAgrE Membership Committee is pleased to announce that Richard Hughes (FIAgrE), Managing Director of Hugh Pearl (Land Drainage) Ltd is the first IAgrE member to take this route to CEng registration.

Richard, a member of IAgrE since 1972, has spent most if not all of his working life with Hugh Pearl (Land Drainage) Ltd becoming Managing Director in 1981. He has been heavily involved in agricultural contracting trade organisations and in 1984, together with three other drainage contractors, was instrumental in the establishment of the Land Drainage Contractors Association.

As is so often the case, Richard was in a position of responsibility – managing an organisation whilst at the same time being actively involved in major engineering project design and implementation – and so did not have the time to develop an application via the Mature Candidate Routes (MCR) or study for, and sit, the Engineering Council examinations.

Richard is to be congratulated on his achievement.

By definition, this route is a transitory route. Existing (younger) practising engineers who do not have the educational base necessary for registration have the opportunity to develop their portfolios for the MCR or to study for the EngC examination. Thus, this route was only made available for a period of five years. All registrations made by this route will need to have been completed by September 30th 2005.

Typically, candidates will

- have held a senior engineering position for a minimum of seven years necessitating an involvement with significant financial and engineerinpersonnel resources
- be able to demonstrate their competence to practise at a level which clearly meets or exceeds the requirements for Institution Fellowship have a minimum of 20 years of employment in an engineering environment
- be over 45 years of age.

If any one wishes to have further information on this route, please contact the Membership Secretary: email: **membership@iagre.org.**

MEMBERSHIP CHANGES

Admissions

Associate

B O Adigun (Nigeria)
W A Bird (Wiltshire)
R G Ryan (Warwickshire)
S Salawu (Nigeria)
G West (Cambridgeshire)
Y K Yiu (Hong Kong)

Student

King's College, London:
G J Caplen

Royal Agricultural College:
J S MacGregor

Walford & North Shropshire College:
C H Allen
R K Dearnaley
J Hood
G W Norbury
S D Price
T R Radmore

Transfers

Member

R Cole (Norfolk)
W J Copeland (Co Armagh)
N J Penlington (Nottinghamshire)

Engineering Council Registrations

CEng

P W Amos (Edinburgh)
A D Gregory (Bristol)
D W M Pullen (Bedford)

IEng

B G F Mathew (London)

LETTER TO THE EDITOR

Dear Sir,

Getting all sides of Industry working together

I am writing in response to your article in the Early Summer issue of *Landwards* regarding the high age of the average engineer in our industry today. I believe that the only answer to this decline in interest of our subject, is to create a positive response and quickly. Today's engineers much maximise their skills, gain a few new ones and go out and attract new blood quickly.

It is universally agreed, I am sure, that there is a shortage of skilled personnel in the engineering sector of industry. As reported in the article: 'The average age of a mechanic in our industry is 53 years old'. As the 'old school' retire, fewer youngsters are ready to pick up the baton.

The reasons are complex but I will highlight what I feel they are in the main. Firstly, it is not cost effective to take on apprentices and undergraduates and, with a lack of publicly owned industry, few places are available for the would-be fitter, or mechanic. Secondly, mechanical engineering is unfashionable, it is seen as an out-of-date industry to be in. I must agree that on the face of it, this appears to be true. The media rarely publicise a great engineering feat these days and with the decline in the once great British engineering industry still very apparent, (even in the displays of the National Science Museum), it hardly seems to be the direction to go in. Today's 'disposable society' also appears to the uninitiated to be against basic engineering principles. Thirdly the potential earnings of the skilled fitter, or mechanic, lack the differential with other manual workers that they once enjoyed. This is largely due, I feel, to the engineering unions of the nineteen sixties. In their rush to recruit more members and so gain more power, they relaxed the entry requirements. Initially, semi-skilled workers were allowed to join; then shortly afterwards, almost anyone could enjoy the benefits of being with a major engineering union. Of course, when votes were needed on important engineering issues, the engineers were out-voted by their non-skilled brethren. As issues concerning wage increases and structures of pay were voted on, slowly but surely the differential between unskilled and skilled worker were eroded. Graduates, of course, recognised the trends affecting the engineering industry and fought shy of becoming part of a declining industry; they saw little opportunity in traditional engineering and looked carefully at other ways to develop their careers. Those who did choose to major in engineering, found few opportunities and many migrated to other disciplines, such as production management or research roles.

The companies that are saving money by not taking on apprentices and undergraduates, are facing a hugely expensive future, sadly, so are the few that are taking apprentices and undergraduates, because there are increasingly, less and less skilled personnel to go round. Those that have recognised that this problem is occurring, are saying: "Things will inevitably change in time because, the few skilled personnel left will be able to command a high wage, which will attract others into the industry. Things will turn full circle." Personally I am not at all sure that this will be the case.

As an engineer in modern industry, I have many roles to play. I am sure this is true of many of today's engineers. In my role as a trainers' trainer, I have been looking for ways to prevent the 'skill shortage effect' from hitting my employer. Over the past few years, I have been instrumental in developing an 'Asset Care Program'. I am sure that this is one of the few ways forward and perhaps the easiest direction to go in from the point we are at now, which I feel is 'beyond the point of balance', in respect of the skills programmes of the past. A return to the traditional apprentice programme is simply not viable; they just never were cost effective and I am not too sure that they were that good anyway! What we must aim for, is to employ the 'cream of the crop' of today's youngsters, in an enhanced version of the traditional apprentice programme. This must be made a 'lucrative position' and paid accordingly, none of the £2.10 shillings a week that I was paid throughout my own apprenticeship. When these highly skilled apprentices finish their term, their skills must be 'maximised' by being given an 'experience term'. At the conclusion of this term, they should be trained further in the art of training others to a high standard. The people that they will be training will not be other apprentices but a different type of machine operator.

This machine operator has been singled out, or indeed employed, because they have shown a reasonable understanding of engineering practices. I am sure we all agree that many 'unskilled persons' have a degree of engineering ability, perhaps they service their own vehicle, some may

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even carry out complex repairs on them, they may show aptitude in other ways, perhaps by an engineering assessment test. This assessment could be made by the engineer, or at least confirmed by him, one of the extra burdens on a modern engineer using a system such as this. Once chosen, training should be on an ongoing basis and they should be continually assessed until they reach their full potential. This, of course, will vary from person to person, but it should not be impeded in any way, as this can have a detrimental affect.

The engineers task, therefore, is becoming an abstract one. Careful assessment, planning and training is crucial to building a first class engineering workforce. The engineer's role has to change in the modern scheme of things, his burden of responsibility is increasing a hundred fold by today's constraints and expectations. Assessment of machinery suitable for this asset care must be carried out, a breakdown of tasks suitable for an unskilled, or semi-skilled person to carry out must be grouped into training modules. Graduates that would be engineers must therefore be extremely competent in recognising potential and their analytical skills must also be on a human level, as well as on a traditional engineering level.

Manuals must be carefully written for every task, both for training purposes and for reference. If care is taken on the way these are written and presented, a great deal of time on training and re-training can be saved. I have also found that a carefully written check-sheet can not only be a great diagnostic aid but also increase the usefulness of an operator and give an indication of the depth of understanding that they have of their machine. The engineer, therefore, has got to be a writer and/or editor, to ensure that a high standard of printed matter, or software based material is produced and maintained.

A by-product of this asset care programme has been increased productivity due to the operator having a sense of ownership of the machine they are using. Recognised incidents of sabotage in order to gain extra breaktime seems to have vanished (a recent DTI report put this at 10%+ in a recent press release). I also introduced a wish-list covering operations, design changes and operator developments, for the operators and trainers to complete. This has been a useful tool in deciding modifications and technique changes and has resulted in increased productivity.

Yours sincerely
Geoff West
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News of Members

Olayinka Ayeni has recently taken up an appointment as the Agricultural Engineer at Zartech Agricultural Farm at Ibadan.

David Spencer has retired from Spencer E.C.C. Ltd and Margaret will be retiring shortly. They have sold the farm in west Wales and have moved back to Abergavenny. Their new address is Croesonnen Cottages, Hereford Road, Mardy, Abergavenny NP7 6HT. Tel: 01873 850596 Mobile: 07831 221820. The training company is TREE of KNOWLEDGE and is based at the above address and the telephone number is 01873 852499.

Paul Brooks resigned as the General Manager of the Massey Ferguson distributor for East Africa last year and has moved back to the UK to develop his business interests here. Paul has been offered the opportunity of becoming a Harley-Davidson motorcycle dealer.

