

Visit our
on-line store
and save up to 15%

In partnership with
Revaho

40%
Discount

Order on-line
a box of
Hunter I-31's
While Stocks Last



Specialising in Irrigation Systems

Call: 01829 731391

www.tcirrigation.co.uk

PROTEA GOLF MOWERS FROM £2,042+VAT

UNBEATEN CUTTING PERFORMANCE COMPARED WITH THE BIG BRANDS.
EASY TO USE, SIMPLE TO MAINTAIN.

"Awesome! Delighted with both our Greensmowers"
Greenkeeper, Golf Course, Derbyshire

"The cut was fantastic. I was impressed"
Head Greenkeeper, Golf Course, Edinburgh

- **20" 12-BLADE GREENSMOWER £2,042+VAT**
- **25" 12-BLADE GREENSMOWER £2,297+VAT**
- **25" 9-BLADE TEES MOWER £2,297+VAT**

All Protea mowers come with a full 2-year warranty,
and low-cost parts are available next day.

For information on Protea Mowers, Groomers and Scarifiers, call Rivendell Projects on

01949-851420

or visit

www.Rivendell-Projects.co.uk



TRANSMISSION CHOICE A KEY TO THE RIGHT TRACTOR BUY

It is all too easy to divide the transmissions offered in compact tractors into two broad camps, mechanical and hydrostatic. It is equally easy to assume mechanical transmissions are best for fixed speed tasks and hydrostatic for variable speed jobs. But does this approach still hold true? James de Havilland reports...

Most operators understand the fundamental reasons why certain transmissions are favoured over another. So skip the next few paragraphs if what follows is obvious.

With a mechanical transmission, a task such as aeration can be carried out by a number of different operators. All things being equal the job should be carried out to much the same standard, with holes punched in the ground at the same spacing regardless of who has driven the tractor.

A key to this is the mechanical transmission. If an operator sets the tractor's engine speed to deliver 540rpm at the PTO and then selects a given range and gear, the aerator that is being powered by the tractor will go on to work as it did when previously operated at these speeds.

With a traditional hydrostatic drive, aeration can be tricky. Instead of delivering a fixed forward speed at a given engine rpm, a hydrostatic transmission can vary the speed according to load on the engine. Reach a slight incline, either up or down, and the tractor can slow or speed up accordingly.

All basic stuff, but it does help clarify why a mechanical transmission tractor remains the favoured choice for fixed speed work like aeration. Conversely, hydrostatic drive is the ideal choice for pretty much all other types of work. Powering a mower, hydrostatic drive options can include a 'cruise' setting that essentially enables the tractors speed to be governed by the load on the engine. Hit a patch of longer grass, which in turn puts more load on the engine, and the transmission will slow the tractor to help take the load off the engine and vice versa.

Tractor manufacturers have long recognised this, and over the past few years they have come up with alternative transmissions that are designed to mix the ease of operation associated with a hydrostatic drive with the fixed speed ability of a manual.

Among the most recent developments is the continuously variable, CVT, transmission developed by New Holland. Known as EasyDrive,

the transmission can be operated so it will deliver a fixed forward speed at set engine revs, just like a standard mechanical transmission. It is also claimed by New Holland to be extremely efficient, allowing more engine power to reach the wheels than it would with a conventional hydrostatic drive.

At present the New Holland EasyDrive system has been shown on its 45hp four-cylinder Boomer 3045. There is no 'electronic' link between the engine and the transmission, the latter combining an epicyclic system with a variator. The latter is essentially a pair of hydraulically adjusted pulleys linked by a steel drive chain; opening and closing the pulleys adjusts their respective ratios, this providing the key CVT element of the transmission.

In rough outline, the transmission can be operated so the variator operates pretty much like a hydrostatic drive. Set the engine speed on the throttle, press the travel pedal and off you go, the tractor building up speed just as it would with a 'hydro' drive. It is the combination of variator and epicyclic speeds that enables EasyDrive to run at full engine power from speeds as low as 300m/hr to 30 km/hr in a single range.

Where it gets 'clever' is with the two EasyDrive 'cruise' control modes. Again in broad outline, mode one delivers a fixed variator ratio to fix the engine and gear speed exactly like a conventional mechanical transmission. This is used for fixed speed applications to include spraying and aeration.

