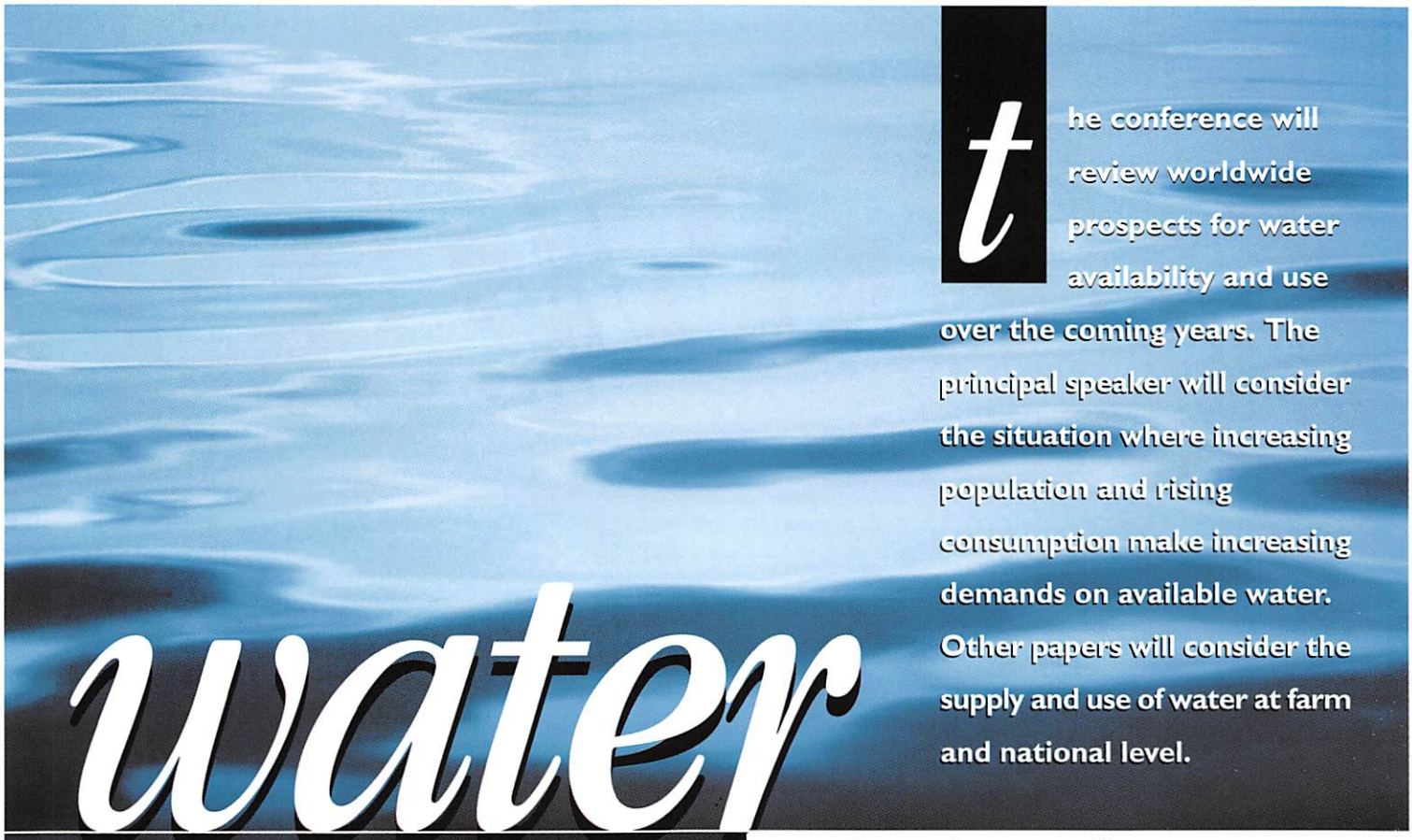
IAgrE Journal

Landwards

Volume 54 No. 1 Spring 1999

Agriculture • Forestry • Environment • Amenity



water

the conference will review worldwide prospects for water availability and use over the coming years. The principal speaker will consider the situation where increasing population and rising consumption make increasing demands on available water. Other papers will consider the supply and use of water at farm and national level.

the key factor

Annual conference

of the Institution of Agricultural Engineers with the Annual General Meeting and Awards Ceremony

Principal speaker
Sir Crispin Tickell GCMG KCVO
"Water in the 21st Century"

Melvyn Kay,
Silsoe College
"Efficient use of irrigation water"

Dr Smail Khennas,
Intermediate Technology Development Group
"Micro hydro-power plant"

Charles Paton,
Lightworks Ltd
"Seawater greenhouse for arid lands"

Martin Lunn,
Essex & Suffolk Water
"Quality water supplies"

Chris Stansfield,
ADAS
"Water storage for irrigation"

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Royal Agricultural College
Cirencester 11 May 1999

Landwards

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

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News and comment

Front cover: *Magnificent new Masseys; the MF 6200 and 8200 series feature innovative transmissions, latest generation 'green' diesel engines, new cab developments and the industry's largest modular rear axle and braking system (photo: AGCO Ltd).*

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Financial engineering – compliment or curse?

Can two walk together, except they be agreed? (Amos 3: 3)

Engineers and bankers must work together to increase shareholders' wealth, yet their relationships suffer from misunderstanding. This paper discusses the *empathy gap* as an alternative to the *equity gap*. The business environment provides shared principles and policy pressures. Process - and product - orientation in decisions are compared. Project financing issues are explored using a tension model to manage risk and improve mutual understanding.

Alfred D Gracey

Introduction

The relationship between engineering and banking is important because these two professions depend upon each other, and their harmonious working is vital for a nation's economic advancement. Engineering, as a primary wealth-creating activity, depends on money as a facilitating resource and as a performance measure. Banking, as a money-handling activity, depends on engineering to add value to the money it invests.

The inter-professional relationship is far from harmonious. Dialogue is perceived as a win/lose game. Engineers are often frustrated by lack of funds in their ambition to create and exploit better technology. Complaints arise of a *financing gap* or *equity gap* between providers and users of finance. This is acute for small and medium-sized enterprises (SMEs), of which the Agricultural Engineering and Materials Handling sectors are largely composed. (A SME is defined in the European Commission Recommendation 96/280/EC as fewer than 250 employees, annual turnover not exceeding 40 MECU or balance sheet total not exceeding 27 MECU, and less than 25% owned by a large enterprise.)

However, a senior banker (Cameron, 1998) asserts that the perception of an equity gap is out of date. Cameron claims that it is now an *empathy gap*: "There is a mismatch between the supply side and the demand side, with a lack of understanding of the real issues on both sides". David Budworth (1996) concludes that resolution of the related problem of "short-termism" lies in improvement of mutual understanding and communication.

Empathy is the ability to understand and enter into another person's feelings and decision-making processes. Its emotional component encompasses qualitative factors such as intuition and perceptions of risk. Its rational component deals with logic, numbers and formality. The various professions engaged in business value these differently. For example, risk-management practices differ markedly between the financial and industrial sectors (Santomero, 1997).

Better understanding of banking issues and bankers' decision-making will enable engineers to achieve a more productive relationship when seeking finance for a technology-based venture. Let us consider four aspects of empathy: **p**rinciples, **p**olicy, **p**rocess and **p**roduct, and then see how they interact in engineering **p**rojects.

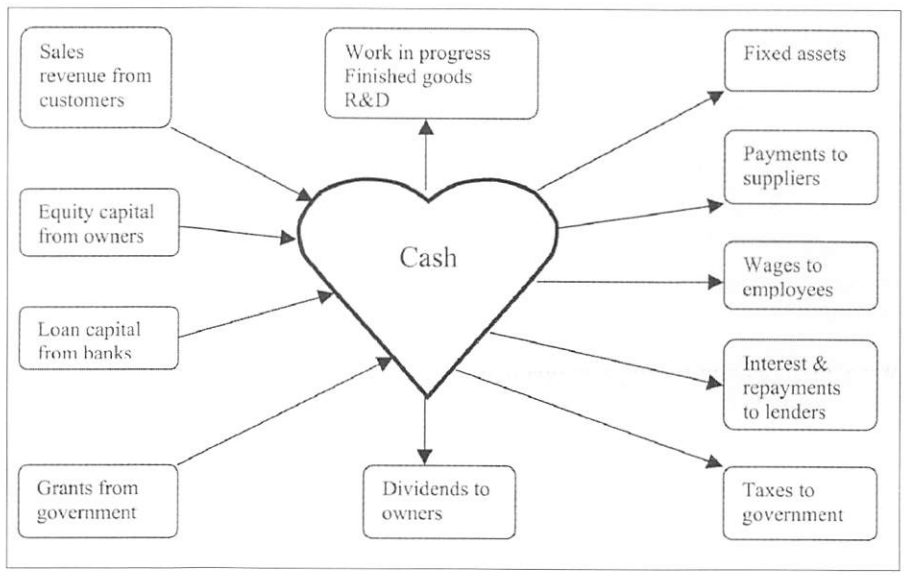

Fig. 1 Cash – the lifeblood of a business.

A version of this paper was first presented at the Bulk'98 Design Seminar of the Materials Handling Engineers Association on 3 December 1998. ***Alfred Gracey FIAgrE is a consultant providing solutions that bridge the gap between engineering and finance. E-mail: agracey@csi.com.***

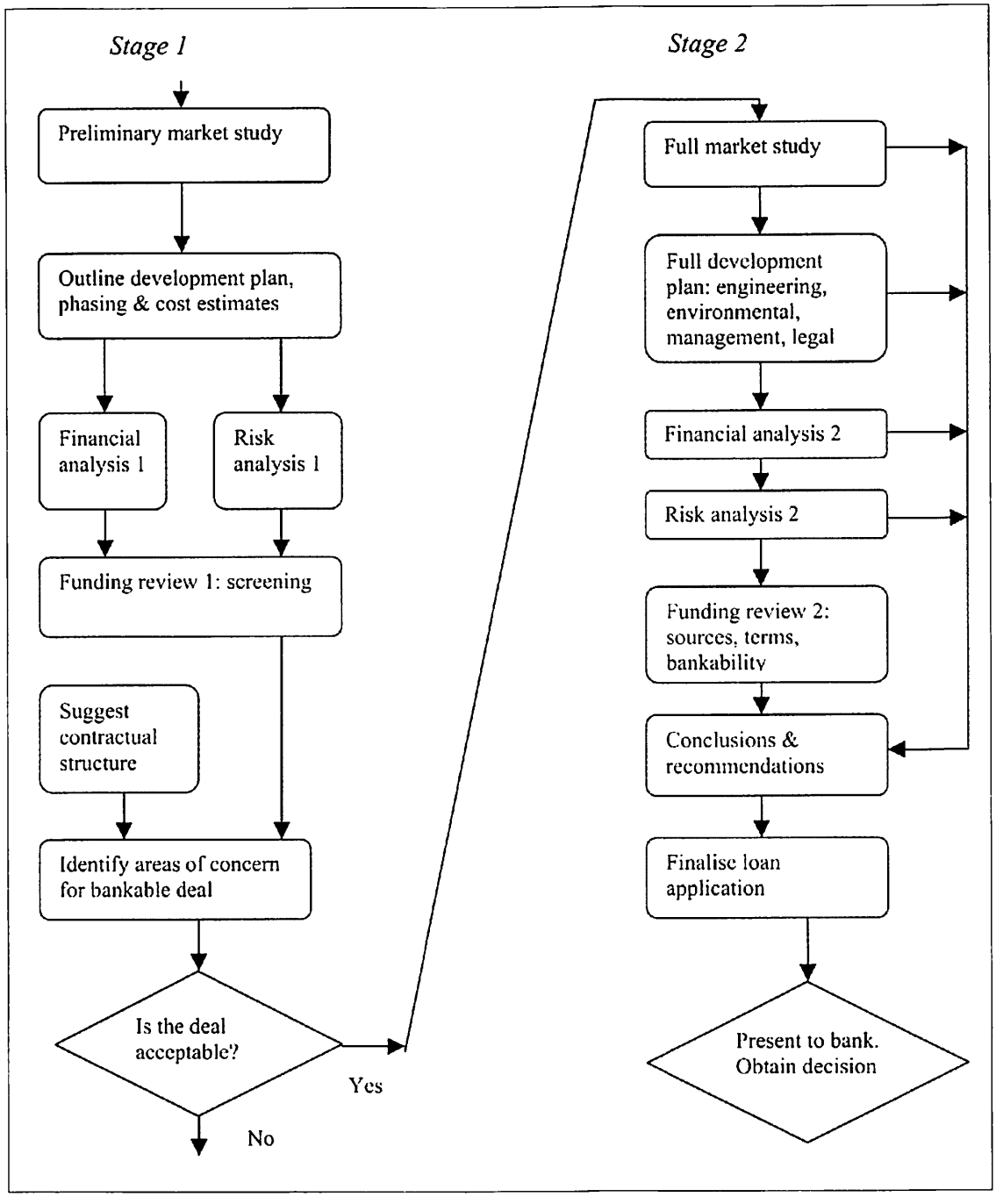

Fig. 2 Banker's view of feasibility study.