Peter Hickman has left Wm Bain & Co in Zimbabwe and has become the General Manager of the Massey Ferguson distributor for East Africa in place of Paul Brooks. He will be responsible for the franchise business in Kenya, Tanzania and Uganda.

Adeniyi Talabi has recently retired from the Civil Service of the Federal Government of Nigeria where his last position was Director of the National Food Security Department in the Federal Ministry of Agriculture. However, he says that he intends to take up any fresh professional challenges that may come his way.

Tony Chestney

Write to Tony with your news! His address is: 32 Beverley Crescent, Bedford MK40 4BY

AGREEMENT ON NEW STANDARDS FOR REGISTRATION

The Engineering Council (UK) has published the Specification for the standards which will replace SARTOR 97 as the basis for recognising Professional Engineers and Engineering Technicians in the UK.

Launching the Specification, EC (UK) Chairman, Sir Colin Terry, paid tribute to the painstaking work of the drafting group led by University of Northumbria Vice-Chancellor, Kel Fidler. Sir Colin said, "We have high hopes that this new standard will help to ensure the UK continues to be recognised as one of the leading engineering nations of the 21st century".

Main Changes

Months of extensive debate have produced consensus on a number of significant issues. The specification emphasises that engineers (and technicians) must demonstrate competence before registration. It also notes a number of significant changes including:

removal of artificial entry requirements to accredited courses;

agreement to use output standards as a basis for accreditation;

increased flexibility in educational requirements for CEng; and rationalisation of procedures for candidates without standard qualifications.

There is also wide agreement that future requirements should be presented in a more accessible form than at present.

EC (UK) will also encourage employers and Institutions to address process, with a view to speeding up and making more transparent the means to achieve registration, particularly by spreading good practice in accrediting graduate training and development schemes.

Revalidation

The Specification also addresses the question of revalidation of registration. It proposes that systems for revalidation should be established for those who need or wish to demonstrate they have maintained their competences. Andrew Ramsay, Executive Director of EC(UK), said "Since effective revalidation can be costly, this service will involve additional expense to the Registrants who take it up, but we might reasonably expect this to be defrayed by the employer."

Programme for Implementation

The profession's agreement on the Specification launched a summer of intense activity, to turn the Specification into working documents for employers, institutions and universities. Five Task Groups were established in particular to ensure that the output measures adopted have wide support, including from employers and engineering academics. As a result, four documents were envisaged, aiming for completion this autumn: UK-SPEC requirements for Professional Engineer for student and employer audiences;

- UK-SPEC requirements for Engineering Technician for student and employer audiences;
- requirements for PEI's to hold licenses to admit registrants; and
- accreditation requirements for education institutions and employers.

What didn't change

The successful and widely-supported 4-year integrated MEng will continue to provide a fast track route for high ability candidates for CEng. There remain just three categories of registration: Chartered Engineer, Incorporated Engineer and Engineering Technician. A report reviewing the scope for a Register of "Professional Technologists" is still in preparation by ETB – the EC(UK) Board have undertaken to consider this when received. Development of the review has influenced the Working Group, but there was widespread and vociferous support – from industry, universities, and registrants – for retention of the IEng title.

While the focus, title and management of Engineering Technician registration has not changed, EC(UK) intend to ensure it embraces a growing demand from industry by fully recognising new opportunities offered by Modern Apprenticeships and other vocational routes into jobs with significant engineering responsibilities. A separate publication aimed squarely at potential Engineering Technicians and their employers will demonstrate the significance placed on this category of registrant.

LONG SERVICE CERTIFICATES

Name	*Grade*	*Date of Anniversary*
50 years		
David John Balmforth **Calverley**	CEng FIAgrE	13 Oct 2003
Ian **Constantinesco**	CEng FIAgrE	13 Oct 2003
35 years		
James Robert **Poolman**	EngTech MIAgrE	19 Sep 2003
Sidney Walter Reginald **Cox**	CEng HonFIAgrE	10 Oct 2003
Ian Matthew **Urwin**	MIAgrE	10 Oct 2003
Anthony Victor **Bashford**	EngTech MIAgrE	10 Oct 2003
James Allan **Gibson**	FIAgrE	10 Oct 2003
Christopher John **Baker**	CEng FIAgrE	10 Oct 2003
Alistair **Lee**	IEng MIAgrE	10 Oct 2003
John Alexander Douglas **MacCormack**	IEng MIAgrE	10 Oct 2003
Ian Charles **Smeaton**	IEng MIAgrE	10 Oct 2003
Michael Patrick **Bernard**	Eur Ing CEng FIAgrE	10 Oct 2003
Christopher Rupert **Garner**	CEng FIAgrE	10 Oct 2003
25 years		
Andrew Charles **Knight**	CEng MIAgrE	29 Aug 2003

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John Moffitt, CBE

HALF A CENTURY OF FARMING

Born in 1929, I find as I get older that I spend more time reminiscing about the past rather than speculating on the future. There is one very good reason – I have a mind full of memories belonging to the most prosperous periods of British Agriculture.

The post war years of the 1950's saw a groundswell of change and expansion driven by a government that saw the need for Agriculture to play a vital part in the economy of the country after the Second World War.

Leaving school in 1946 to return home to milk cows was the natural path for a farmer's son, particularly as National Service was compulsory except for the essential services which included agriculture. I soon started to play my part in the changing aspects of farming.

George Potts, the teenage son of our shepherd, this year received the RASE Long Service Award for over 50 years of service with the same employer. George played his part in the changes that took place from haymaking to silage and the binder to combine. In 1950, a New Holland pick-up baler was bought and within a decade, farming practices on our farm had completely changed. We also invested in an ICI tray-type grass dryer to provide even better quality forage for our expanding herd of Pedigree Friesians but it was a lengthy and tiring job at only 2-3 cwts an hour (0.1-0.15 t/h).

A herd of 70 cows averaging 1,150 gallons (5,000 litres) was considered exceptional and we topped the herd averages for the Four Northern Counties – a far cry from the 10, 000 litre rolling average my son achieves with his 330 cows today.

In 1950 there were 196,000 milk producers in the UK with an average herd size of 14 cows. This number has now shrunk to less than 20,000 and still declining with an average herd size of almost 80. At the end of the war, milk rationing remained in place until 1952 and the demand was for more and more of everything that British farmers could produce.

The National Herd still contained over 30% Shorthorn but cross breeding to Friesians and the rapid expansion of artificial insemination (AI) saw a dramatic increase in yield and a high milk price – in real terms almost three times of that paid today. The milk price was controlled by Government with a review taking place on an annual basis involving a battle between the National Farmers Union, Politicians and The Milk Marketing Board, placing producers very much in the driving seat.

Turnips and mangoles provided a sizeable part of the dairy cow's diet but quickly declined as the techniques of silage making improved. Cereals began to play an increasing part in our operation as our farming continued to expand to over 1,000 acres (400 ha). Prices were exceptional

'In 1950 there were 196,000 milk producers in the UK with an average herd size of 14 cows. This number has now shrunk to less than 20,000 and still declining'

compared to today's market and I well remember the first year we exceeded an average of 2 tons an acre (5 t/ha) of wheat in 1960 and our first yield in excess of 3 tons an acre (7.5 t/ha) in 1959, a variety aptly named N59.

After being at home for 15 years, life started to change for me in the 1960's as I began to take an increasing interest in research becoming involved with the Agricultural Research Council (ARC) which continued for a period of 25 years. I was initially involved with the Dairy sector then with the broader issues of Agriculture under the new organisation, the BBSRC, playing a part in the research programmes at Babraham, Roslin, Compton and Silsoe. I was Chairman of the Governing Body for the Research Institute at Silsoe for 7 years and faced the difficult and challenging times of funding difficulties as well as continuing to develop a number of diverse businesses at home.

Premier Breeders

As AI replaced the need for breeding bulls in the dairy herd and this lucrative market went into decline, I joined with two other breeders, Claybury and Montgomery, to develop a competitive service to the MMB who had, by Government decree, established a monopoly. Premier Breeders, our company, secured 15% of the AI market and pioneered the first National Embryo Transfer Service with seven satellite operational centres. We continued to develop the techniques of non-surgical transfer and the freezing of embryos way ahead of the rest of the world, thanks to the help from research centres such as Babraham and Roslin. As Company Chairman, the business was operated from my home farm at Peepy until we purchased a farm for the company in the 1970's, eventually selling out the total business in 1990 to Genus, the successor body to the MMB.

Hunday Electronics

Another field that had always interested me was to improve the efficiency of dairy cow movement in the increasingly larger herds that were developing. Hunday Electronics was established in the early 1970's as one of the first in the field with automatic identification, winning silver awards for 'Out of Parlour Feeding', 'In-Parlour Feeding' and 'Automatic Milk Recording' over a period of a decade before developing automatic sow feeding systems. In 1991, the business was sold to Osborne Industries in the USA.