In mode two, the operator can select a target travel speed that will work to maintain a fixed engine speed. If the load on the engine increases to the point where it will compromise the PTO speed, the transmission slows the forward speed to reduce the load on the engine. When the peak load is reduced, the forward speed will then recover back to the target speed. This is pretty much how cruise speeds work with hydrostatic drive.

A key difference with EasyDrive is that releasing the travel pedal does not abruptly slow the tractor. As momentum is lost, the tractor will slow to a point where the transmission can reconnect drive

in relation to the engine speed. Offering the drive flexibility of a hydrostatic with the simplicity and fixed speed of a mechanical drive, EasyDrive looks like it has a lot to offer.

The John Deere eHydro transmission offered on the 3720 tractor matches well proven hydrostatic drive with electronic control. It is a clever system, with the added attraction of being really easy to set up. As an example, the transmission can be set to deliver a forward speed of say 3.01 km/hr at 2,400 engine rpm. At these speeds, the rear PTO will be operating at 540rpm.

With a conventional hydro drive, this forward speed to engine speed ratio is not fixed. An increased load on the tractor will see the transmission essentially slow the tractor while the engine and PTO speeds are maintained. With eHydro, the operator can set the transmission so as the load increases, the engine, PTO and forward speed will all be linked.

So if the tractor slows, so does the engine and PTO. This is just what happens with a mechanical drive and a key reason why a conventional hydrostatic tractor is not the best tool for aeration work; the hole spacing will be directly influenced by the load on the tractor. With eHydro, the hole spacing remains constant even if the tractors working speed varies in accordance with load.

Of equal importance, the eHydro system does not take a long time to understand and set up. An eHydro novice can be up and running quickly, the system making it easy to replicated fixed settings to suit a specific job.

There are those who will counter this by saying a mechanical transmission tractor makes life even easier. Just select the gear you need to achieve the desired forward speed and throttle up to get 540rpm at the PTO. For most sports and amenity work, this works fine and it is easy for the operator to remember what gear speed, range and engine rpm suit specific tasks.

With eHydro or EasyDrive, it is possible to adjust the tractors engine speed and forward speed to achieve what you want. This is really useful when aerating as it allows the hole spacing

continued on page 34



In applications, such as mowing, the New Holland EasyDrive can be operated just like a hydrostatic transmission tractor, the operator either using the floor mounted travel pedal to 'manually' vary the driving speed or fixing a 'cruise' speed that can automatically take into account varied load on the PTO.



EasyDrive is set up using a set of buttons mounted to the left of the operator. The main buttons are pretty easy to understand, with only Speed Set needing a bit of understanding. This control is essentially used to cap the tractors speed to 30%, 60% or 100% of maximum, in effect changing the sensitivity of the travel pedal to suit different applications.



The eHydro transmission option on John Deere 3720 tractors offers all the features of a conventional hydrostatic drive with added control. It is easy to set up the tractor to run at a fixed forward speed, even after changing the throttle setting.

to be right for the job as opposed to what the tractor will let you deliver.

Kubota's 'intelligent' HST Plus transmission is offered on its GL40 series tractors and again it is pretty easy to understand and use. In broad outline, think of a standard hydrostatic transmission with three ranges to suit low, medium and transport speeds. Kubota then supplements this with various advanced features.

These include its Hydro Dual Speed system. This allows the operator to shift between ranges without having to stop and is great when you want to have a low speed to work with a loader and then shift to a higher ratio to take that load to a trailer. Stall Guard can be selected to allow a loader combination to push hard into a heap without the risk of the engine 'bogging down'.

Another feature is Auto Throttle Advance. With a conventional hydrostatic drive, the drive pedal controls the speed, the engine speed being controlled by the throttle. With the Auto Throttle system, the engine speed will drop to idle when the tractor is stopped by the travel pedal. Sounds a small detail, but it really is a great feature not to have the engine revving hard when the tractor is not moving.