Principles

Principle 1 The purpose of a company is to increase shareholder value.
This provides a robust criterion against which to judge the assumptions and ambitions of employees. It disciplines bankers and engineers with equal rigour. Wise directors aim for their company to provide goods or services in ways that sustainably increase shareholder value

Principle 2 Cash is the lifeblood of a business enterprise.
Inflows and outflows are illustrated in *Figure 1*. If cash fails to flow properly at any point, the clot or haemorrhage could have fatal consequences. An engineering project's cash inflows and outflows occur at different times, often over several years. Asynchronous flows are reconciled using *discounting techniques* to find their net present value. Loans, equity, trade credit and government subsidies all have different cost values. A *weighted average cost of capital* can be calculated for their aggregate amount.

Principle 3 A company must innovate in order to survive.
In today's competitive marketplace, a non-innovative company soon loses its competitive advantage. It withers and becomes extinct. Similarly, a non-innovative engineer throttles her or his career and livelihood options. Professional institutions promote continual professional development because this is the bedrock of innovation and economic survival.

Innovation, according to the Innovation Unit of The Department of Trade and Industry, is simply *the successful exploitation of new ideas.* This definition encompasses novelty in all spheres of business – in financing, personnel and administration as much as in design, construction, manufacture, marketing, sales, transport and operation.

Governments and the European Commission recognise that the wider economic benefit of innovation is often greater than its financial benefit to a single company. This justifies public subsidies. Their effect is to reduce the weighted average cost of capital for an investment. Subsidy criteria and argumentation are unfamiliar territory for most engineers, accountants and bankers. Specialist advisers are often essential when business plans are prepared for external consumption, such as in applications for grants or capital loans.

Principle 4 Successful companies communicate with their investors.
Successful and innovative performance correlates strongly with the depth of mutual understanding and support engendered amongst shareholders and lenders (Fellowship of Engineering,

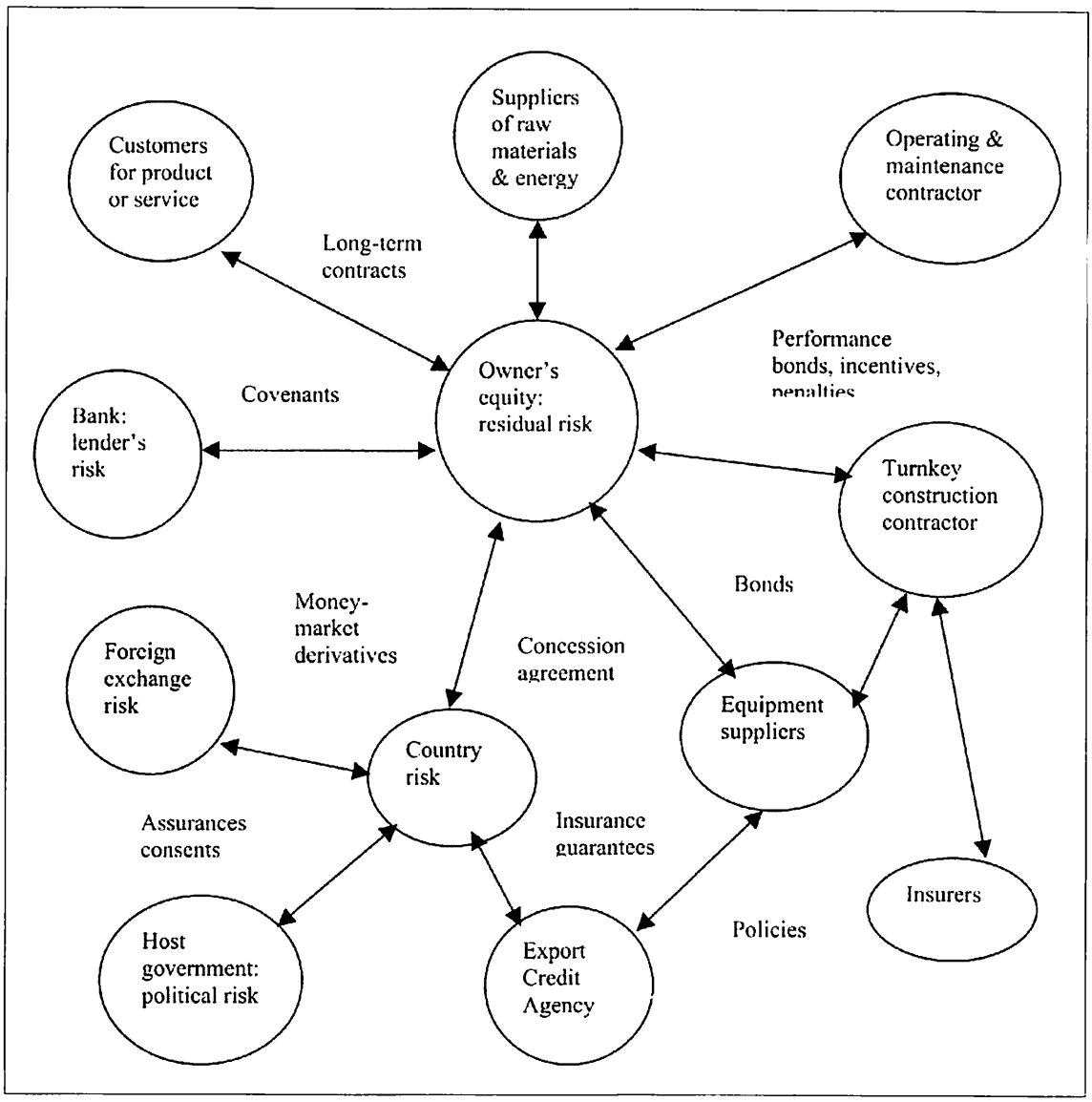

Fig. 3 Balancing risk forces.

1991). One side effect of professional communication is the phrase *financial engineering*. Bankers coined it to describe their structural design and operation of financing packages for complicated projects. It is a banker's tribute to the ingenuity of engineers. To return the compliment, invert the phrase - to *engineering finance*. In order to "engineer" finance, technologists must appreciate the financier's decision methods. These emphasise concepts and behaviours that exist only in the shadows of engineering practice.

Policy

The wisdom of investing funds is influenced by an assessment of the forces that drive change. This assessment feeds the evolution of business strategy and policy. In the general business environment these forces are political, economic, socio-cultural and technological. Within an industrial sector, pressures arise from competitive rivalry, customer bargaining power, supplier demands, and threats from substitute products and new entrants (Porter, 1980).

Process *versus* product

Engineers are usually more concerned about the process of their activity than its eventual product. They focus on technology and neglect financial impact. For example, a recent *Bulk Solids Today* mentioned benefit/cost advantage only twice in about 200 short articles, and gave no quantified data. The current issue of *Bulk Handling* refers to financial impact nine times in several hundred news items. Payback and profit on turnover are each mentioned once. Capital expenditure announcements are silent about their financial justification. Claims about "lowest cost" and "savings" are not supported by numerical measures (such as a ratio of with/without machine). In a recent edition of *Landwards*, about half of the articles and news items hint at cost aspects of engineering in agriculture, but only two in forty explicitly acknowledge commercial profitability.

What does this suggest about engineers' interests in shareholder value, in cash flow, in customers' financial welfare, or in the economic benefits of innovation? There are professional and commercial impacts as in the following examples.

- Engineers undervalue themselves and their technology. A Chartered Engineer is required to have technical competence in appreciating the financial implications of his or her actions, and to possess commercial awareness, including the profitable management of industrial and commercial enterprises (see ICE 43: 1987, *Qualities of the Chartered Civil Engineer*; and Engineering Council's SARTOR 97 regulations).
- Sales opportunities are lost. Lifetime benefit/cost analysis often provides a clinching reason for a potential customer to buy your product or service. More sales at the right price backed with suitable financial terms stimulate more innovation and strengthen share valuation.

In contrast, bankers focus on "the deal" - on the ends and not the means. The financier's first reaction to a

proposition is "What income might this generate?" Only after a satisfactory reply does the financier ask, "What costs can it bear?" The performance of technological inputs is taken for granted. The financier's third action is to calculate net cash flow, present value and some financial ratios. This feeds a provisional Go / No-Go decision. Technology is scrutinised only in a "due diligence" step. The financier's motive is risk-containment. Technological excellence is irrelevant; dependability is more important than novelty. A typical decision path is illustrated in *Figure 2*.

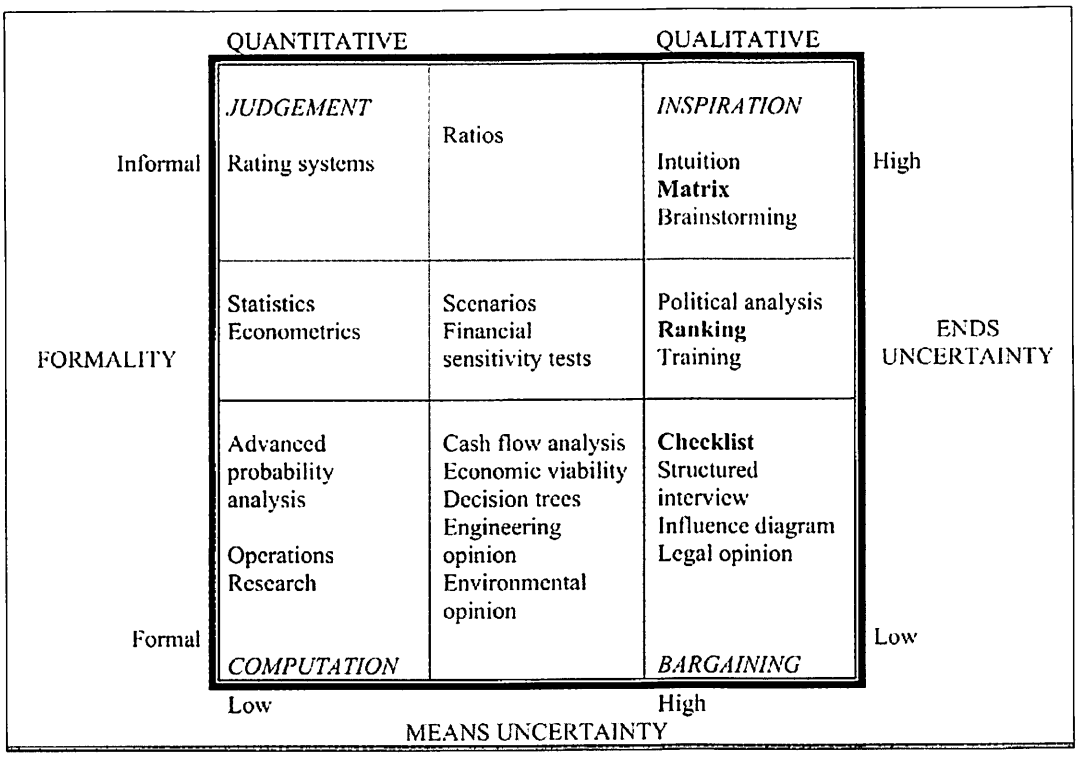

Fig. 4 Assessment techniques mapped onto the Tension Model.

Projects

The financial demands and risks of a new project increase according to its novelty. The financier's approach is pervaded by a desire to limit those risks. It is therefore necessary to consider how risks are assessed and mitigated. An innovative approach to project risks models them as a tense web. This is mapped in *Figure 3*. Risk distribution is centrifugal. Risk retention is centripetal. Opposing forces become dynamically balanced by negotiating a network of contractual agreements.

A recent survey (Gracey, 1997) of project financing explored the tension between professional approaches when making risky decisions. Risk assessment techniques were analysed in terms of formality and quantification. Their distribution is shown in *Figure 4*. Ranking, Matrix (tick box) and Checklist were found to dominate.

Engineers are evidently at a disadvantage when communicating with the other professions involved. Engineers are most adept with formal and quantitative techniques, and prefer situations characterised by low uncertainty about ends and means. The other professions prefer qualitative and informal techniques, which suit situations wherein uncertainty is high.

The relative popularity of decision strategies in the survey is shown in Table 1. There is a strong bias towards "political" decisions, characterised by bargaining and entrepreneurial inspiration. Conversely, there is a bias against "rational" decisions, characterised by computation and judgement – where engineers are more comfortable.

Therefore, conflict and misunderstanding are likely when a banker, an engineer and other stakeholders meet to decide risk allocation and mitigation. Each stakeholder calls evidence from a technique that is meaningful to him but not to others.

The first step towards resolving this dilemma is to recognise that another party has a different approach. It is driven by that party's appreciation of principles and policy factors. The second step is to understand the risk assessment technique and decision strategy employed by the other party. Harmony develops as two or more stakeholders share respect for a particular technique and play a decision strategy game.

As a project proposal evolves towards commitment of finance, formality increases. This enlarges the common ground between engineers and bankers, improving the chance of fruitful dialogue. Following financial close, formal-quantitative techniques feature strongly during construction and maintenance. But entrepreneurial exploitation of the built facility demands full rein for

Table 1 Distribution of assessment techniques against decision strategies

Distribution of decision strategies		
JUDGEMENT		**INSPIRATION**
5%	3%	**15%**
6%	10%	**13%**
9%	24%	**16%**
COMPUTATION		**BARGAINING**

informal-qualitative techniques in its operation.