Vintage machinery

Why I should begin to take an interest in old agricultural equipment in 1964 is a bit of a mystery but as with most things in life it is about opportunity.

One day on my journey between farms, I noticed a 1940's Oliver '70' tractor by the roadside. To cut a long story short and after some haggling, I purchased it for £8.0.0 and took it home to West Newham Farm where I was now living with my wife and family and restored this beautiful six-cylinder petrol engine machine.

Another farm that was purchased in 1965 was Westside with an old set of traditional buildings which provided an ideal resting place for further vintage purchases. At one stage over 200 tractors and engines brought the accommodation to bursting point.

Diversification became a growing interest and in 1979, with considerable help from the National Tourist Board with the development, we were privileged to have the Queen Mother open the 'National Tractor and Farm Museum'. I took advantage of the Government's 'job creation service' and built workshops to provide facilities for the essential restoration work.

In 1971 the Museum won the coveted 'New Museum of the Year Award' for the UK and was reserve to the 'Museum of Europe' the following year. Dividing my time between farming and the different businesses I had developed was difficult but it taught me one important lesson and that was that good loyal people were essential to success. If any of my staff showed ability, flare and hard work, they were given the responsibility to run that business as their own. I was extremely lucky to attract excellent people into these positions and by now farming over 2,000 acres (800 ha), delegation became a key element in running a successful operation.

Milk processing venture

Unhappy with the monopoly powers of the Milk Marketing Board (MMB), I decided to enter a new field of marketing our own milk. Grants were still available and with two farming partners we bought second hand pasteurising and packaging equipment in order to retail 'fresh from the farm' cartoned milk to outlets in the North East from our Bays Leap Farm on the outskirts of Newcastle. This venture was perhaps the shortest and least profitable venture I had yet undertaken. The competition for the liquid market was fierce and within five years, we sold out to one of the competitors realising that diversification is not always as profitable as forecast.

Retirement

So now at the age of 74 and having successfully transferred the farming business to my son some 12 years ago, I can reflect on an interesting lifetime in farming and I am pleased that I have not had to adapt to the pressures of today where one person now milks 330 cows and, despite more than doubling the yields of both milk and cereals, prices have dropped to half of what they were during my farming years.

Today I am just as busy as ever – we have a large garden which I enjoy and continue with my interest in anything old. This year in particular I celebrated both the 100th birthday of my favourite tractor, the Ivel, raising £100,000 for charity as well as celebrating 50 years of marriage.

I have kept a full page diary for over 55 years and am currently trying to chronicle them into a shortened version. As we get older, our memories are prone to exaggeration but the written word never changes. I have published two books since retirement and am currently writing the history of our Hunday Herd and the evaluation of today's modern dairy cow.

I feel extremely fortunate to have had such an interesting life in farming and, although I am occasionally pessimistic of the future, I am sure that Agriculture will continue to play an important part of the economy of our great country.

'I feel extremely fortunate to have had such an interesting life in farming and, although I am occasionally pessimistic of the future, I am sure that Agriculture will continue to play an important part of the economy of our great country.'

RISK AND ENGINEERING

Engineers are accustomed to dealing with uncertainties in the properties and behaviour of materials. Each discipline has developed over time, methods and procedures to continuously enhance the safe and reliable operation of products and processes. The successes of these procedures is evident all around us, whether in respect of small electronic devices, intercontinental flight in twin-engine civil airliners, domestic appliances or countless other examples. The risk management methodologies employed to achieve this level of performance are often very sophisticated and involve logic, judgement and complex numerical procedures.

When the need for an engineering product is obvious and universally agreed, then the technical risks are the crucial ones and the engineer can handle them in relative isolation. This was probably the case in earlier days in respect of the provision of basic infrastructure such as drinking water supply or electricity. However, today, with technology available to meet most basic needs, engineering products have to be justified in terms of added value to an enterprise and its customers and have to be acceptable to the community at large in terms of safety, environmental, public health and political impact. Risk is not readily tolerated and mistakes lead to recriminations. Error implies blame with both politicians and lawyers, seemingly, obliged to find a guilty party. The development of this 'blame culture' has a damaging effect on the morale of those organisations in the firing line, inhibiting learning, innovation and risk taking.

Despite the dramatic improvements in the performance of engineering products, recent history is littered with a series of apparent failures. We read of cost and time overruns in projects such as the Jubilee Line, the West Coast Railway upgrading, and the new air traffic control centre at Swanwick. The media fills from time to time with stories about the danger of rail travel, the risk to health of cell phones or electric power lines, the environmental dangers of genetically modified (GM) plants and nuclear power is presented as an unacceptable evil. While in some of these situations there are undoubtedly elements of technology inadequacy or failure, the main difficulties and problems lie at the interfaces of technology with commercial, political and social constituencies.

The uncertainties inherent in these external constituencies are quite different in kind from the uncertainties that engineers traditionally deal with in addressing technology issues. They are much more qualitative than quantitative and they embrace a whole raft of cultural and emotional factors that often contradict apparently obvious logic. Engineers find this a difficult domain to deal with. If they respond simply using their training in quantitative and logical thinking they alienate other stakeholders in projects. This 'cultural divide' must be bridged to avoid project failure and mutual recriminations. It is vital to find ways to reconcile the difference between 'objective risk' based on scientific measurement and basic engineering principles and 'subjective risk' perceived by the non-technical public at large. This can only be achieved if the validity and limitations of each approach is well understood.

Three reports

The Royal Academy of Engineering has produced a series of three reports covering different aspects of engineering risk management in order to show how this cultur-

Table 1 Definitions of commonly used terms in risk management

Risk management term	*Definition*
An uncertainty	Something unknown or unable to be precisely quantified but potentially relevant to the project under consideration
A risk	The potential but uncertain impact of a phenomenon
Risk management	The systematic and continuous process of identifying and assessing internal or external threats and opportunities for a project or enterprise, and deciding optimum responses to them
ALARP	As low as reasonably practicable
Likelihood	The probability of something happening
Impact	An event that will affect a project or enterprise's future in terms of value or reputation
Avoid risk	Make a fundamental change so the risk no longer applies to the project
Reduce risk	Reduce the likelihood that the uncertainty will occur or impact on the project
Mitigate risk	Reduce the adverse impacts of the risk, if it should happen
Transfer risk	Transfer the effects of the risk to another organisation/ person/ project
Accept risk	Accept that the risk may be realised and therefore accept the consequences
Risk owner	The person responsible for the project or enterprise subject to the risk, whether external or internal, and its resolution
Risk manager	The person accountable to the risk owner for resolving the risk through an agreed Risk Management Process
Risk appetite	The degree of risk that an organisation is willing to take in pursuit of its mission
Risk reward	The benefits for an enterprise's stakeholders as a consequence of successfully managing risk
Risk premium	The increase in reward that should accrue from successfully managing a high risk venture compared with a low risk alternative
A hazard	Something with the potential to cause harm to people, the environment, or property
Safety	The elimination and ongoing absence of unacceptable hazard
Safety case	A formal assessment and reporting of hazards and the steps taken to reduce the risks to an acceptable level

al divide might be bridged. The reports provide the engineering community with guidance on how to take other stakeholders interests into account. They also provide business leaders, policy makers and managers with insight into how engineering activities should be integrated into their decision making and operating procedures.
The three reports can be found on the Academy's website at www.raeng.org.uk/news/publications/reports entitled:

- The societal aspects of risk
- Common methodologies for risk assessment and management
- Risks posed by humans for the control loop

'Risk management' has recently taken centre stage in the strategic thinking of most major organisations. UK thinking on the matter is encapsulated in the 'Turnbull Report' published in 1999.

It is interesting to observe that the risk management models developed in the financial and business arenas have a lot in common with traditional engineering methods of dealing with the uncertainties in properties and behaviour of materials. However, these methods have been extended to ensure a structured methodology for dealing with human behaviour as well as information uncertainty. The first report addresses the critical issues surrounding 'society's' perceptions of risk. It explains why the engineer's traditional numerical approach, based on statistics, is quite inadequate in dealing with the real human emotions that come into play in addressing technology. For too long, science and engineering have seemed to blame society for not understanding the benefits that they offer. While there is a very strong case for improving the level of science education and understanding, the report illustrates how engineers need to make major changes in their approach to addressing the legitimate concerns of community stakeholders in their projects. This is referred to in the summary where it is stated that "Engineers need to understand how groups in society develop perceptions about the riskiness of engineering projects and processes and what these perceptions depend on". This cultural construction of risk is becoming more widely accepted and frequently emerges in the debate over issues that are unresolved or un-resolvable by the scientific evidence.

The second of the Academy reports on 'Common Methodology' builds on these developments and shows how engineering risk management can be integrated into an enterprise's corporate risk management policies and procedures. It recommends a generic strategic approach within which the more tactical technical processes can be accommodated. It emphasises that while a structured approach to risk management is essential, it must not be allowed to become routine or mechanistic. Independent assessments should be made at critical decision points to maximise the integrity of the process.

The majority of the accidents seen today are due to human or organisational errors rather than technical failures. While further improving reliability and extending automation continues to be a priority for engineers, much more attention needs to be given to the human factors involved in operating and maintaining engineering products. The third report in the series, 'Humans in the Control Loop', looks at this issue in some detail.

It concludes that engineers need to be much more aware of the available research on human behaviour and to incorporate its lessons into the design of control rooms, drivers cabs, and the other interfaces between humans and machines. Major differences are observed between different industrial and service sectors in their approach to dealing with human factor issues. The report argues that there are great gains to be made by a much more coordinated and determined sharing of experience across sectors. The key issues involved in sharing and exchanging best practice are summarised. It should be noted that these apply quite generally and across many other fields than simply human factors.

The issues dealt with in all three reports are complex and the working groups who developed them are not claiming to have produced the definitive texts. All see the need for further work and appreciate that their recommendations will require significant effort on the parts of all the target audiences to implement. One key element in this is the need for a common language that can meet the specific needs of the engineer but at the same time is meaningful to the layman, so that each can participate in the dialogue.

In publishing these reports the Royal Academy of Engineering is grateful to all of the members of the working parties who contributed to their preparation. Whether they were Fellows of the Academy or not, they were generous in providing data and views based on a very considerable wealth of experience. We believe that the output will be of value to educators, practicing engineers and those who employ and manage them as well as policy makers and opinion formers.
John Turnbull, FREng, is the leader of the 'Risk Project'.

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ACCREDITATION CONFLICT

Certification of Welding Inspectors

The Welding Institute (TWI) has been associated with the Certification Scheme for Welding and Inspection Personnel (CSWIP) for over 30 years. A major part of this scheme involves the certification of welding inspectors.

Recently, a completely separate organisation in the UK, the British Institute of Non-Destructive Testing (BINDT), has introduced its own certification scheme for welding inspectors as part of their Personnel Certification in Non-Destructive Testing (PCN) scheme.

Potential users of Welding Inspector certification should be aware that the engineering experience requirement for access to certification is of a much shorter duration in the PCN scheme compared to CSWIP, and there is no minimum age at which certification may be obtained.

Neither TWI nor CSWIP supports, recognises or endorses the PCN welding inspector scheme in any way.

The CSWIP Welding Inspector Certification Scheme is unaffected by the introduction of the PCN scheme. CSWIP will continue to offer a means of demonstration of competence for welding inspectors which is recognised by all relevant authorities and clients throughout the world, accredited by UKAS, and backed by the technical resources and quality standards of TWI. CSWIP is the only UK certification scheme recognised by the European Welding Federation and the International Institute of Welding.

The following is an extract from a recent letter received from Professor Sir Bernard Crossland CBE, FRS, FREng, FIAE, MRIA.

"My attention has been drawn to the possible reduction in the experience required for access to certification as a welding inspector. Based on my experience of investigating accidents and disasters arising from defective welds, I strongly believe any diminution of the experience required is to be deplored. If welds of acceptable integrity are to be produced then there is a strong case for enhanced standards of education, training and experience."

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EQUIPMENT SAFETY

National Sprayer Testing Scheme reports results of its first 6 months

Almost 1200 sprayers have been tested during the first six months of the scheme according NSTS Manager, Duncan Russell.

'All the sprayers on the database have passed, but 50% of them have required some repair or rectification before a pass certificate can be given' says Mr Russell. 'The most common fault found is leaks and drips from the application system, something operators can cure for themselves' he continues.

The National Sprayer Testing Scheme launched at Smithfield started testing sprayers officially on 1st January this year. The NSTS is one of the three lead components of the Voluntary Initiative, along with the Operators register (NRoSO) and CPMPs. The NSTS target is to have tested 5,000 sprayers by 31st March next year.

Mr Russell agrees there is still some way to go to achieve the target. 'We've a healthy number of machines being offered for test even at this time of the year and with January – March the busiest time for testing, I'm reasonably confident we will be close to the target' he says.

The most important thing is to get enough testers and test centres established. 'Currently', continues Mr Russell, 'there are 74 test centres and, with the test being available through their branches and through Case, John Deere and Hardi dealers, this gives a total of 474 locations where the NSTS test can be obtained'.

'I'm looking for further test centres and anyone who is professional in the sprayer business should seriously consider being part of the scheme' he says. 'Sprayers are becoming more sophisticated and it's important that their maintenance and testing should be carried out by dedicated and qualified sprayer specialists'.

'There is a fear held by machine owners that we are asking machines to perform better than they did when new' says Mr Russell. 'That is certainly not the case. Machines are subjected to a series of simple checks to make sure they are working as designed and are safe for both the operator and the environment. The test consists of checks on 40 items on the sprayer, 30 of which it must pass to receive a pass certificate, the other ten are cautionary note items and it is up to the owner whether these items are put right'.

'To help with machine preparation a check sheet is available from the NSTS website www.nsts.org.uk' says Mr Russell. 'Regular inspections by the operator can keep the machine functioning correctly and accurately and save much downtime and possible application inaccuracies.'

Figures show that only 5% inaccuracy could cost as much as £5.60/hectare in winter wheat, with much more in root crops. 'Downtime is an incalculable cost' says Mr Russell, 'with a tight weather window or disease pressure, any loss of spraying time can be very costly indeed'.

CONTACT

For further details on the scheme or on becoming a sprayer examiner, contact NSTS, Samuelson House, Paxton Road, Orton Centre, Peterborough PE2 5LT. Tel: 01733 362925. E-mail: info@nsts.org.uk Web: www.nsts.org.uk

INFORMATION TECHNOLOGY

Product lifecycle management – the right ingredient for Buhler

Ingredients mixing on an industrial scale

Buhler Group is a worldwide supplier of machinery for processing chocolate, pasta, flour and other bulk materials in the food industry. The company is also a major competitor in the chemical process engineering, bulk solids handling and die casting industries. With such a diverse business model, one of the company's major challenges is trying to manage the vast amount of product development data that it generates.

The scale of Buhler's business is impressive, with over 1.4 million parts in over 700 product lines installed in thousands of plants around the world. Traditionally, like many companies, separate groups managed the design information on all these parts. Buhler used a variety of manual methods to keep track of product development, while automated systems ran independently from one another with little consistency, continuity or connection. In this environment, employees often did not know where data resided and wasted considerable time hunting for information, working with non-concurrent revisions and recreating existing but misplaced documents.

To add to the problem, Buhler's global operations required the sharing of data with 40 affiliated companies and more than 80 subsidiaries worldwide. Bottlenecks occurred in trying to work long-distance with subcontractors supplying parts for Buhler equipment and with the engineering consultants, architectural firms and construction companies designing and building the large plants where Buhler machines are installed. For the most part, information was shared via 2D drawings, reports and other paper documents, with all the usual delays and confusion of finding, copying, mailing, faxing and distributing hard copies.

Food for thought

Aware that the lack of efficient data exchange was hampering the company's efficiency and potential development, Buhler decided to overhaul and streamline its business operations. Instead of trying to manage information through separate and disjointed systems, the company chose to consolidate its data into a single product lifecycle management (PLM) system from SmarTeam. The system enables computer aided design (CAD) files and a wide range of project information to be archived and readily exchanged, not only among different groups, departments and facilities but also with outside companies.

"PLM is a strategic component of our enterprise Information Technology (IT) infrastructure," explains Karlheinz Ribar, the project manager at Buhler overseeing the PLM implementation. "Buhler is building a worldwide collaborative product development system that extends into the supply chain and tracks critical information throughout the product lifecycle."

Ribar has set a tough aim for the system – to reduce the time to market new products by 30%, increasing the speed of delivery to customers and strengthening Buhler's position as a market leader.

The system connects all of Buhler's subsidiaries via data replication and web servers, with over 1000 people worldwide using SmarTeam for system design and project management. As SmarTeam is available online, employees can access information remotely via the Internet. Different divisions within Buhler, subcontractors, outside consultants and process plant architects can exchange information electronically without the delay of handling paper documents.