Conclusion

Responsive communication between engineers and bankers is essential during a project's gestation and post-natal care. Lack of empathy causes failures in communication. They arise partly from unfamiliarity with the other party's concepts and terminology; and partly from ignorance of other thought processes and decision techniques. Fundamental principles and policy responses provide common ground for beginning the dialogue. The dichotomy between process and product challenges habitual thinking. Intuition and qualitative judgement dominate early discussion. The "deal" is sought by a bargaining strategy. Formal computations and technological details are secondary.

Closing the empathy gap, with these insights, will make *financial engineering* and *engineering finance* each other's complement.

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Survey of finance for innovative technology

The European Commission has awarded an important business research contract to MCS. This dynamic British firm will investigate how to strengthen links between finance, innovation and technology. MCS will explore the role of Business Angels in financing young high-tech enterprises and helping them to succeed. It will also examine how Guarantee Mechanisms support commercial exploitation of technological discoveries.

Over the coming sixteen months, MCS will work closely with the *Innovation Programme* of the European Commission to survey the current state of the art across Europe and the USA. They will organise conferences where interested parties can discuss issues, and promote the uptake of good practices across the European Union and its associated states.

This appointment is part of the Commission's FIT Project, which promotes European initiatives in financing innovative technology. Finance for Innovative Technology tackles gaps in understanding between creative engineers or scientists, business angels or other venture capital sources, and government policy-makers. Commercial exploitation of advanced technology is vital for economic growth and generation of new employment opportunities – as demonstrated by the vigorous USA economy. The FIT project's website http://www.cordis.lu/finance/ describes its policy and associated programmes.

Marc Verlinden, who manages the FIT project in DGXIII/D of the European Commission, praised the MCS proposal: "MCS has a clear grasp of the important issues and offered a concise, comprehensive plan of work."

Greville Warwick, director of MCS, is delighted that MCS was chosen ahead of a strong field of competitors. "MCS understands the ambitions and frustrations of innovative technologists and financiers. This engagement recognises the research skills of MCS and our focus on delivering practical solutions. We will contact Business Angels, entrepreneurs, innovators and many others who are active in business incubation. Opportunities for informal investors across Europe will be promoted widely."

Over the past decade, MCS has achieved growing success in obtaining finance for new enterprises of all sizes. It can provide expert assistance to start-up ventures across Europe.

Contributions are invited from informal investors, innovators, entrepreneurs and interested officials. Comments or case histories for the FIT surveys of Business Angels or Guarantee Mechanisms may be sent by e-mail to mcs.fit@netcomuk.co.uk or fax to MCS on +44 (0)1926 512477. Further information is accessible at http://www.profnet.co.uk/profnet/mcs/ .

Contact: **Alfred Gracey, MCS, 10 Station Road, Kenilworth CV8 1JJ, UK. Tel 01926-512475.**

The human factor

A unique buttock measurer, talking dummies, airline beds, and a car simulator are just some of the interactive exhibits on display at The Human Factor: designing products, places and jobs for people.

The exhibition is being held at the Science Museum, London and is supported by the Engineering and Physical Sciences Research Council, The Health and Safety Executive and The Ergonomics Society. It was officially launched on 12th March 1999 as part of set99 week and will run for six months until the end of August 1999. The aim is to ensure that visitors to the exhibition not only have some fun exploring ergonomics first-hand but they will go away with a much better idea of the importance of ergonomics to all aspects of our lives.

In addition to the exhibits mentioned above, visitors will also be able to discover a few of the dangers of chairs, meet the British Standard dog, operate a dentist's chair, and crash the computer interface from hell. The exhibition is open daily from 10.00 am to 6.00 pm at the Science Museum, South Kensington, London.

Adapted from an article in: *The Ergonomist*, The newsletter of The Ergonomics Society, March 1999.

Bright future predicted for wood fuel for energy

British farmers could become important growers of wood fuel for power stations if they adopt the early findings of a £3 million Forestry Commission research project. The preliminary results of the research into growing willow and poplar trees for wood fuel were announced recently at a symposium at the Forestry Commission's research station at Alice Holt in Surrey.

The results confirm that yields as high as 17 dry tonnes of biomass per hectare per year are possible through the coppicing of fast-growing varieties of trees on the best sites. That's 70 per cent higher than the yields assumed in planning the 8-megawatt, wood-fuelled "ARBRE" power station being built at Eggborough in North Yorkshire.

The research is being carried out by the Forestry Commission's Forest Research Agency, and is jointly funded by the Department of Trade and Industry (DTI), the Ministry of Agriculture, Fisheries and Food (MAFF), the Forestry Commission and the Department of Agriculture for Northern Ireland (DANI).

Presenting the preliminary results, Forestry Commission project leader Alan Armstrong said, 'The best site produced a remarkably high yield of 17 oven-dry tonnes of wood per hectare in year one. Some new willow varieties bred in Sweden are showing much higher yields than varieties used in the past.

'What are the best sites? The least productive ones are gravels, and the most productive ones are moist, but not water-logged.

'These experiences will soon be published in a new technical paper, and will cover items like the importance of ploughing and harrowing to agricultural standards, and of eliminating weed competition, which cannot be over-stressed.'

Explaining the potential benefits of the research, Paul Tabbush, Head of Silviculture and Seed Research at Alice Holt, said, 'Our experimental results will allow new biomass industries to be planned with more confidence and reduced risk. They will indicate the best places throughout the UK to grow short rotation coppice (SRC), and the best varieties of willow and poplar to use.'

Conference chairman Henry Brown, head of MAFF's New Crops and Sugar Division, endorsed the research work, saying: 'This research could support increased farming of energy crops on set-aside and non-arable land. Growing wood-fuel crops can provide new income opportunities for farmers and landowners, and contribute to a reduction in atmospheric carbon dioxide, one of the main 'greenhouse' gases contributing to global climate change.

'The Government signed up at Kyoto to a legally binding commitment to reduce the UK's greenhouse gas emissions by 8 per cent of 1990 levels by the year 2010. The UK has agreed to reductions of 12.5 per cent. A significant increase in the area of energy crops will be essential to achieve this, and about 125,000 hectares of new energy crops should be planted.

'Short-rotation coppice (SRC) is a new crop, and it is vital that the effects on yield of soil type, climate and location are properly understood.'

Silvan Robinson CBE, Chairman of British Biogen, the trade association committed to developing the biomass industry, told delegates in a keynote speech, 'This promises to be an historic year for the biomass industries. There is an inexorable trend towards their promotion by both the European Community and the Government in this country, with targets being set. This is mainly under the pressure of climate-change objectives, but the need to diversify land use is particularly relevant for biomass.

'Targets are one thing, practical implementation another. Governments are not going to promote biomass with an open cheque book. Coppicing is at present the front runner, and it is essential that it performs and that there is confidence that higher yields and lower costs are in prospect, hence the importance of this research.

'Electricity and heat produced from biomass have to compete in what is increasingly an open market. These markets will also provide a growing outlet for forestry residues, and there is a natural alliance between the development of SRC and a forestry industry looking for new outlets.'

Research enquiries: **Paul Tabbush or Alan Armstrong, Forest Research, Alice Holt Lodge, Wrecclesham, Farnham, Surrey, GU10 4LH; tel 01420 22255; e-mail: *p.tabbush@forestry.gov.uk* or *a.armstrong@forestry.gov.uk***
Publications: **Dr John Parker at the same address, e-mail: *jparker@forestry.gov.uk***

Lord Donoughue launches great British cheese map

The quality and diversity of British cheese was celebrated today when Food Industry Minister, Lord Donoughue, unveiled a promotional cheese map, featuring sixty cheeses chosen from more than four hundred produced in the UK. The map is aimed at improving exports of British cheese.

Speaking at the offices of the Dairy Industry Federation, Lord Donoughue said: 'I have been intensively involved in encouraging the UK's cheese export performance for nearly two years. The UK produces over four hundred different cheeses, which I consider to be some of the finest in the world.

'This MAFF-funded promotional cheese poster has been produced in French, Spanish, Italian and German, as well as English. It will be used in range of promotional activities both by the industry and British Embassies in target export markets to promote our excellent product.

'Last year, the British Cheese Seminar which MAFF organised was the first step in identifying a way forward in more successful marketing of British cheese. I am delighted to say that our cheese exports are showing an upward trend. I have every confidence that this is going to continue and I would hope that maximum use is made of the imaginative and eye catching cheese poster.'

UK cheese production has increased by 22% since 1991. In 1998 the UK produced 377,000 tonnes of cheese. The total volume of cheese exports between January and October 1998 were nearly 45,000 tonnes. This represents an increase of 13 per cent compared with the same period in 1997.

Copies of the poster from **MAFF, tel: 0171 270 8615**

Agriculture in the UK

Details of the UK's main agricultural events, incomes and financial structure of the agriculture industry during 1998 are now available in two comprehensive publications.

Agriculture in the United Kingdom 1998 is the eleventh volume in an annual series which describes agricultural and environmental policy developments. It describes MAFF's efforts in lifting the beef export ban, measures introduced to deal with the short term impact of the BSE crisis, developments on CAP reform and publication of the Agenda 2000 proposals; implementation of new EU rules on the welfare of animals in transit and environmental policy initiatives.

Total Income from Farming in 1998 fell for the third year in succession by 29 per cent (32 percent in real terms), 58 per in real terms since 1996. This follows an overall increase of 95 per cent in real terms between 1991 and 1995.

Farm Incomes in the United Kingdom 1997/1998 is the fourteenth volume in an annual series and gives detailed analyses of the developments in the income, assets and liabilities of the agriculture industry at the farm level and in aggregate.

Full details of the Aggregate Agricultural Account for the 1998 calendar year and records in *Agriculture in the UK 1998* show that:

- agriculture accounted for 1.0 per cent of the UK Gross Domestic Product and 2.3 per cent of the total workforce;
- the 22,300 largest UK holdings, 9.4 per cent of the total, accounted for over half of all agricultural activity;
- farm-gate prices for agricultural products on average fell by 7.4 per cent;
- the values of the industry's Gross Output (at basic prices) and Intermediate Consumption fell by 9 and 8 per cent, respectively; and the value of agriculture's Gross Value Added (at basic prices) fell by 11 per cent.

The main changes recorded in *Farm Incomes in the United Kingdom 1997/1998* are as follows.

- In 1997/98, average net farm incomes fell for all types of farm in the United Kingdom, ranging from a 36 per cent fall for dairy farms to a 92 per cent fall for Cattle and Sheep (lowland) farms; and mixed farms in Scotland, Wales and Northern Ireland recorded falls of over 100 per cent.
- In 1998/99, it is estimated that, with the exception of General Cropping, all farm types in the United Kingdom again recorded falls in average net farm incomes.
- These falls range from 35 per cent for cereals farms to nearly 400 per cent for Cattle and Sheep (lowland) farms; General Cropping farm incomes are estimated to have increased by nearly 60 per cent due to higher potato prices.
- Net worth remained largely unchanged overall in 1997/98, increasing by half a per cent in Wales and 1 per cent in Northern Ireland, but falling by just over 1 per cent in England and Scotland.
- The average level of bank loans in 1997/98 increased in all four countries. However, around 45 per cent of farms in the United Kingdom had no bank borrowings.

It should be noted that the income figures for 1998/99 included in *Farm Incomes in the United Kingdom* are provisional estimates for the year ending February 1999 and are subject to revision.

Agriculture in the United Kingdom 1998 (Price £15.00, ISBN 0-11243049-X) is available from The Stationery Office (TSO), Tel: 0171 873 9090. This and *Farm Incomes in the United Kingdom 1997/98* are available on the Internet at www.maff.gov.uk.

Pirelli Agricultural Tyres - Trelleborg Wheel Systems A joint venture for agriculture

Pirelli Agricultural Tyres, pioneer of low-section radial tyres, and Trelleborg, pioneer of low ground pressure tyres, have signed an agreement to form a joint venture to manufacture and to market the agricultural product lines of the two brands, reinforcing their role and presence in the marketplace.

As a result of the agreement, the new company, Trelleborg Wheel Systems SpA, becomes the only tyre manufacturer in the world having agricultural tyres as a 'core business', offering to its customers a complete and wide range of products to satisfy all needs within agriculture and associated fields.

On one side is the Pirelli range, specialising in high technology, high performance radial tyres to fit all types of tractors from small orchard and vineyard models to the most advanced units of more than 200 kW. On the other side is the Trelleborg range, specialising in bias-belted tyres in sizes to suit most agricultural and forestry machinery, where the company shares world market leadership, encompassing tyres for tractors, implements, trailers, harvesting equipment, garden and compact tractors, mowers and attachments.

The joint venture is controlled 60% by Trelleborg and 40% by Pirelli Tyres. The combined sales of the two brands of agricultural tyres will generate a turnover of more than £110 million. To support the activities of the Italian factory at Tivoli, near Rome, an investment of more than £11 million is planned over the next three years as well as the launch of a new range of products.