Recipe for success

Buhler has plans to link SmarTeam to the company's SAP financial system (SAP is the world's largest enterprise software company which provides companies of all sizes with business solutions). It also

plans to process planning and computer numerical control (CNC) programming systems in manufacturing this way

Data from areas such as engineering, manufacturing, sales and service will all be included in a directory for each job, tracking the course of each customer installation from concept development through detailed design, engineering change, field maintenance and eventually decommissioning.

With its far-reaching plans, Buhler has put itself at the forefront of companies that are broadening the scope of PLM. Historically most at home within engineering departments where it was used to manage drawings and CAD files, PLM has reached other areas of business that are now waking up to the benefits of this enterprise-wide access to information. For Buhler, PLM means the difference between being one of a crowd and having a real, measurable competitive advantage.

"In this sense, the most valuable benefit PLM brings to Buhler is that it serves as an enabling technology for greater collaboration," explains Ribar. "Not only among separate groups, departments and facilities within the company but also in the supply chain and among the partner companies that make up our extended enterprise. In that respect, PLM is absolutely essential for us to compete effectively in the world of e-commerce."

Pick n' mix

According to Ribar, a number of reasons favoured the selection of SmarTeam.

The software is widely used and supported internationally, so Buhler facilities around the world can implement it. The scalability and economy of the software guaranteed that small subsidiaries and individual groups could easily implement the solution. In addition, SmarTeam could be easily customised for Buhler's specific processes and procedures.

As it is based on Microsoft Windows, the software uses familiar features such as drag-and-drop, cut-and-paste and intuitive menus with which users are already familiar and so can become productive in a matter of days rather than months. It also operates within AutoCAD, Mechanical Desktop and other leading midrange CAD solutions, so users can access data and perform PLM operations without exiting their CAD system.

The web technology provided by SmarTeam enables Buhler to implement its plans for distributed facilities to gain access to product data.

Ribar says that Buhler also needed a system that could handle different types of documents created in Microsoft Office applications such as Word and Excel, in addition to CAD files. Moreover, the PLM system had to have the capability of interfacing with different application programs in manufacturing, sales and other areas.

Piece of cake

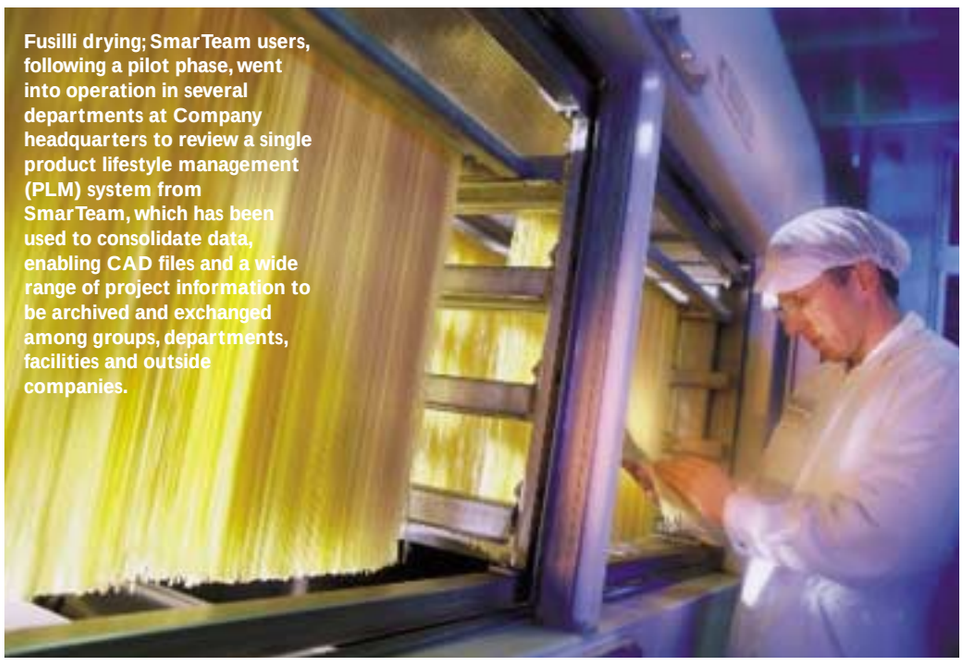
Following a pilot phase, SmarTeam went into operation with 50 users in the pasta, chocolate and thermal processes departments at company headquarters in Uzwil, Switzerland. Users consisted of designers managing their CAD files as well as non-CAD users, including managers and others in the design approval process who use the system to view drawings in the review cycle.

"Project leaders, department supervisors and other managers who have no AutoCAD knowledge whatsoever are able to view and release designs quickly through the use of viewer technology built into SmarTeam," notes Ribar.

Initial results in the pilot rollout phases of the implementation demonstrate significant savings in time and costs for information and document retrieval and in the elimination of redundant efforts by re-using existing data.

"We have now implemented the system into two of our affiliated companies in Germany: Buhler-Bindler and Buhler-Frisse," Ribar explains. "Additionally, we are in the planning phase for two big European sites: Buhler-Braunschweig and Buhler-Madrid."

Eventually, the PLM system will co-ordinate the flow of information to and from subcontractors providing parts and subsystems, as well as to outside consultants performing engineering services. Buhler also hopes that PLM will facilitate the exchange of information with large architectural, engineering and construction firms to help determine plant layouts and how these large facilities will be built.



Fusilli drying; SmarTeam users, following a pilot phase, went into operation in several departments at Company headquarters to review a single product lifestyle management (PLM) system from SmarTeam, which has been used to consolidate data, enabling CAD files and a wide range of project information to be archived and exchanged among groups, departments, facilities and outside companies.

Proof of the pudding

Using a module within SmarTeam, a link has been established between PLM and Buhler's SAP financial system to track man-hours, project costs, invoices and other information. This capability gives managers on-line access to up-to-date information on each project and eliminates the need to recreate data for the financial system that already exists in the PLM.

Buhler also plans to link SmarTeam with production process planning and CNC programming systems in manufacturing. In this way, part geometry stored in SmarTeam CAD files can be used by these

systems as input for machining parts and fabricating assemblies on the shop floor.

In addition to CAD files and engineering drawings, a wide range of other types of information will be archived in the PLM database, including documents created in Microsoft Office applications such as Word and Excel and well as photos, videos and other types of graphical information.

"In this way, the system will handle design data as well as engineering changes, correspondence, bids, quotes, proposals, service histories and other relevant information for each project, giving engineers, managers and others a complete history of each project from start to finish," says Ribar. "PLM enables us to manage projects throughout the complete lifecycle."

Company profile

SmarTeam Corporation Ltd develops, markets and supports rapidly implemented, yet totally customisable, product lifecycle collaboration solutions that drive efficiency, quality and responsiveness for customer centric organisations and their value chains. Founded in 1995, it is one of the fastest growing companies in the PLM market with over 2000 customers worldwide and a broad solutions portfolio that enables manufacturing organisations and their supply chains to efficiently manage and collaborate on product information from concept through realisation. SmarTeam's solutions help companies gain improvements in product quality, reduce costs, expedite project turnaround, comply with industry standards and shorten 'time to market'.

CONTACT

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AWARD

John Deere 'Combine Harvester Engineering Award'

John Deere's manager, technical services, David Preece has received a special combine harvester engineering award from the company, in recognition of his major contribution to the design of the Power Separator in WTS (walker tine separator) combine harvesters, and to other harvesting projects.

Incorporated as standard equipment on all John Deere 9000 WTS Series combine harvesters, which were introduced for the 2002 harvest season, the power separator lifts, stretches and opens the straw mat to allow more efficient grain separation, compared with the previous cross shaker design used in Z Series and 2200 Series models.

It was the result of a six year engineering project with the specific objective of improving combine harvester performance in UK conditions. The design utilises a combination of conventional and tine separation technology to deal more efficiently with green and damp straw, and enhance grain separation on the straw walkers.

The four stage threshing system begins with a large 660 mm diameter cylinder and long 750 mm concave. A rear beater and second concave provides additional threshing, and propels the crop to the extremely long 11-step straw walkers. Further separation is provided directly above the straw walkers by the tine power separator, which constantly and gently lifts and combs the straw mat to release trapped grain.

Key advantages of this system are that the full crop flow area is used for threshing and separation, so maximising combine harvester performance; it's easy to change from crop to crop; and there's a low specific power requirement, which means lower fuel consumption.

David Preece with his John Deere combine harvester engineering award – a commemorative pewter plate – in recognition of his major contribution to harvesting equipment design during more than 30 years with the company

"Our initial test designs adapted a baler pick-up, which was grafted into the back of the combine harvester above the straw walkers so that we could learn more about the stretching and pulling actions on the straw," says David Preece, who has worked in service and customer support for John Deere Limited in the UK for over 30 years, specialising in harvesting equipment.

"The main problems we faced were the increased moisture and friction levels in green straw, typical of UK varieties that were being bred to become riper in the head but stiffer in the straw. This meant that grain kernels were not being separated as efficiently as possible, so contributing to greater losses out of the back of the combine harvester or the need to reduce operating speed. "Essentially the power separator allows faster forward speeds and reduces grain losses, and overall performance of the combine harvesters has improved by between 10 and 13 per cent compared with previous similar sized models. Not only does the new design enhance performance in UK conditions," he adds.

"This award demonstrates John Deere's commitment to developing and testing combine harvesters for UK conditions, and the valuable contribution our UK field and service staff make to machinery innovation and design," says Peter Leech, John Deere's manager, customer support.

"The power separator unit has been very successful and well accepted by customers, contributing to John Deere's increased share of the European combine market."

CONTACT

Jonathan Henry, John Deere Limited. Fax: 00 44 1949 860490. Web: www.johndeere.co.uk

First pan-European campaign to combat risks of dangerous substances at work

One fifth of EU employees – 32 million people – are exposed to carcinogenic agents; 22% of workers inhale fumes and vapours for at least a quarter of their working time; two-thirds of the 30,000 most commonly used chemicals in the EU have not been subjected to full and systematic toxicological tests; for substances with known toxicological risks, as few as 12% of firms comply with risk prevention regulations.

The first pan-European campaign to reduce the risks of chemicals, biological agents and other dangerous substances at work – hazards that affect around a quarter of the EU's 150 million employees – is being promoted by European Agency for Safety and Health at Work. Cancers, asthma and neuro-psychiatric problems are just some of the illnesses that can be caused by the 100,000 chemicals marketed in the EU, as well as biological agents.

According to research, 21% of EU employees are exposed to known or suspected carcinogens, such as benzene (in fuel) and crystalline silica (construction materials), while 22% of workers inhale fumes and vapours for at a least a quarter of their working time, including organic solvents, wood dust and welding fumes. In addition, 16% of employees handle or come into contact with dyes, pesticides, Chromium VI (via wet cement) and other dangerous substances for similar periods, either directly or through contaminated surfaces and production processes. Sectors most at risk range from construction and agriculture to printing, cleaning, health care and automotive mechanics.

These risks are heightened by inadequate regulatory compliance and information. One study, for instance, found that only 12% of firms were aware of their regulatory duties. Moreover, a separate study revealed that 20% of Safety Data Sheets supplied by manufacturers of hazardous substances contained errors.

The health impacts are significant. Research has shown that 4% of all cancers, for example, are work-related and that 10% of employees contract eczema. In addition, studies suggest that one third of all cases of adult-onset asthma are caused by workplace exposures. Occupational skin diseases alone, which often force employees to change jobs, including 10% of hairdressers, are calculated to cost the EU 600 million a year. Occupational asthma is estimated to cost the EU 400-800 million.

The human and financial costs, however, are likely to be much larger. Existing data is based on studies of substances with known toxicities. However, two-thirds of the 30,000 most commonly used chemicals in the EU – around 20,000 substances – have not been subjected to systematic toxicological tests and assessments. Only new chemicals notified since 1981 must undergo these tests, although the EU is developing a strategy to systematically assess so-called 'existing' chemicals.

"Dangerous substances contribute significantly to the 350 million days lost through occupational ill health in the EU and to the seven million people suffering from occupational illnesses," says Anna Diamantopoulou, European Commissioner for Employment and Social Affairs. "The Agency's campaign, together with EU initiatives, including our recent White Paper on a Strategy for a Future Chemicals Policy, are important steps in dealing with this severe, but often hidden, problem."

Pat Cox, President of the European Parliament comments: "The use of dangerous substances in the workplace is commonplace for millions of EU workers. It is important that campaigns such as these convey the message to both workers and citizens that dangerous substances need to be handled with care both in the workplace and at home. This campaign is not only important in raising awareness but provides us with advice and good practice on how to eliminate or minimise these risks. The important role of the media in assisting in this task cannot be underestimated."

"I am very pleased to announce that the European Week for Safety and Health at Work has developed into the largest safety and health event in our region, including not only the 15 EU-Member States but also all Candidate Countries and all EFTA countries," says Hans-Horst Konkolewsky, Director of the Agency. "Dangerous substances need to handled with care – this is the key message of our 2003 campaign. In many cases safe substitutes for dangerous substances do exist, for instance to replace organic solvents. If this is not possible, exposure can be eliminated or reduced through efficient control measures. We hope to communicate these messages along with a lot of good practice information to workplaces all across Europe where dangerous substances are handled."

To support this drive, the Agency's campaign, which will form the heart of its European Week on Safety and Health at Work in October, will provide a range of information about the risks and solutions through various media. These will include information packs in all official EU languages, posters, leaflets and a multilingual website at http://osha.eu.int/ew2003/. The Agency, which acts as a European portal for information on occupational safety and health, will also announce at the Week's closing event in November the winners of its European Good Practice awards for organisations that have most successfully tackled the problem of dangerous substances via preventive measures, risk awareness, substitution and other techniques. During October 2003, events will be organised across Europe to bring the campaign to life in all organisations, large and small, public and private.

MORE INFORMATION

European Agency for Safety and Health at Work, Gran Via 33, E-48009 Bilbao, Spain. E-mail: information@osha.eu.int. Fax: +34 94 479 4383.

RECYCLING INITIATIVE

Green project set up for black plastic

The Environment Agency is leading a partnership dedicated to ridding Gloucestershire of the 2,000 tonnes of plastics it is estimated that the county's 7,000 farms produce every year.

The trial project is a joint venture between the Environment Agency, Farming and Wildlife Advisory Group, Plasmega Ltd, National Farmers Union (NFU), Stroud District Council, Serviceteam and the Recycling Consortium. It will collect the plastics from the farms and will use a process pioneered by Plasmega Ltd to recycle it into items such as fence posts, building aggregate, pipes and drain covers. Doing this will mean that the plastics waste, mainly in the form of silage wrap, will no longer have to be buried or be burnt.

The Gloucestershire Farm Plastics Recycling Scheme feasibility study, was set up in 2000 by the Environment Agency and the Farming and Wildlife Advisory Group (FWAG) to investigate environmentally sustainable disposal options for waste plastic produced by agriculture.

The situation they were faced with was both complex and discouraging. There was only one factory in the UK which could deal with contaminated plastics, and that was in Dumfries.

Therefore, one of the first things the scheme investigated was a company which could deal with the wet, dirty plastic which was collected from the farms. Research identified a company called Plasmega, based in Sharpness, which had developed a new method of processing the waste plastic without the need for washing it.

Once Plasmega agreed to accept the waste and joined the study, the partnership began the work of investigating how the plastic should be collected, what type of material could be recycled and possible markets for the end product Plasmega produced.

Using a typical refuse collection vehicle (which could compact the plastics and squeeze out any excess water) was discovered to be the best way of collecting the waste from farms. Other organisations, including the National Farmers Union, Stroud District Council, Serviceteam and the Recycling Consortium have since become involved.

A trial will now be run to test the practicability of collection of farm waste plastic and to generate data on the financial viability of such collection.

The project has four objectives to:

- develop and demonstrate a viable method of farm plastics collection;
- generate data on the operational and financial performance of the collection scheme;
- promote farm plastics recycling amongst Gloucestershire farmers; and to
- use the data and experience gained during the pilot trial to design a sustainable farm plastics recycling scheme for Gloucestershire.

The project, which will be funded by the Environment Agency Recycling Consortium, Plasmega Ltd and Cory Environmental Ltd, will aim to collect up to 500 tonnes of waste plastic from Gloucestershire Farms during a one year period.

Speaking about the project, the Environment Agency Manager for Lower Severn, Harvey Bradshaw, says: "The management of farm plastic is an area of major concern to the Agency and representatives of farming and industry.

"The Government has already published its 'Waste Strategy 2000', which set out its objective of reducing the amount of plastics waste being landfilled and work to gain value from it. Projects such as this will deal with the problem, providing a cleaner, more environmentally friendly solution to the question of what to do with farm plastics."

CONTACT

Collections can be arranged through FWAG. Charged at £10 per tonne. Tel: 01452 627487. Further details from Oliver Blackburn, The Environment Agency, Sapphire East, 550 Streetsbrook Road, Solihull, B91 1QT. Tel: 0121 711 5855.