Trelleborg Wheel Systems has been fully operational in the United Kingdom and Italy since 1 January 1999 and will commence operations in France from 1 May 1999. From May, the world-wide activities of Trelleborg Wheel Systems SpA will be directed from new headquarters at Tivoli, close to the production facility. It is from this historical Pirelli site of approximately 224,000 square metres, that Trelleborg Wheel Systems SpA is confident that the strength provided by focusing totally on the agricultural market will enable it to satisfy the needs of farmers throughout the world better than any other company.

Membership Matters

Quarterly The Newsletter of the Institution of Agricultural Engineers Spring 1999

IAgrE appoints new Chief Executive and Secretary

The Institution of Agricultural Engineers (IAgrE) is pleased to announce the appointment of Mr Christopher Whetnall as Chief Executive and Secretary in succession to John Neville who retired at the end of February. He took up his appointment on February 1st.

Chris Whetnall, who is 51, joined the Institution in 1970 and has been a Member since 1975. Following Voluntary Service Overseas and an initial period of 6 years teaching agricultural engineering in Kenya, UK and Fiji, he had a 20 year career with resource development consultants, Hunting Technical Services Limited (HTS), part of the Oil Division of Hunting plc. During this period, he worked on both long and short term consultancy assignments in over 20 countries including Iraq, Sudan, Somalia, Saudi Arabia, Hong Kong and China working for a variety of private and institutional clients including DFID, EU, IBRD and the African and Asian Development Banks.

In 1988, Chris started HTS' sister company Hunting A S Ltd (HAS) an international trading and procurement business supporting both HTS and third party clients and exporting to over 60 countries.

Appointed to the main board of HTS in 1993, Chris Whetnall had board level responsibility for HAS and, latterly, HTS' UK environment business, procurement and corporate IT/MIS strategy.

A native of Yorkshire, Chris has lived in Hertfordshire since 1980 and now lives in Lilley. He is married with a daughter, 24 and a son, 22. His leisure activities include d.i.y., reading, travel, tennis and sailing.

ASAE supported by IAgrE mark anniversary of ventilation system

The slotted inlet ventilation system for livestock housing was conceived in 1948 by Professor William F Millier at Cornell University. This simple air-inlet system provides uniform distribution of air pressure by making the inlet an integral component the full length of the building structure. After its introduction, it has been adopted to the extent that it the most commonly used air-inlet control mechanism for mechanically ventilated systems throughout the USA.

The American Society of Agricultural Engineers recognises achievements of this calibre with the presentation of plaques to the institutions concerned. Consequently, at a seminar on the subject, at Cornell on 24 November 1998, Melissa Moore, ASAE Executive Vice President presented William Millier with a plaque to mark the 50th anniversary of the discovery of the slotted inlet system.

Professor William Millier holding the IAgrE Certificate he received from Dr Mike Kelly (left), with Dr Andrew Landers (right), now extension specialist at Cornell University.

Dr Mike Kelly, Head of Building Design within the Environmental Division of SAC, was invited to speak at the seminar, and also presented Cornell with a Certificate from IAgrE supporting the ASAE initiative.

The links between ASAE and IAgrE are good, and meetings of this type which jointly recognise achievement go a long way towards cementing contacts and friendships between the two organisations.

Claas at Herts and Essex Branch

The first of our Winter meetings was a talk on the **Claas Xerion 2500 Tractor** by **Andrew Rabett** (Field Sales Manager/ Product Specialist). Andrew began by outlining the tractor's main attributes, which included:

- a multi-purpose tractor designed for all year round use
- 9.5 tonnes unladen, 32 t laden
- 40 km/h top speed, with no suspension
- high performance
- good visibility
- simple to operate
- good operator comfort
- highly mobile
- flexible chassis
- easy to maintain
- front and rear linkage
- 4 equal sized wheels, with 60% weight on the front and 40% on the rear when unloaded
- tractor can run on terra tyres
- differential locks on both axles

The speaker described how the cab can be secured in three positions: mid position, rear, and off-set (*e.g.* for mounting a sugarbeet harvester). It was a relatively easy job to move the cab, with pins to remove inside the cab and then a hydraulic ram to pivot the module (together with the 'umbilical cord') to its new position. The tractor's steering can operate under three modes: front wheel steer, rear wheel steer, 4 wheel steer, and joystick steering.

Andrew pointed out that the Xerion's hydraulics work on electronic load sensing, and can deliver 120 l/minute flow. There is no draft control on the front linkage, but it does have a float control. The engine is a 6 cylinder Perkins developing 187 kW.

In Andrew's words, 'the heart of the Xerion is the gearbox', and this features a completely stepless transmission system. Other options had been considered at the design stage, but hydrostatic, for example, would only give 75% efficiency, although of course it would give a stepless system. The Claas HM8 gearbox gives 87-92% efficiency, and offers the operator speed change without interruption to power.

The gearbox can be worked in four modes: speed control (like a hydrostatic), accelerator pedal (like an automatic truck), power mode and constant speed. The system comprises a hydrostatic unit and a mechanical gearbox working in tandem/parallel, and two linked epicyclics. A computer controls the output in its entirety, and the technology is very similar to that of Formula One cars! The driver of the 2500 has no knowledge/control of what gear he is in, even though gears are actually engaged by simple dog clutches. Andrew reported that Fendt and Steyr are using similar technology, although the Steyr system is closest to that of Claas.

In work, the tractor engine manages to keep a very smooth even note, with this feeling quite foreign to most tractor drivers. As a consequence of the gearbox control, the fuel consumption is much lower than a conventional tractor. The actual computer used on this machine is the same as the one used on the Claas Lexion combine. Andrew described how the computer would function in the (unlikely) event of a failure - it would display suitable error messages, and it is possible to drive the tractor in a limited mode in order to get home.

The tractor costs £100 000, and there are currently three working in the UK (with contractors, doing mowing, baling and power harrow/drilling operations in the main). Claas continues to work with other machinery manufacturers in order to develop suitable implements and combinations to use in conjunction with the Xerion. Andrew commented that there are no plans to compete with the lower power JCB Fastrac, which plainly has found a niche on UK farms. He also said that there were one or two coach and truck manufacturers interested in the gearbox principle.

The speaker concluded by saying that as far as Claas was concerned, they could see that in the future large farms would adopt the following workhorses:

- a systems tractor, *i.e.* the Xerion!
- a materials handler
- a high speed tractor mainly for haulage
- a self-propelled harvester (as required).

There would be no room for the general purpose 4WD tractor, and since Claas offers machines to fit three out of the four above, it was in a satisfactory position. Andrew reminded the meeting that Claas now sold a rough terrain telescopic loader (ex Sanderson) made at Saxham.

The vote of thanks was made by R Barrowman, and with an attendance of over 30, it had been a successful evening.

Richard Langley

New Chairman for Engineering Council

The new Chairman of the Engineering Council, Dr Robert Hawley (right) is congratulated by his predecessor, Dr Alan Rudge following his election by the Council's ruling Senate. Dr Hawley, Chairman of Taylor Woodrow, was formerly Chairman of British Energy and a past-President of the Institution of Electrical Engineers. Dr Rudge, who is Chairman of W S Atkins and Chairman of the Engineering and Physical Sciences Research Council, has been Chairman of the Engineering Council since its re-launch in 1996, following unification of the profession.

Institution membership changes

Admissions - a warm welcome to the following new members

Fellow
Do The Gia (France)

Associate Member
M A J Fairfax (Gloucestershire)
K W Ford (Staffordshire)
R J Goldsmith (Buckinghamshire)
M O Goodwin (Staffordshire)
A J Hooper (Herefordshire)

Associate
R B Gunn (Berkshire)

Student
S A Bentley (West Sussex)
C R Dakin (Shropshire)
O R W Hiers (Bedfordshire)
L K Jordan (Essex)
L K Kaptoge (Bedfordshire)
C Melvin (Bedfordshire)
A Paul (Bedfordshire)
T L Pomeroy (Worcestershire)
A J Puddephatt (Bedfordshire)

Reinstatement
C J Connor (Lancaster)

Transfers – congratulations on achieving a further phase of your professional development

Fellow
T Chamen (Bedfordshire)
Member
T Overbury (Gloucestershire)
Associate
J Wange (Uganda)

Engineering Council

Registrations

CEng
J E Fox (Kenya)
M J Thakoordin (Guyana)

IEng
S D Cartmel (Staffordshire)

Sweet visit

Twelve members of the Drying, Storage and Processing Group braved the November fog to visit British Sugar's largest refinery at Wissington near Downham market. We were given a fascinating tour of the factory from the intake of the raw beet through to the point at which the crystallised refined sugar and sugar syrup disappeared for further processing and/or storage. Hygiene and safety risks prohibit visitors to this final part of the process. We will remember most:

- the large scale of the overall operation, the factory being able to process in excess of 15,000 tonnes of beet a day;
- the computerised intake system which allows completely confidential yet rapid sampling and analysis of each load for cleanliness, sugar content and chemical impurities, with some 900 lorry loads are accepted each day;
- the ubiquitous presence of NFU observers during the beet acceptance phase;
- the use of water for transporting (initially over 60 m vertically) and cleaning the beet from each lorry through to the point at which sugar is 'diffused' from the shredded beet;
- the sheer physical scale of the plant, in particular the three counterflow rotary diffusers;
- the computer system that enables a handful of workers to monitor and control the whole process from one central control room;
- the competence of our guides Richard Manford and Phil Ayres.

The normal jobs of our guides are as area managers responsible not for the factory but for interfacing with beet growers and customers for the by-products beet pellets, lime and soil. However, their knowledge of the refinery operation and of the interaction of the problems of the factory with those of beet production added greatly to a most interesting visit.

It was approaching 7 p.m. as we left the factory and, as the fog had cleared, all of us repaired to a local hostelry for bar meals and further chat. Finally thanks to Mike Bennett for making arrangement with the factory and to Brian Stenning and the Institution Secretariat for arrangements overall.

Martin Nellist, Hon. Sec.

News of Members

Richard Heath of Lackham College is anxious to acquire back numbers of the Institution Journal, to complete the set in the College library. Anyone willing to donate copies is invited to contact Richard on 01249 466800 ext. 300.

After almost 3 years as a Waste Engineering Specialist and Engineering Lecturer at SAC Auchincruive, **Phil Amos** has accepted an Engineering and Physical Science Research Council studentship to study for an MSc in Environmental Engineering at Newcastle University. The Environmental Engineering Group within the Civil Engineering Department has strong contacts with industry and has been a major player in the development of many wastewater treatment systems in use today. Part of the MSc is a five month research and design project looking at passive treatment systems for acid mine drainage, a major problem in the North East of England and Southern central Scotland. A passive treatment system designed by Dr Paul Younger of the Civil Engineering Department and installed at the former Quaking Houses Colliery in County Durham has recently won the conservation Project of the Year Award.

Between leaving SAC and joining Newcastle University, Phil tells me that he jointly led a climbing expedition to the Bolivian Andes. The British Cordilleras Expedition 1998 spent two months in the Andes near the capital city of La Paz, and made probably the second British ascent of a 6000 metre peak, Chachacomani, probably the first ever ascent of a pinnacled rock ridge which they named 'Picos Ingleses' and probably the first British ascent of several 5600 - 5800 metre peaks in the area. The expedition spent three weeks at one basecamp and saw only three people during this time. Phil says that it took sixteen days to find out the World Cup final score!

S W E Butler is now attending the City University as a mature student and is studying for Bachelor of Engineering Degree in Aeronautical Engineering. He says that since gaining his private pilot's licence he has developed an interest in aeronautical engineering and maybe in the future he will be able to combine aeronautical and agricultural engineering.

After leaving Silsoe with an MSc in soil conservation, **Garret Gillespie** worked on a farm until December 1998 when he left for the Yukon in Canada. He intends to spend the winter months in Canada pursuing recreational activities. On his return, he will be looking for a suitable position in agricultural engineering, particularly in the areas of soil management in developing countries. Garret would appreciate any assistance from other members in this respect.

K W Priddle works for Transco as a Project Manager on a new high pressure pipeline and is based at Aylesbury. He started work with British Gas and was promoted to the new post with Transco as Agricultural Liaison Officer. However, his home is still in Somerset.

After spending 15 years working in Swaziland in the Pineapple, Sugar Cane and Road Transport Industries, **James Ward** considered returning to the UK but was unable to find suitable work and has therefore moved to Port Shepstone in South Africa. His new post is to manage a transport depot for Unitrans Sugar which has 48 employees, 13-14 trucks and associated fleet of cane, flat deck and sugar tankers. The company transports harvested sugar cane from various farming areas in the Eastern Cape, southern Kwa-Zulu Natal, and the local areas to the Umzimkulu Sugar Mill. They also transport all the products of the mill, some in bulk sugar tankers and others as one tonne bags and pre-packed palletised loads. Both operations run 24 hours day, with a fine balance between delays in loading and off-loading sugar, with the production rapidly using up all of the available warehouse space. All of the finished products are taken to huge warehouses in the Durban's docklands (125 km North) where it is either sold into the local market, or loaded onto ships for export.

The cane industry in South Africa is very different from the one in NE Swaziland. All the cane is entirely rain fed, not irrigated, the growing season is correspondingly longer, the terrain is very hilly, and harvesting is generally more labour intensive (cut and stack). Their haulage distances are also far longer, as high as 74 km from some loading zones. They load a mixture of bundle and grab loaded loose cane, and the mill off-loads using the spiller bar method which is quick and efficient. James says that there are many new challenges, one of the biggest being to operate profitably as part of a listed company within the existing transport legislation, and not overloading the vehicles plays a large part in this. They are experimenting with self weighing systems using load cells, and certain other load control measures. The Company is also examining several types of cane transport machinery to work in the field, including driven road trailers. New labour legislation has also been introduced, modelling mainly on Scandinavian labour law, and working within these constraints in an African environment requires close attention. As the transport cost is a significant component in the sugar industry, James hopes to be involved in using applied technology to keep their fleet ahead of others, by optimising payloads and generating new business in the area which will involve closer links with the actual harvesting operations. There is also the possibility of picking up work in timber transport from inland areas.

James tells me that he has recently completed the Henley Diploma in Management and hopes to be able to complete the MBA programme during the next few years. He sends his best wishes to all Institution members for 1999 and for the Millennium.

Last Autumn, **John Ray and his son** sold their 120 ha farm in Oxfordshire and have bought a larger farm near Kirriemuir in Angus. John says that to be profitable they needed more than 120 hectares for the two of them and whilst on a short holiday in Scotland he came across Ladywell Farm which was for sale. The next weekend his son went to look at it and they decided to make an offer which was accepted quickly. The new farm consists of about 196 ha and has two pig units. They are also renting some more land so that they have over 240 ha in total.

The Institution of Agricultural Engineers

Landwards

Author and Subject Index 1994-1998

(including the final editions of *The Agricultural Engineer*)

INSTITUTION OF **AGRICULTURAL ENGINEERS**

LANDWARDS

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Crop sprayers - What now, What next? (Conference) Development and use of a coupling system for small volume refillable containers	Perryman M A	1994	49	1	27
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Fifty years at Wrest Park - past and future role for Silsoe Research Institute	Legg B J	1998	53	1	17-20
Agricultural Engineering: the centre of the spider's web: Presidential Address	Legg B J	1998	53	2	2-5

INSTITUTION OF **AGRICULTURAL ENGINEERS**

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West End Road
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MK45 4DU

They are intending to rear pigs under contract for the adjoining estate. We wish both of you success in your new undertaking.

Richard Goldsmith is now managing the development of a 500 ha coffee estate in Zambia for the African Plantations Company Ltd. This development will include dam construction, drip and centre pivot irrigation systems, and a coffee processing factory.

Norman Skea is still in China, where he is engineering manager of an ice-cream factory for Nestle.

Dave Gee-Clough has now retired from the Asian Institute of Technology, but is still living in Thailand, and can be contacted at 50/127 Baan Thipmongkol, 501 Wat Naam Daeng, Bangkaew, Bang Phli, Samut Prakhan 10540, Thailand Tel: 753 7287.

Letter to the Editor

19th February 1999

Dear Editor,

Having recently paid my subscriptions to this Institution and the IMechE. I was once again reminded of the somewhat fragmented way in which the engineering profession is represented, and reflected on the fact that since the publication of the Fairclough report there seems to have been only sporadic progress towards the goal of unifying the profession. I have noted particularly that the recent mergers have all been comparatively large organisations becoming larger. Even the IMechE and IEE would seem to have a conspicuously high number of joint activities, suggesting that a merger between these two is not unthinkable. I certainly find in my own professional life that mechanical and electrical activities are increasingly inseparable, reinforcing the point further.

From my time sitting on the IAgrE Council, some years ago, I know that these issues have been discussed. At that time, no action was thought necessary but I do not know whether the issue has been discussed since. It is certainly my belief that the members would be better represented as a specialist group of a larger institution than as a small institution. In addition, the more mergers that take place the smaller the IAgrE will be in relation to the others and could therefore risk being sidelined. The fact that membership has been declining for a number of years would seem to suggest that some sort of action will be inevitable sooner or later in any case.

I also believe that engineers will never realise the status to which they aspire until represented by a unified voice, as in other professions, and legislation requires that certain activities can only be performed by professionally qualified persons. The former certainly requires unification, whilst the latter would be more effectively lobbied by a single large organisation.

These views are not put forward as a criticism of the Institution or its officers, who I know work hard to pursue the aims of the Institution. I put them forward for debate amongst the membership as a whole, since I believe it is a matter which affects everyone.

That's enough from my 'soap box', so let's hear some other views!

Yours sincerely

Dr David Hatherill MIAgrE

74 Shirley Avenue,
Shirley, Croydon, Surrey CR0 8PH

[This matter is being kept under review by your Council Members who would also be pleased to receive more opinions. Editor]

BCA celebrates 50 years of education and training

The millennium is a true time of celebrations for staff and students, past and present, from the Berkshire College of Agriculture, Burchetts Green, near Maidenhead. 1999/2000 is the 50th academic year of the College, which started out as an agricultural centre, but now trains students in such diverse activities as Marine Engineering, Greenkeeping and Child Care. Agriculture, Land and Countryside Studies, Horticulture and Veterinary Nursing remain at the heart of the College, with Animal Care and Equine Studies now offered up to Higher National Diploma level.

Decade re-unions are planned throughout the year, beginning with a dinner for those at College during 1949/59 on 11 September 1999. Students from 1959/69 will join together on 30 October and those at College during 1969/79 can celebrate together on 12 February 2000. Events will culminate at the Summer Ball on 16 June 2000, when 1979 to current students can celebrate, joined by any others who wish to come along.

BCA Principal, Peter Thom, said 'I very much look forward to all our celebrations and to welcoming past students and staff back to College. The College continues to go from strength to strength. The curriculum has inevitably broadened out, ensuring the continued prosperity of the College'.

Contact: **Carol Taylor at the College on 01628 824444; fax 01628 824695; e-mail:** marketing@bca.rmplc.co.uk

Plan endorsed for future role of Engineering Council

A report outlining the future role and activity base of the Engineering Council has been endorsed by the Council's ruling Senate.

The report, *The Way Forward,* has been produced by a group of senior figures from the engineering profession, who have carried out the first major review of the Council's activities since its relaunch in 1996, following unification of the profession.

The report recommends a more flexible approach to the Council's activities with the aim of giving better value for money to its 285,000 registrants, whose fees are by far the Council's greatest source of income. It is intended that the recommendations will result in a leaner and more dynamic Council, better able to respond to change. This reflects not only what is happening throughout the public and private sectors, but also the professional engineering Institutions that the Council represents.

The proposals will now be taken into development and implemented in consultation with the Institutions. This work will bring together the Council's developing strategy and, through the Council's Senate and Boards, set in place the changes necessary to take the profession forward.

The report's principal proposals include: devolving more activities to the Institutions or other agencies, but maintaining responsibility for standards and quality; transferring the burden from the fees of registered engineers to other sources of income; capping or reducing registrants' fees; improving the effectiveness of the Senate as a forum for the engineering profession; improving awareness of the Council's activities to a wider range of beneficiaries.One of the fundamental proposals is that the non-core activities of the Council should be subject to a time limitation of between three and five years, after which they would be transferred to another agency or terminated.

The chairman of the activity review group, Dr Alan Rudge, the retiring Chairman of the Council, said: 'The intention is to continue the process of shaping the profession which was begun by the agreement for setting up the new Engineering Council and creating the partnership with the Institutions. It seeks to build on the successes of the Council and to deal with some of the difficulties and challenges that have arisen as this role has developed over the past three years. Despite all the challenges that achieving a united engineering profession implies, the need for unity has never been greater. Since the Council's relaunch much has been achieved, both internally and externally. The infrastructure and processes supporting the Senate and other boards and committees are working effectively and, externally, the Council has consolidated relationships with Government, industry and the Institutions.'The members of the activity review group, together with Dr Rudge, were Roger Dobson (Director General and Secretary, Institution of Civil Engineers); Senate member Robert Foster (Department of Trade and Industry); Malcolm Shirley; Peter Wason (Secretary, Institution of Incorporated Engineers); and John Williams (Secretary, Institution of Electrical Engineers).

Commercial Members

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Autoguide Equipment
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Mr C M Blackbrough IEng MIAgrE
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Salford Priors, Evesham
Worcestershire WR11 5SW

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16 The Oaks, Silsoe,
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Dr C D Mitchell CEng FlAgrE
Farm Energy Centre
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Warwickshire CV8 2LS

Membership movements

Mem No	Name	From	To
2030	A L Baldwin	Russia	Norfolk
6328	R J Brindle	Scotland	Staffordshire
4820	P N Burt	Tyne and Wear	Northumberland
5151	N D Ede	Ghana	Mozambique
6496	C D Forsyth	Cumbria	Perthshire
6742	R J Goldsmith	Buckinghamshire	Zambia
6130	S Haresign	Bedfordshire	Lincolnshire
6727	J E Holmes	Lancashire	Essex
6718	T C Kindred	Essex	Suffolk
3008	D J Lees	West Midlands	Northumberland
6136	A J Ray	Oxfordshire	Angus
5803	K J Ray	Oxfordshire	Angus
5636	S A Rendell	Cambridgeshire	Devon
4813	P D Rowland	TanzaniaUganda	
6589	M H Shah	Oman	Canada
6401	P E Walmsley	Staffordshire	USA
4955	J H Ward	Swaziland	South Africa

Gone Away

Name	Last known address
Leanna Dawn Pritchard	14 Braziers Quay, South Street, Bishops Stortford, Hertfordshire CM23 3YN
David Adam Scotchmer	4 Preston Court Cottages, Preston Cross, Ledbury, Herefordshire, HR8 2LL

Long service certificates

50 years

Name	*Grade*	*Date of Anniversary*
Peter Charles John Payne	CEng FIAgrE	6 Jan 1999
John Bishop	IEng MIAgrE	18 Jan 1999
Stanley George Hanson	CEng MIAgrE	18 Feb 1999
Walter Clifford Hill	FIAgrE	18 Feb 1999

35 years

Stephen. Godfrey Brunner	MIAgrE	9 Jan 1999
John Robert Edmunds	IEng MIAgrE	9 Jan 1999
Kenneth Albert McLean	IEng MIAgrE	9 Jan 1999
David Gardiner Mitchell	IEng MIAgrE	9 Jan 1999
Anthony George Moon	MIAgrE	9 Jan 1999
Leonard Wallace Ormiston	IEng MIAgrE	9 Jan 1999
Oliver John Henry Statham	IEng MIAgrE	9 Jan 1999
Thurston Frank Weaving	IEng MIAgrE	9 Jan 1999
Peter Bernard Forba Fru	IEng MIAgrE	2 Feb 1999

25 years

Adeniyi Ebun-Oluwa Talabi	CEng MIAgrE	1 Jan 1999
George Dugald Paul	AIAgrE	4 Jan 1999
Beni Gopaul Sankar	IEng MIAgrE	18 Feb 1999

Agricultural Engineering for the 21st Century

99 International Conference on Agricultural Engineering

(99-ICAE)

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- Rural Structures, Bio-environment and Waste Treatment Engineering
- Post-harvest Technology and Food Engineering
- Farm Electronics, Information Technology and Precision Agriculture
- Biomass Engineering and Rural Energy
- Aquacultural Technology
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- Strategies for Sustainable Agriculture
- Workshops on Special Subjects

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Progress at Engineering Council

As we enter the year of celebrating the end of this millennium, there is a lot of good news for the Engineering profession, which has made considerable progress in a range of areas in the course of 1998.

Among the many significant developments, we have seen the creation of the Institution of Incorporated Engineers (IIE), now established as the biggest Incorporated Engineering Institution. The IIE is working hard in conjunction with its fellow Institutions and the Engineering Council to promote the qualification of Incorporated Engineer as a significant and important professional engineering standard. We are starting to persuade both academia and industry of the importance of the Incorporated Engineer to the future of the profession, but there is still much work to do. The creation of the IIE has been a significant move in that direction.

Linked with the position of the Incorporated Engineer is a continuing work on the development and acceptance of SARTOR with the main routes now defined towards registration. While some development work here remains to be done, I am glad to say that SARTOR is now largely regarded as the national standard.

We have also achieved much progress with the promotion of engineering and, in conjunction with the Institutions, have been working hard on raising the profession's profile. We are now engaged in on seeking Industry sponsorship for the planned National Marketing Campaign, being mounted in conjunction with the Engineering Employers' Federation and the Engineering and Marine Training Authority. This should be a major boost to our profession and above all to improving its recognition and perception among the general public. One of the key aims of this campaign is to attract more young people of the right quality into the profession and to boost all the good promotional work that is already being done by many organisations, mostly volunteer, across the length and breadth of the UK.