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www.silsoe.cranfield.ac.uk

DATA PROTECTION

HSE brings accidents to book

The Health and Safety Executive (HSE) launched its new Accident Book – approved by the Information Commissioner – at the RoSPA Conference for Occupational Health and Safety. The new book will help organisations to comply with Data Protection legislation.

The new publication, the HSE Accident Book (BI510), has been revised as most existing accident books allow personal details and information to be seen by anyone reading or making an entry in the book. The previous version, produced by the Department of Work and Pensions (DWP), and other similar books do not comply with the Data Protection Act 1998 (DPA). In revising the Accident Book, DWP has passed responsibility for production to HSE.

The Information Commissioner, whose role is to enforce the DPA, has ruled that businesses must change their accident book to comply with the DPA by 31 December 2003. The new design allows for accidents to be recorded, while details of individual(s) can be stored separately in a secure location.

In addition to recording incidents, the new book also contains useful information on first aid and how to manage health and safety information to help prevent accidents from happening in the first place.

Kate Timms, HSE Deputy Director General, who spoke at the conference on building partnerships with key stakeholders, said of the new Accident Book: "The book is being launched as a tool to help organisations in terms of both health and safety and Data Protection compliance."

All organisations now have under three months to meet the new Data Protection regulations, which will be enforceable from 31 December 2003.

MORE INFORMATION

Copies of The HSE Accident Book ISBN 0 7176 2603 2 price £4.75 plus VAT are available from HSE Books, PO Box 1999, Sudbury, Suffolk, CO10 2WA. Tel: 01787 881165. Fax: 01787-313995. HSE priced publications are also available from all good bookshops.
For enquiries call HSE's InfoLine. Tel: 08701 545500.

TRADITIONAL CRAFT

Warwickshire's hedgerows in the spotlight

The characteristic hedgerows of Warwickshire, which form such a vital part of its landscape, are featured in a new video promoting conservation through the traditional craft of hedgelaying. The video has been produced by the National Hedgelaying Society with financial assistance from Defra's Rural Enterprise Scheme (RES), and was launched at the Royal Show.

Hedgelaying is the historic practice of cutting and managing hedges and has developed over centuries to maximise their efficiency as stockproof barriers. Each region's hedgerow style developed according to the characteristics of its landscape and farming, and around 30 regional styles are recognised.

The video, which aims to raise the skills and knowledge of landowners, farmers and others with an interest in hedgelaying techniques, is introduced by HRH the Prince of Wales and features Warwickshire's 'Midland' style among eight regional styles of particular interest. It covers:

- the history of hedgelaying;
- the importance of hedges in the UK landscape;
- the role of hedges in nature conservation;
- regional styles of hedgelaying; basic techniques; and health and safety.

The Midland style, also known as Bullock style, is a thick, high hedge, which predominantly uses thorn. Traditionally made in cattle-rearing country, it is designed to keep large heavy bullocks in their field. The brush faces the animal side to prevent them eating the new growth, and strong ornate bindings run along the top to hold the hedge in place.

The basic principles of hedgelaying are common to every regional style. Each stem of the hedge is partially cut through, allowing it to be layered at an angle, and secured to create a stockproof barrier. The hedge is still able to live and grow and is rejuvenated from the base as it throws up new shoots.

Apart from its practical applications, hedgelaying makes a valuable contribution to the health of the countryside. It helps preserve hedges and extend their lifespan, enhancing the appearance of the countryside, providing important wildlife habitats, acting as green corridors for birds, mammals and insects, and preserving the diversity of farmland species. It also keeps alive an important traditional rural skill and contributes to the rural economy.

Emily Ledder, from Defra's Rural Development Service, commented: "Hedgelaying can bring lasting landscape and wildlife benefits and is a traditional economic and craft activity in many parts of rural Britain.

"One of the main aims of the Rural Enterprise Scheme is to support sustainable and enterprising rural economies and communities. We hope the video will improve understanding of an important agricultural skill, and so bring benefits to the wider rural economy, as well as those involved in agriculture. It will also help keep alive one of the key tools for conserving the wildlife, landscape and historic value of the countryside."

MORE INFORMATION

National Hedgelaying Society, 'Way Post', Vines Cross, East Sussex, BN21 9EG.

PILLOW TANK

Structure-flex provides 'Water, water everywhere'

700 litre pillow tanks from Structure-flex; enabling water to be carried to inaccessible places with no natural supply

The Turkish Forestry Commission has over 1,500 small pick-up trucks, which it is planning to convert into small fire intervention vehicles. These small vehicles are able to penetrate forests which larger vehicles would find impossible, and will play a vital role in containing small, localised fires before they develop into raging infernos. To make it viable, each vehicle needs to carry its own water supply, and thanks to Structure-flex Limited, the transformation from pick-up to fire-fighting vehicle is a simple one.

Based in North Norfolk, Structure-flex is forging an increasingly strong reputation for the manufacture of innovative products for the packaging and transportation of bulk liquids, both single and multiple trips; the water carriers are designed to be re-filled.

Each of the forestry commission vehicles would carry one of Structure-flex's 700 litre pillow tanks of water, strapped down with a 'bellyband' harness, for stability and safety, and a pump. These simple additions to a basic pick-up truck make it a self-sufficient vehicle able to carry water to inaccessible places which have no natural water supply.

Pressure loss indicator from Nordic Tyres shows red if tyre pressure drops by as little as 0.14 bar from the initial setting

"Structure-flex is supplying 6 trial tanks and associated fittings so that the Turkish Forestry Commission can carry out trials over the next few weeks," says Ian Doughty, Managing Director of Structure-flex. "If the trials are successful, it will open the door to our flexi-tanks playing a vital part in fighting fires in vulnerable forestry sites."

CONTACT

Contact: Ian Doughty, Structure-flex Ltd, 24 Grove Lane, Holt, Norfolk, NR25 6EG. Tel: +44 (0)1263 712911 Fax: +44 (0)1263 711555 E-mail: ian.doughty@structure-flex.co.uk Website: www.structure-flex.co.uk

SEED DRILL

Flatlift seeder unit launch

Retro-fit seeder unit for use with 'Flatlift' cultivation systems

To re-think oil seed rape establishment, using a Flatlift and cultivation toolbar with the addition of the new Flatlift seeder unit can dramatically cut establishment costs, whilst giving better establishment than broadcasting methods.

The new seeder system, consists of two 35 litre polyethylene seed hoppers with two outlets per hopper. An accurate, positive displacement fluted metering system ensures that the seed is delivered precisely through fishtail outlets into subsoil and cultivated soil immediately before the packer roller, for optimum consolidation.

Manufactured for Spaldings by Horstine Farmery, the framework is designed for quick and easy fitting to the Flatlift packer roller frame. Drive to the seeder unit is innovative, taken from the packer roller shaft which does away with the need for a separate landwheel and allows seed output to be varied according to operating speed. The drive mechanism is controlled by an in cab operated electromechanical clutch, which allows quick and easy disengagement of the drive at headland turns preventing the wastage of seed.

Working directly behind the combine harvester on stubble and chopped straw the system can reduce the time and cost of establishment. The single pass, 'one man' operation can help cure the harvest bottleneck and release men and machines, that are usually used for rape establishment, free for preparing land for cereals. 'One-pass' establishment with a Flatlift gives the added benefits of subsoiling to break the pan and improve drainage which gives stronger, healthier plants with increased yield potential.

CONTACT

Contact: John Chamberlain at Spaldings (UK) Limited, Sadler Road, Lincoln LN6

COMBINE HARVESTER

The CS - harvest quality and quantity in balance

New Holland has extended its already comprehensive combine harvester offering with the addition of two new models to its CS range. The existing CS540 and CS640 have, in a single year, already carved a significant place for themselves, appealing in particular to those growers and contractors looking for a sound investment in a workmanlike yet up-to-the-minute machine. This appeal now broadens with the addition of the five- and six-straw walker CS520 and CS660.

The CS520 offers 'entry-level' access to the prestigious and distinctive new 'family' styling, first seen on the CX range, while the 211 kW top-of-the-range CS660, with its 8800 litre grain tank capacity, will attract contractors and larger-scale growers.

Supreme comfort, style and capacity are the watchwords for the entire CS range. But probably its most distinguishing hallmark is its ability to preserve the very best-quality straw without compromising output, regardless of crop condition.

"With the gap closing between the value of straw and the value of grain per hectare in a number of situations, and new markets emerging for straw, having good 'baleable' quality is becoming increasingly important," says product marketing manager, Nigel Mackenzie.

It is the CS' unique patented Opti-Thresh™ system, which allows the rear 36° section of the 121° wrap concave to be folded away from the drum, that is responsible for this particular aspect of the combine harvester's performance. The raise/lower adjustment is made using a simple side-mounted, two-position lever. Multi-Thresh™ concave position adjustment on the rotary separator - which is optional on the existing models, but standard on the CS660 - complements the thorough but gentle crop treatment.

"In summary, the combination of features on the CS allows users to set a precise balance between capacity and straw-friendliness, under a broad range of harvesting conditions and for the widest variety of crops," says Mr Mackenzie.

Continuing the straw theme to the back of the machine, all CS combines can be equipped with the standard straw hood canvas, or optional straw chopper. "In addition, the top three models can be specified with an independent chaff spreader which then allows chaff to be either spread or directed into the straw flow when swathing," says Mr Mackenzie. "Where straw is to be incorporated, again there is the option to spread chaff independently or in the main stream of chopped straw, where it will travel further, especially in side winds."

As for the header, cleaning ability, unloading rate, the drivelines and the cab, the CS can be described as 'best in class' in each case. In particular, a simple but heavy-duty drum drive, a new cascade pre-cleaning system that provides a dual air blast, and Tier II-compliant engines all contribute to an excellent all-round performance.

Automatic header compensation and stubble height control are standard on the CX-spec headers, with lateral float optional on the five-straw walker machines and Autofloat an option on all CS models.

Visibility onto the header from the quiet and comfortable Discovery Plus cab is excellent, thanks not least to the length of the straw elevator. At the same time, the mounting position of the slim monitor on the right-hand side A-pillar gives the operator at-a-glance eye-level information on all the important engine, threshing and cleaning functions. A multi-function control lever with large 'easy-feel' buttons and in-line gear shift further ease the burden on the operator.

Vital functions are engaged through electro-pneumatic or hydraulic components - the use of electronics being reserved for monitoring purposes only. Not only does this avoid the complexity of electro-hydraulics, but a pneumatic clutch and actuators also provide very smooth engagement of header, threshing, chopper and unloading system.

A standard air compressor not only provides air pressure for the remote controls, but is also invaluable for cleaning the machine away from the yard, particularly when moving between seed crops or trying to reduce contamination by weed seeds.

Practical considerations such as this, together with economical operation and technological advances define the CS combine harvester's special ability to optimise performance and quality of output.

TYRE PRESSURE

Tyre pressure loss indicator cuts costs and improves

Pressure loss indicator from Nordic Tyres shows red if tyre pressure drops by as little as 0.14 bar from the initial setting

A simple, low-cost tyre pressure loss indicator has been introduced by Nordic Tyres (UK) Ltd, the distributor of Nokian agricultural, industrial and forestry tyres in the United Kingdom and Ireland.

Able to provide an instant visual warning of a pressure loss as small as 0.14 bar , the indicator is available in versions to suit most tyres running at any pressure between 1.4 bar and 4.8 bar . It is now being fitted as standard to all Nokian trailer tyres supplied on wheels, both as original equipment and as replacements.

Following inflation of a cold tyre to its recommended pressure, the indicator is screwed fully onto the valve in place of the normal dust cap. Green and red bands within the indicator will then rise until they are exactly level. Any loss of pressure will cause the green band to drop below the red, giving operators a clear visual warning that the tyre needs to be inspected for possible damage, such as a puncture, before being re-inflated to the correct pressure.

If the indicator should experience impact for any reason, it has been designed to shear above the valve ensuring that there is no loss of air from the tyre, allowing movement to continue safely until the damage indicator can be replaced.

Suitable for tyres fitted to a wide range of agricultural, industrial and turf maintenance equipment, the pressure loss indicator is designed specifically to prevent the costly and unsafe practice of driving or towing a vehicle or machine equipped with under-inflated tyres. Robert Hughes of Nordic Tyres (UK) Ltd says the device will be particularly beneficial on radial tyres where it can often be difficult to tell whether there has been loss of pressure.

"Although a radial tyre is better able to withstand lower inflation pressures than one of cross-ply construction, no tyre should be run for any length of time at less than its recommended pressure for the carried load and the driving speed," commented Mr Hughes. "Under-inflation is likely to produce significant reductions in grip, stability, handling and tyre life. Our pressure loss indicator should prove a very useful aid to maintaining vehicle safety while saving both time and money."

Priced at £11 (excl. VAT) for a set of four, the Nordic Tyres' pressure loss indicator is available direct from the company and its authorised dealers. The device will also be exhibited at all forthcoming major agricultural shows.

CONTACT

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CROP SAMPLING

Launch of grain sampling spear

New grain sampling spear can sample up to a 2 m depth and in five places; in compliance with assured crop schemes

Spaldings have introduced a new 5 gate aluminium grain sampling spear, into their comprehensive grain storage and conditioning product range.

The new spear is designed to sample grain up to a depth of 2 m and give a representative sample of the grain in five places to help comply with assured crop schemes.

The spear is manufactured from light but durable aluminium, with a pointed end for ease of entry into the grain.

The spear can be ordered from Spaldings under product number 18050 and is priced at £120.00

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ALLOY STRATEGY

Lead-free solder in long life, high reliability applications

Lead-free solder in use; all solders, for European products, must be free from lead by July 2006

The change to lead-free solders must take place by July 2006 for consumer products sold in Europe.

The new lead-free alloys and the consequent changed processing parameters may have a fundamental effect on the reliability of long life components and systems. To study any long term effects, TWI are setting up a two-year international Group Sponsored Project.

The aim of the project is to develop a clear understanding of the issues relating to the use of lead-free alloys for long life and high reliability products. Following this understanding, the development of testing and modelling will predict the influence of these changes on product life.

The project builds on the extensive background experience of TWI, the University of Greenwich and the Open University. Results will be available throughout the two years allowing advance information to assist companies in their own implementation strategies.

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TRACTORS

RenPIM produce 40 kg tractor roof prototypes

RenShape Solutions proved the answer to a big problem for Reko International, of Ontario in Canada, when they won the contract to produce 30 tractor roof prototypes, each weighing 40 kg and measuring about 2 m^2.

The size of the part was further complicated by the design which included a series of large bosses that would be difficult to de-mould.

The parts were produced using Vantico epoxy tooling and RenPIM polyurethanes and were accurate and durable enough for functional testing.

Reko started the project by using CAD data to cut a RenShape 450 model. A fibreglass reinforced epoxy paste tool was then built and used for the mould, while a Shore 50 A silicone rubber was used for the loose mould inserts.

A modified RenPIM polyurethane system was used for the prototype parts after it became apparent there were no fast setting materials readily available, with a pot life long enough to shoot the part.

After tests, Reko technicians realised they could use RenPIM 5218 A/B polyurethane for the large parts, if they used a different combination of hardeners. When the hardener was mixed with RenPIM 5219B, this slowed the pot life to seven minutes - long enough to mould these huge parts.

Two meter/mix dispensing machines were used to shoot the tool, with the first run determining the precise de-mould time. While the seven minute work life was adequate, the de-mould time needed to be increased so an air ejection system was added.

After the mould was filled with the specially formulated RenPIM material, the prototype remained in it for several hours. More air ejectors were then added to help de-moulding and enable the mould to be opened while the prototype remained in the cavity half.

The resulting parts exhibited good accuracy with virtually no warping despite their large size. After inspecting these prototypes, Reko's customer asked for some design changes to be made and the mould was altered to add more ribs. Some additional prototypes were cast before proceeding to final production parts that were moulded using structural foam.

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Call for Papers

Land Use and the Environment - Delivering Solutions

Opening address - Baroness Young

This conference will highlight technologies and practices that can bring real and immediate benefits to all aspects of the environmental resource - soil, water, air, bio-diversity, landscape and amenity value - that are impacted by land-use.

Chaired by Professor Brian Legg - Director of NIAB, the opening address by Baroness Young - Chief Executive of the Environment Agency, will be followed by speakers including:

- Professor Dick Godwin - ***Cranfield University - Silsoe***
- Professor Christopher Wathes - ***Silsoe Research Institute***
- Tim Rollinson - ***Director Forestry Group - Forestry Commission***

who will be reviewing the key opportunities for responding to the challenges facing the three main sectors - crop production, livestock production and forestry.

Four afternoon sessions (two each in parallel) will allow more detailed consideration of the solutions proposed. There will be three twenty minute papers in each session.

Parallel Session 1	**Chairman**
Livestock	**Prof Christopher Wathes**
Forestry	**Geoff Freedman**
Parallel Session 2	
Soil & Water/Mechanisation	**Prof Dick Godwin**
Amenity/Environment	**Peter Redman**

If you wish to submit papers for consideration by the session chairmen, please contact them directly.

IAgrE Annual Conference May 13th 2004

Venue:

Royal Agricultural College
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