A lot has also been achieved in the last year with raising the status of engineering in the view of Government and parliament, and the Engineering Council has played a major part to this end. Again, much support is provided by the Institutions, particularly the contribution of the Institution of Civil Engineers in hosting our regular briefings for Engineer MPs.

The many activities, including conferences, competitions and awards, taking place during the course of the year have also played their part in the continuing promotion of the profession. The Engineering Council's own *Young Engineers for Britain* competition goes from strength to strength and the *Environment Award for Engineers* is being further enhanced this year.

There was more good news for the profession with the publication of the Engineering Council's Statistical Review, which shows that engineers have an increasingly firm foothold on the boards of our major companies and overall our salary levels are more than holding their own.

Last year ended on a happy note with a Carol Service in what is now the Engineers' Church of St Peter's in Eaton Square. Now an established event in the engineers' calendar, I hope that more will attend with every year. The Competitiveness White Paper also arrived late in the year and, with encouraging emphasis placed on our engineering and technology base, served as a welcome Christmas present for the profession.

The year also ended with the completion of the Engineering Council Activity Review, the report of which is now before members of Senate. This it is likely to mean a good deal of change within the Engineering Council as it moves forward to serve the profession to better effect. Its aims include reducing costs and creating a more dynamic Council, giving it greater flexibility to take on new tasks, particularly in conjunction with the Institutions.

Whilst identifying all the good news, there remains much to do in 1999, of course, particularly with regard to establishing clear messages which can represent the profession's unity of purpose. One area of anxiety is over possible revisions to the National Curriculum which may further dilute science and technology in schools, and are working closely with Institutions in making clear our concerns.

We also need to make continuing progress on expanding all classes of the register and the benefits of registration and Institution membership for all engineers. This requirement becomes all the more urgent with the analysis of our statistics of the numbers joining the Engineering Council Register in 1998. Once again, we have seen a drop across all categories of the Register. Although small, the downward trend is consistent and is compounded by the high age profile of the registrant population. The biggest fall is in Incorporated Engineers, the very group we should be concentrating on, and one where registration levels have halved in the past ten years.

The need to encourage registration (and at the same time Institution membership) is a shared problem between the Engineering Council and the Institutions, which we need to tackle together if we are going to reverse the decline and assure the future of the profession. This must be the primary task for us all in the months ahead and the Council is developing marketing expertise to take this forward.

The steady improvement in the reputation of the engineering profession will only continue if we all work on all these issues together. This means standing back and ensuring that we all appear as a coherent and united profession, speaking with one voice.

The profession now has a structure that is producing positive results, but building on these successes will only be achieved by commitment from everybody. This will often mean compromising some local concerns in order to serve the greater good.

Malcolm Shirley, Director-General

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INSTITUTION of AGRICULTURAL ENGINEERS, WEST END ROAD, SILSOE, BEDFORD, MK45 4DU, UNITED KINGDOM. Tel: 01525 861096 Fax: 01525 861660

UK agricultural tractor registrations in 1998

Total UK agricultural tractor registrations (over 30 kW) fell 37.2% in calendar year 1998 to 9,586 units. Registrations of compact tractors (30 kW and below) declined 10.4% to 916 units.

1998 proved to be an exceptionally depressed year for sales of tractors and indeed for other types of farm machinery. The market sank to the lowest level seen since the registration data began to be collected in the early 1960s. The primary reason for the poor volume of sales was obviously the extreme financial difficulties that most sectors of farming experienced during the year. It is well known that sales of tractors tend to be highly cyclical, with investment being cut back disproportionately during downturns but frequently rising rapidly during periods of recovery.

In reviewing the prospects for the coming year, we believe there is a prospect of some modest improvement. Whilst farm incomes are likely to remain low in the short term, there have recently been some small signs of recovery and we anticipate these will strengthen during the year. Certainly the level of interest shown during the recent Royal Smithfield Show was encouraging and we hope that this indicates that the market has indeed reached bottom and will shortly turn. The trade, therefore, is anticipating a modest increase in sales in 1999 to a level back above 10,000 units - it is likely that any real strength will come in the second half of the year.

Contact: **C J Evans, Economist, AEA; e-mail:** ***aeaecon@farmline.com***

Duncan Russell joins the AEA

Duncan Russell has joined the AEA as Services Manager. Duncan's main tasks will be the administration of the Sprayer Testing Scheme and Tillage events.

The Sprayer Testing Scheme was set up in June 1997 and, to date, around 35 test centres have been set up and some 500 tests carried out. Figures obtained show that worn nozzles are the most common cause of failure, 33% of those tested. Items inspected during the test include mechanical safety, delivery system, application system, accessories and ancillaries. Each machine that passes is issued with a unique certificate number and the owner informed in two years time when a re-test is due. Tillage has grown into a well known and supported event in the calendar, with three events being planned for 1999. Venues being in Lincolnshire, Shropshire/Staffordshire and Scotland.

Having grown up on the family farm, Duncan joined Vauxhall Motors as an engineering apprentice before returning to the farm and eventually farming in his own right. Duncan has been County co-ordinator of Normac since 1987 and has organised the Normac Demo and other Normac events. He joined Easton College as a part time lecturer in 1990, becoming Training Manager in 1994 until he left there at the end of February.

Duncan is married with two daughters and has a great interest in things mechanical particularly Harry Ferguson and Ferguson tractors, owning one of his 'grey tractors'. In addition, he is a great watcher of Formula 1 motor racing. In his spare time Duncan writes a monthly column, Russell's Ramblings, for *Farmers Guide.*

Logica chose ERDAS® for agricultural projects

Logica, a leading independent software consultancy, has won several key precision farming projects in Europe and has selected ERDAS IMAGINE ® for all of them. These include a monitoring system for the Potato Marketing Board (PMB), the Cereal Yield Estimation System and 'FarmSense', a CD-ROM based product aimed at bringing imagery into the hands of farmers.

The PMB and Cereal YES systems use satellite remote sensing techniques and GIS to provide growth maps to accurately assess and predict the revenue it derives from the levy placed on farmers. All the projects were funded by the European Commission Centre for Earth Observation (CEO) and use high resolution IRS-LISS and SPOT-XS satellite imagery, as well as local meteorological data and crop/soil type information in order to provide an estimate of yield potential which can be updated daily throughout the growing season.

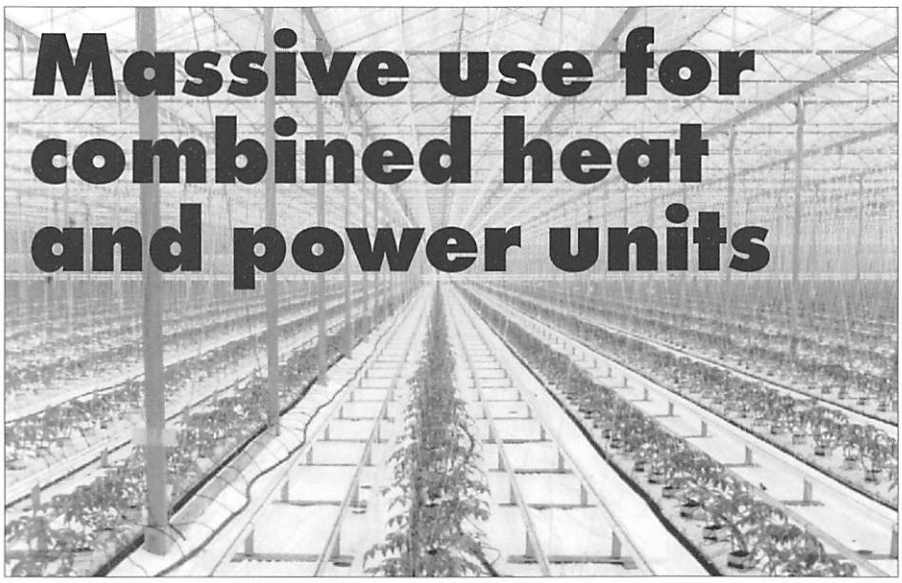
Crop classification maps are produced prior to the main potato harvest to enable field checking to be carried out. Logica chose ERDAS IMAGINE running on Windows NT for all image processing and mapping as the preferred software application because it provided the widest range of image processing tools with a well integrated vector processing environment which is crucial for integration with GIS data.

The software is being used to rectify and classify several years worth of SPOT XS data to produce crop maps with accuracy statements, which enables the clients to compare actual planted crops against declared yields. Coupled with conventional ground level checking, this allows for increased efficiency of policing crops thereby protecting revenue. The maps provide the clients with an indication of those fields which are growing crops along with other information from the GIS database, such as planting returns which indicate the claimed area under cultivation as returned by the farmer.

ERDAS IMAGINE's advanced hybrid classification techniques are linked with information provided by the individual farmers in the form of a planting return along with 1:25,000 and 1:50,0000 maps which are used as a backdrop for the classification outputs.

The 'FarmSense' CD-ROM based product, a recently completed contract also awarded by the CEO Programme, involves Galaxy PrecisionAg Services Ltd, Logica UK Ltd and ERDAS (UK) Ltd. The project uses ERDAS MapSheets Express, free map-viewing software, and takes the form of a self-extracting jointly developed CD-ROM. The CD-ROM demonstrates how farmers and agribusiness can use satellite-imagery and other field-mapping data on their PC's cost-effectively and easily whilst adding value to their existing information systems. The CD-ROM contains an online tutorial introducing mapping data and techniques, over 100 Mb of British mapping data and a free copy of ERDAS MapSheets Express™. Further information on this project can be found at http://www.jhbunn.co.uk/galaxy.

Massive use for combined heat and power units



Planted out a month before this photo was taken, this is one of the three glasshouses devoted to tomato production at Runcton and totals 13.4 ha in all.

Geoffrey E Lawson

Though Combined Heat and Power units (CHPs) have been employed for some years for glasshouse heating, and especially in Holland, it has only become possible recently in the UK. In general, it is relatively easy to use the heat directly from these units, but the problem has always been the surplus of electricity that is generated at the same time. The Utility companies, until privatisation, have either been reluctant to buy in this surplus or, to offer such a low figure as to make it impracticable.

This state of affairs has been dramatically altered by a contractual arrangement between Hazlewood - VHB, our largest glasshouse grower (90 ha in total), and Scottish Hydro-Electric who are now responsible for supplying the energy from CHP installations. In short, Scottish Hydro sell heat and some electrical energy for the glasshouses, but absorb any surplus electricity into the grid for their own purposes. This neatly overcomes the problem for the grower and adds to the generation capacity for the energy supplier and becomes financially viable at the same time.

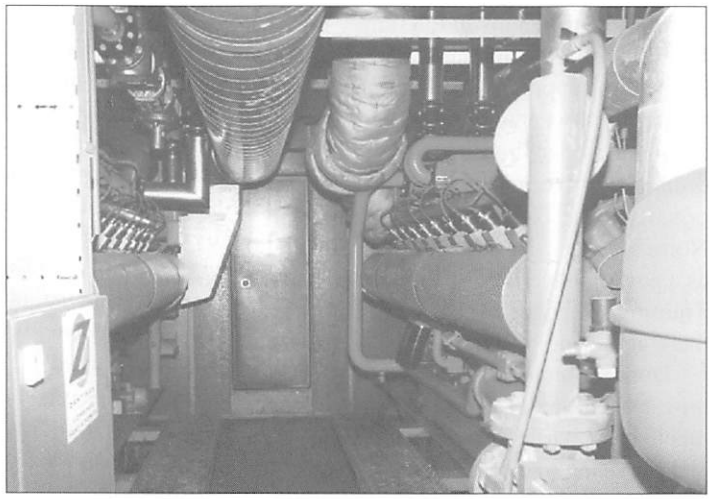
In practice, this has resulted in two very large CHP installations at the Hazlewood - VHB Nurseries in West Sussex and which venues provided a recent and very successful visit for the Horticultural Engineering Group when 30 members attended.

Production of pot grown herbs

Their West End Nursery, at Angmering, is devoted to very large scale production of pot grown herbs which are seen in most Supermarkets. Here, the energy source is from two Austrian built Jenbucher engines fuelled by natural gas and running 24 hours a day. Each engine has a cubic capacity of 48.7 litres with 20 cylinders in a 'vee' formation running at 1,500 rpm. In terms of output, each will produce 1 MW of electrical energy, of which only about 25% is used in the summer and 75% in the winter, and 1.25 MW of heat energy. As a safeguard, two conventional boilers are also used to maintain a sufficient level of heat, and this especially should the gas supply fail or be interrupted. It also follows that a surplus of heat will be generated by the CHPs during a warm day, and this is diverted into two huge insulated storage tanks whose contents can be brought back into the main circulating system during the night. It goes without saying, given the size and complexity of the overall system, that it is all computer controlled.

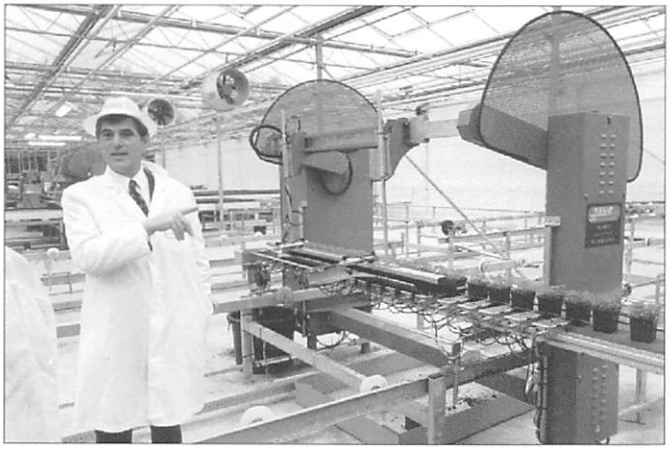
The exhaust, gases which are relatively clean anyway, are passed the into a three stage catalytic device where they are cleaned up to provide a valuable supply of CO_2. This is then ducted throughout the glasshouse by means small plastic tubes to increase the level up to 1,000 ppm to enhance plant growth. All the exhaust gas can be used in this way and so instead of increasing outside pollution, given exhaust to atmosphere, the plants absorb the CO_2 instead. Not only is this a positive environmental gain, but the efficiency of the CHP arrangement is such that it shows a saving of up to 42% of input energy compared with a power station source of electricity.

A very high degree of mechanisation

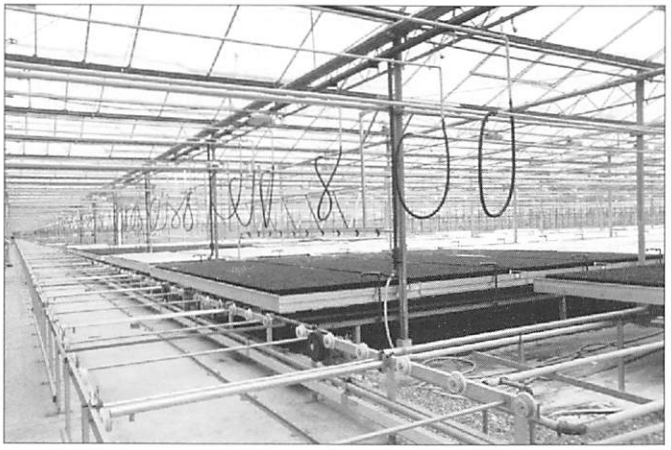


Each of these two 20 cylinder engines, which run 24 hours a day, produce 1 MW of electrical energy and 1.25 MW of heat.

Geoffrey Lawson MIAgrE is an Agricultural and Horticultural Engineering Consultant at 19 French Mill Lane, Shaftesbury, Dorset SP7 8EU. He provided this feature of a Horticultural Engineering Specialist Group visit for 'Landwards'.



Tony Girard (Operations and Development Director for Hazlewood - VHB) describes the almost fully automatic system for filling and seeding the pot grown herb production. Shown also is the machine for lifting a row of pots to place them out on a flat.



This view of part of the 6 ha glasshouse devoted to herb production shows the comprehensive transport system which filled flats out to the bays, and will bring them back for spacing out and eventually for despatch.

has been employed in the 6 ha glasshouse itself where, out of interest, even the compost has to be of 'food quality' because the pot grown herbs will go directly for sale on supermarket shelves.

The system is based on the typical large Dutch flats which hold the pots throughout, and which are transported mechanically around the preparation area for washing, filling, and seeding. They are then moved longitudinally along the ends of the house where they are transferred into their designated bays, and removed in due course in a similar fashion.

At the outset the filled and seeded pots are placed onto these flats automatically by a machine and they will return, having grown on, to be lifted off, spaced out and transferred to another flat to reach the next and final growing stage. When grown to 'sale' size, the flats come back to the packing area where the pots are removed, placed in sleeves, and packed ready for transport to the supermarket distribution centres. Virtually all this work is carried out automatically, with Dutch machinery much in evidence, though clearly supervision is necessary for quality control and health and safety purposes.

The pots on the flats have to fed with water and nutrient and the amounts will differ with the stage of growth and, bearing in mind the extent of the houses amounts to 6ha, this again involves computer management. This whole enterprise has to be seen to be fully appreciated.

Production of tomatoes

The Runcton Nursery, near Chichester, is devoted solely to the production of tomatoes but on an extremely large scale. The three glasshouses amount to 13.4 ha in all, and the plants are grown in rockwool blocks on rockwool slabs using a total recycling system for irrigation and nutrients. The energy source here is two Deutz engines powered by gas, operating 16 hours a day, and shut down for the remaining 8 hours during the night period. Each engine, which has an output of 2 MW, has 16 cylinders arranged in a 'vee' formation and running at 1,000 rpm., In a similar way to the West End nursery, the exhaust gases are cleaned up to provide CO_2 easily providing levels in the glasshouse of up to 1,000 ppm which is the optimum required for tomato production.

Heat storage is even more important at Runcton, because of the engine shut-down period, but here again the storage is vast with a total capacity of 3,200 cubic metres, and is designed to maintain appropriate temperature levels in the houses but also has the back-up of three conventional boilers when necessary.

Devoted only to tomato production the principal crop is the 'round' type, though some 'plum' and 'truss' tomatoes are also grown. The main long season crop is planted in October/November and will first fruit in February to be finally 'pulled out' in October. The tomatoes are planted two to each rockwool block and, over the whole growing period, the active length of the layered stems will extend to as much as 12 m and overall as much as 15 m.

Irrigation and nutrition requirements are controlled by computer, and the system is 'closed' so there is no drainage to soil and that form of pollution is avoided. Excess irrigation water is collected and sterilised by UV sources and stored for further use.

Surplus heated water, produced by the CHPs during the day, is stored in these tanks ready to be circulated through the glasshouses at night when the engines are not running. The tanks hold a total of 3,200 cubic metres and some idea of their size can be judged from the figures standing alongside.

Production of the round tomatoes is expected to reach 650 t/ha and the output from the whole nursery will, remarkably, account for some 6% of the total classic tomatoes grown in Britain. Again the whole glasshouse complex has to be seen to be fully appreciated.

The Committee and Members of the Horticultural Engineering Group would like to record their sincere thanks to Tony Girard (Operations and Development Director) and John Way (Director of Operations, Sussex), together with other members of the Hazlewood - VHB staff, for providing them with a truly memorable and technically informative visit.

John Way (Director of Operations, Sussex) together with his crop manager Bob Horn, answered many question from the Group on both the CHP system and the techniques of large scale tomato growing. Note each drip-fed rockwool block, standing on covered rockwool slabs, contains two plants which grow up in a narrow 'vee' formation.

HSE research proposes standard tests for vibration white finger

The Health and Safety Executive (HSE) has published two contract research reports on the diagnosis and management of a group of diseases called Hand-Arm Vibration Syndrome (HAVS), of which the most widely known disease is vibration white finger.

HSE estimates that around a million workers may be exposed to hazardous levels of vibration from hand-held tools and equipment and that around 36,000 people could have an advanced stage of HAVS. The disease is a chronic disorder which worsens with continuing exposure to vibration. It can be limited by early assessment but without objective measures it is difficult to be sure how far it has progressed. Both reports, by Professor Mike Griffin and Christopher Lindsell from the Institute of Sound and Vibration Research at the University of Southampton, describe tests to assess the extent and progression of the effects of HAVS.

Standardised diagnostic methods for assessing components of the hand-arm vibration syndrome, CRR197/98, examines tests which are sensitive to vascular changes (rewarming times, finger systolic blood pressures) and tests to diagnose neurological components of HAVS (thermal thresholds, vibrotactile thresholds). The report calls for tests to be standardised across UK testing centres so that data from different individuals can be compared.

Cold provocation tests for the diagnosis of vibration-induced white finger: standardisation and repeatability, CRR173/98, looks in detail at the methodology for assessment of the vascular component of HAVS. The findings of studies investigating certain experimental variables which may influence measurement of finger systolic blood pressures and finger rewarming times are also reported.

Dr Ron McCaig of HSE's Health Directorate commented, 'HAVS is a serious and potentially disabling condition which workers who are exposed to hand transmitted vibration may suffer. Health surveillance will often be needed for such workers based on reports of symptoms, often by questionnaire and physical examinations. Sometimes more detailed assessment will also be needed and objective test methods can help clinicians establish the severity of disease in individuals. The results of such test can help in managing further exposure to limit any further changes.'

Copies of *Standardised diagnostic methods for assessing the components of the hand-arm vibration syndrome,* ref CRR197/98, ISBN X, price £25.00 and *Cold provocation tests for the diagnosis of vibration-induced white finger: standardisation and repeatability*, ref CRR173/98, ISBN 0-7176-1574-X, price £15.00, are available from HSE Books, PO Box 1999, Sudbury, Suffolk, CO10 6FS, tel: 01787-881165

Book review

Practical Hydraulics

by M G Kay
Publisher: E & F Spon
ISBN: 0-419-22880-2

Melvyn Kay has succeeded in writing a book which takes the fear of mathematics out of hydraulics. This is a book for those who like their science explained by everyday examples and not by equations. It will suit non-engineers who require a working knowledge of hydraulics and could also serve as a primer for the increasing numbers of student engineers who find mathematics daunting.

Although the book primarily deals with water, it covers much of the material that should be covered in a first course in Fluid Mechanics. Kay has also chosen to describe many hydraulic phenomena with common examples, some of which lie outside conventional hydraulics. There can be few books on hydraulics that deal with the behaviour of cricket balls, the performance of supersonic aircraft, and the drag properties of swimsuits for female athletes.

The book is also strong on historical context. There are many short descriptions of the work of leading engineers and scientists who have contributed to the development of hydraulics. This should help retain the interest of non-technical readers.

Well illustrated throughout, the book has a number of useful worked examples that are placed in boxes. Fundamental equations are explained well. However, because of the lack of mathematical content, some applied equations which have a firm foundation in theory 'appear out of the blue'. However, this is a small price to pay for the book's ease of access. Many, more traditional texts are available which adequately cover these derivations.

The book is suitable for students of hydraulics and hydrology, non-engineering professionals who are interested in fluids, and those who simply find fluids fascinating and want simple explanations.

C S Parkin

Video reviews

Threshers and Threshing

A Video Review by Farming Press (Miller Freeman Plc)
ISBN: 0-85236-398-2
Retail Price: £15.99

Threshers and Threshing runs for just over an hour and, for me, that is its one draw back: it is too long. As has often been said about historic farm videos, they rely too much on film of the old working practices rather than informative content.

The balance is obviously difficult to find and there is no doubt in part this video comes close to achieving it. There are good explanations of the technical side of threshing and changes made, for instance, from steam to tractor power.

There is also well developed interviews with old contractors explaining the work of threshing gangs. My only criticism of the work is that it is punctuated with archive and modern film of the machinery which is far too long. Views of threshing plant in action is exciting but not for too many minutes or with too many repeats.

However, do not let me put you off if you are an enthusiast; I am sure you will enjoy the video. It is extremely well produced with first class commentary and it does contain 'historic moments' of interest to most who will never have experienced threshing machines in full swing or should I say steam.

M J Hann

Harvest from Sickle to Satellite

by Brian Bell & Chris Opperman
Old Pond Publishing, 104 Valley Road, Ipswich, IP1 4PA
Duration: 40 min
Price: £14.95 (inc VAT)

This video records the range of grain harvesting machines and methods that were on view at a 'Sickle to Satellite' event and tracks the development of harvesting methods from hand cutting with a sickle through to the latest design of combine.

The sequences showing the restored machines in action are excellent as is the accompanying commentary which provides performance details and information on the restoration of the individual machines.

An excellent historical review of the subject equally valuable to historians and those who just like to see old machines in action.

J H Neville

Ferguson Tractors

by Stuart Gibbard
Old Pond Publishing, 104 Valley Road, Ipswich, IP1 4PA
Duration: 55 min
Price: £15.95 (inc VAT)

This is a complete and detailed review of the history of the Ferguson Tractor tracing the development of this most influential design through from the early days to the point where Ferguson became linked with Massey Harris.

The viewer is taken through the model development in great detail and many variants of each model are shown.

This is a valuable information source for the many admirers of the Ferguson Tractor and would be particularly helpful to anyone contemplating a restoration project.

J H Neville

Tree logging with TIRIS radio frequency identification

Tree monitoring and recording is becoming of major concern for many organisations including local authorities, woodland owners, park commissions or organisations like the National Trust. But how in a long road lined with trees, or a copse of trees in a park or wood, does one identify and monitor the status of each individual tree? Conventional metal tags are readily defaced, stolen, or, in time, simply fall-off and are difficult to update.

Intelligent tagging

West Country based company Fujikura Europe has devised an intelligent labelling solution specifically for the arboriculture and forestry sector. Based on Texas Instruments Registration and Identification System (TIRIS) radio frequency identification technology (RFID), which is already in everyday use in many applications including car key engine immobilisers, Fujikura tree identification systems are already undergoing trials with local councils in England and Scotland, and in the Royal Parks in London. This new solution uses a low cost TIRIS electronic tag embedded in each tree. The radio frequency tag tree tag can be updated with information about the status of the tree, its maintenance requirements, *etc*, at any time. The data can be read with a simple handheld reader to allow safety or conservation officers or contractors to identify exactly which tree they are dealing with, to check its history before they carry out any work, and to record their actions - all in the field. The tags do not need batteries so they effectively last forever and require no maintenance.

Local authorities, woodland owners, park commissions or organisations like the National Trust increasingly have a statutory requirement to monitor, manage and protect trees under their care. With conservation concerns growing and lawsuits or damage claims especially against local authorities from fallen trees or branches increasing, how do organisations track and log data such as tree maintenance and hazard status for large numbers of trees simply and cost effectively? Intelligent tagging provides the answer.

The Fujikura Total Recognition System (FTRS) utilises a tiny, low-cost, laser encoded RFID silicon chip known as a transponder. These were developed and are manufactured by Texas Instruments and supplied to Fujikura by RFID Components, TIRIS' main distributor. Each radio frequency activated transponder is less than 4 mm in diameter and 24 mm long. It requires no electrical power of its own, and therefore no maintenance, and is immune to dampness and other atmospheric conditions as it is hermetically sealed in a glass encapsulation. Using a special hammer, a proprietary hollow nail, developed by Fujikura, is embedded in the tree that is to be identified. The small transponder microchip has a tiny copper antenna attached and is then inserted in the nail and covered with a plastic cap. If the tree does start to overgrow the end of the nail, the chip can still respond for a number of years. Alternatively, the cap can be removed and the tag simply withdrawn and replaced in a new hollow nail.

Thus, each tree has its own RF transponder which has a unique encrypted code. The tree itself is now uniquely identified and can have information transferred to it, or recaptured from its tag, by means of an external hand-held computer. The complete FTRS includes hand-held computers which are loaded with specially developed software for tree recording and general survey data capture. A reader on the computer simply emits an exciting radio frequency signal to interrogate the chip from near the foot of the tree, and the unique code and stored data is transferred immediately back to the user. It in fact takes just 70 milliseconds to read the information stored.

The FTRS software now provides immediate information to the system user on the screen of the hand-held computer. This might be used, for example, by a contractor to identify maintenance to be carried out, or by the surveyor to update information regarding the state of the tree. Data stored for future reference may be the current physical size - height and girth, for example, obvious visual effects such as bare branches and aphid infestation, results of ultrasound and microdrilling tests, and maintenance work that is required immediately.

In use today

Originally developed to log the decay of telegraph poles, the new tree tagging system is now in use or is being trialed by the councils of Leeds, Harrogate and Dundee, the National Trust, the Royal Parks of London, and the Royal Botanic Gardens in New York. All of the information, though encoded in the chip in only a maximum of 1360 bits, appears very clearly on the computer screen in a user-friendly format. Simple look-up tables already cover the common and botanical names of 250 tree species, and new entries can be added. For example, when encoding a new tree, entry of the single letter 'Q' will bring up *quercus* which then makes up one field of a new record. New look-up tables can be user defined when in 'manager mode', and then locked out from further changes when used in the field. Fields can also be selectively turned 'on' or 'off' in 'manager' mode to limit exactly what information is to be collected. Look-up tables typically would contain tree species, size class, age class,

environment, conditions, actions, priority and next action.

According to Phil Wade, Product Manager at Fujikura Europe, 'This unique solution is perfect for tree identification. Global Positioning Systems (GPS) are not accurate enough to pin-point each tree, especially when they are grouped together: bar-coding systems and any other physical tagging systems are so prone to vandalism and the environment, and cannot easily be adapted to store updated information'.

Hand-held computer

The hand-held computers have been specially developed in conjunction with TIRIS by hardware solutions provider Blackroc. As PSION's premier OEM, Blackroc has re-engineered the rugged PSION Workabout computer to make it application specific for use with TIRIS' RFID technology. The Blackroc T100F has two megabytes of Flash memory and acts as the computer/scanner for the tree identification system when loaded with the Fujikura FTRS software. They are all CE marked and meet the latest EMC approvals. The units feature industrial high capacity rechargeable batteries for long use in the field, and a long life. An alternative Workabout solution from Blackroc allows a bolt-on RFID scanner if customers are already using the hand-held computer for other applications. All the current data can be uploaded from a PC, and collected data downloaded at the end of a day's use out in the field for analysis and record creation for later retrieval. Printed information can be obtained either on-site or back in the office.

The RFID transponders are available as read-only tags that simply identify the tree with a unique code that cannot be overwritten, whereas the full multi-page read/write transponders described above coritain 1360 bits of memory. They can both be used in a very wide ambient temperature range from -40°C to +100°C. Smaller specimen trees can utilise an alternative housing that will simply attach externally to the tree.

Contact TIRIS' UK distributor: **Graham Lane, RFID Components Ltd, Wolseley Road, Kempston, Bedford, MK42 7UP. Tel: 01234 840102.**

Epsilon timber crane range

Developed using finite elements techniques, designed and manufactured with the latest computer aided equipment, and manufactured from high quality grain refined steel, to DIN 15018 and Hl - B4 standard, this new range of timber cranes, while being lighter, are stronger and have increased lifting power. All important factors to the haulier by giving greater payload capacity which is mirrored by highly cost effective operation.

Specifically designed for short timber loading, prototypes of the three new models, part of a family of timber cranes with capacities from 5 to 30 t, were bench tested to 120,000 load alterations. under maximum load.

To prolong operating life through reduced wear, the Epsilon E 12.78Z timber crane features an oil covered double-rack slewing system with end of stroke cushioning to ensure a high slewing torque while the column, in the crane base, is supported by a wear, and maintenance-free suspended bearing.

Rated at 11.5 t, the Epsilon E 12.78Z has a lifting capacity of 1400 kg at a max reach of 7.8 m. With a deadweight of 1985 kg it takes up just 0.75 m chassis space and can slew through 415 deg.

Long boom timber cranes, both the Epsilon E 8.74 and the E 12.97 have a linkage system mounted above the main boom and combined with return oil utilisation, provide increased lifting capacity.

With central lubrication and ergonomic top seat, and control rod layout to minimise operator fatigue, both the Epsilon E 8.74 and the E 12.97 operate at 270 bar.

With narrow main booms for improved operator visibility, Epsilon units are suitable for rear and front mounting, as well as mounting on trailers, debarkers and as stationery timber cranes.

Designed specifically to make service and mounting easier, and to cater for the special requirements of the timber industry, Epsilon timber cranes carry a two year warranty on all steel components and are designed to comply with all four parts of ISO 9001 and to DIN 15018 H1 - B4 standards. Operating a full UK sales and service network, Epsilon distributors T. H. White, one of the UK's longest established companies, presently has a turnover approaching £60m, and has provided machinery sales, service and support to a wide spread of industry for over 160 years.

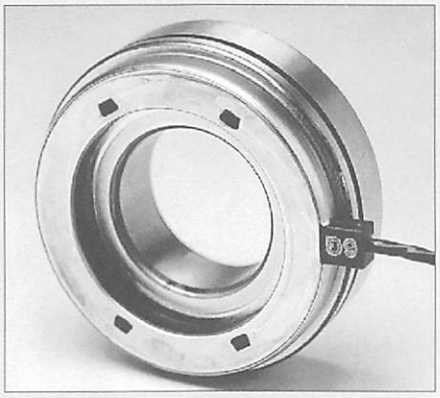
Contact: **T H White Ltd, Nursteed Rd, Devizes, Wilts SN10 3EA.**

Sensor bearings bring AC motor technology to fork trucks

By using a bearing with a built-in electronic speed sensor, manufacturers of fork lift trucks are now able to use higher performing AC electric drive motors in preference to traditional DC drive.

The bearing, produced by SKF, the world's largest manufacturer of bearings, incorporates a 'Hall-effect' sensor to measure the rotational speed of the motor shaft. In one of its first industrial applications, the bearing has been installed in a new AC Superdrive motor control system developed for the latest range of forklift trucks from BT Industries of Sweden for both the main traction motor and the lift trucks' hydraulic pump motor.

The bearing generates an accurate feedback signal of the rotational speed which has enabled the company to adopt AC motors for its forklift trucks. Despite the simplicity and lower cost of AC induction motor drives, DC motors have dominated the forklift truck market until



now because the cost of the control units for AC drives has been too high.

The bearing is based on a standard deep-groove ball bearing fitted with a magnetic impulse ring and two 'Hall-effect' sensor cells. The impulse ring is magnetised with 64 north and 64 south poles and, as they rotate, the poles develop a magnetic field which creates an electromagnetic field in the sensors. By using two sensors, the bearing can provide information on both speed and the direction of rotation.

The new AC Superdrive control system has been developed by Atlas Copco in conjunction with BT and electric motor manufacturer ELMO Industries. Fitting the bearing is very straightforward, requires no extra space and it is well protected inside the motor casing to provide a reliable, steady pulse signal.

Over the past 15 years, many industrial drive systems have converted from DC to electronically controlled AC drives because of their greater flexibility and the benefits of brushless operation. Despite falling AC motor costs and cheaper and more sophisticated power semiconductors, AC forklift truck control has remained too expensive.

However, with SKF's sensor bearing, the new control allows AC drive systems to match the cost of traditional DC drives while giving better performance.

Contact: **Chris Haywood SKF Industrial Sales Division, Sundon Park Road, Luton, Bedfordshire LU3 3BL. Tel: 01582 490049.**

Latest rotary cultivators can take double the power

Dowdeswell has extended its range of Powavator rotary cultivators with three models suitable for tractors producing up to 195 kW at the power take-off. Previously, the implement was only available for tractors developing a maximum of 98 PTO kW.

Known as the Powavator 260 series, the new models come in working widths of 3.05 m, 3.56 m and 4.06 m. All are of heavy-duty construction, engineered to deliver high workrates in the toughest of working conditions behind tractors equipped with 1,000 rpm PTO speed and Category 3 linkage ends.

A novel feature on the new machines is a split input shaft driving gear trains at both ends of the main rotor, which helps to balance power delivery and weight distribution. The splitter gearbox has a safety clutch and offers rotor speeds of 187 rpm, 222 rpm and 265 rpm at 1,000 rpm PTO input speed, selected by an automobile-style gear change lever.

Users have a choice of traditional 'L' bladed, spiked, speed-bladed or stubble rotors. The first-mentioned has a cutting, lifting and turning action, ideal for chopping vegetation and working down most soil types. The spiked rotor has straight tines designed for tougher, drier soils where a percussive action can help break down clods. The speed-bladed rotor is an alternative to the spiked rotor and is suited to deep cultivations, particularly on potato land. The stubble rotor has rectangular tines with a slight twist in the blade close to its mounting point. The resultant cutting, churning action has proved very successful breaking down and mixing in stubbles.

Degree of soil finish can be altered on screw-adjusted rear trailing boards, spring-loaded to minimise stress or damage in stony or heavy conditions. Options for all three machines include a choice of either twin depth wheels, a crumbler roll or a packer roller at the rear of the machine, front disc openers, a rear linkage for a bed former, and a front frame equipped with subsoiler legs.

Contact: **Michael Alsop, UK Sales Manager, Dowdeswell Engineering Co. Ltd, Blue Lias Works, Stockton, Nr Rugby, Warwickshire CV23 8LD. Tel: 01926 812335.**

Diary dates

Horticultural Engineering Specialist Group

Thursday, 20 May 1999

Venues: Mill Nurseries and Premier Plant producers, Keyingham

Large scale mechanised plant-handling systems under glass.

Mechanisation for glasshouse salads production.

Application of combined heat and power (CHP) in commercial glasshouse production.

Contact Tim Wilson Tel: 01482 842123

Soil & Water Specialist Group Conference

Wednesday, 17 November 1999

Venue: Silsoe College

Profitable wheat: a guide to cost effective establishment

Chairman: Mr Ben Gill, President NFU

Further details to be announced.

S E Midlands Branch

Tuesday, 28 April 1999

All day

Visit to Fens

(Follow-up of talk on 1 February)

Contact Secretary by 14 April

Saturday, 19 June 1999

At 19.00 h

Venue: Silsoe College

Rally Karting + Barbeque

Contact Secretary by 7 June

Thursday, 1 July 1999

All day

Visit to G's Fresh Salads Ltd.

Ely

Joint Meeting with the Machinery Management Group

Contact Secretary by 17 June

Hon Sec: M D P Matthews Tel: 01525 860000

Southern Branch

Tuesday, 21 April 1999

At 19.30 h

Venue: Rycotewood College

Paints and coatings in the new millennium

by speaker from Philip Johnstone Group (Sigma Paints)

June 1999

Weekend date and details to be confirmed

Location: Southampton

Visit to Southampton harbour, control tower, Ro/Ro and/or container ship

Hon Sec: O J H Statham Tel: 01865 782259

West Midlands Branch

Saturday, 12 June 1999

At 11.00 h*

Location: Lighthorne, Warks (& Warmington, Warks at 13.00 h)

Visit to Lighthorne Herb Farm, and to the National Herb Collection at Warmington

A chance to look around the Lighthorne Herb Farm with owner Peter Turner and then to tour round the National Herb Collection which he also runs.

* Numbers restricted, pre-booking via Hon Sec essential

Hon Sec: M C Sheldon Tel: 01926 318333

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