For those who prefer to stick with a mechanical transmission, there are choices that enable the operator to 'change on the move'. There is



Kubota offer its HST Plus hydrostatic transmission on its GL40 series, advanced features enabling the operator to select fixed cruise and automatic engine idling features. The key is to look more deeply into what transmissions are on offer and not assume they are all the same.



With the John Deere eHydro transmission, setting a fixed working speed is simple; use the travel pedals to attain the desired speed and press set. The speed can then be fine tuned, on the move, using the same switch.

nothing new in this, powershift on higher powered tractors having long been established. But smaller tractors have tended to have perhaps a splitter and that is it.

Massey Ferguson offers its Dyna QPS™ transmission as an option on its 38hp MF1540 and 46hp MF1547. Incorporating both a Power Shuttle and Power Shift, the 12 forward/12 reverse mechanical gearbox combines the positive drive of a three-range clutched gearbox with a clutchless change-on-the-move transmission.

Power Shift allows the driver to change up or down between the four speeds in each of the gearbox's three ranges without affecting power delivery or momentum. Up and down gear changes are activated by pressing a pair of switches mounted on the side of the range-change lever. This is ideal for tasks such as spraying, fertiliser spreading, top dressing, mowing and turf aeration.



The Massey Ferguson Dyna QPS™ 12 forward/12 reverse transmission incorporates both a Power Shuttle and Power Shift which combines the positive drive of a three-range clutched gearbox with a clutchless change-on-the-move transmission.

All MF1540 and MF1547 tractors specified with Dyna QPS transmission are fitted with an enhanced instrument panel that incorporates an LCD screen displaying the shuttle lever position, the selected Power Shift ratio, the selected range ratio, PTO speed and other tractor information such as fuel level, coolant temperature and fixed and resettable hourmeters.

A key point to remember is that modern tractors can offer features that simply were not available barely a decade ago. It is possible to buy a 30 to 50hp model that offers a considerably more versatile transmission. With a growing emphasis upon precision working, choosing a tractor that makes it easier to work at the speed the application demands is now easier.



1 + 2 Annuals @ 0%
 Terms and conditions apply
 Visit www.JohnDeere.co.uk for details



You could be doing so much more with eAurora Central Control.

Introducing the first web-based central control system in golf irrigation. One that requires no desktop software and gives you all the functionality you'd expect of a central control system – right from your home or wherever you like. For a demonstration, contact your John Deere dealer.

www.JohnDeere.co.uk

Freephone 0800 085 25 22



BY APPOINTMENT TO
 HER MAJESTY THE QUEEN
 SUPPLIERS OF AGRICULTURAL, DOMESTIC AND
 INDUSTRIAL EQUIPMENT
 JOHN DEERE LTD, NOTTINGHAM





What's your Number?



Name: Dave Steward
Company: Scotts Professional
Position: Marketing Manager for the UK & Ireland

How long have you been in the industry?
"12 years."

How did you get into it?

"I transferred from the Levington Consumer business when they were acquired by Scotts."

What other jobs have you done?

"Apart from working in marketing I worked in sales and have sold new cars for a garage in Basingstoke; Bovril, Marmite and Ambrosia for the Beecham Group and then garden products for Fisons who I joined in 1986."

What do you like about your current job?

"The sheer variety. I can be launching new products at a trade show one minute and writing a new advert the next. I am responsible for all of Scotts professional products, not just those related to turf and so I have contact with a range of people within the horticultural industry as well."

What changes have you seen during your time in the industry?

"The whole industry has become more professional and has a more responsible attitude. I think that this is because everyone in this business can see that the work they do is appreciated and benefits everyone."

What do you like to do in your spare time?

"I enjoy cooking, watching sport, gardening and listening to music."

Where do you see yourself in 10 years time?

"The boring answer is still enjoying myself at work but the real answer is being able to spend at least some time on the golf course."

Who do you consider to be your best friends in the industry?

"I have met a large number of people in this industry and always enjoy their company; I couldn't possibly name anyone in particular."

What do you consider to be your lucky number?

"25."

Pick a number, you've picked...?

"7."

Dave has picked Dave Roberts from Kubota

POSTERS AND SIGNS

BIGGA's Health & Safety series produced by Xact
www.xact.uk.com



All employers have a legal duty to either display a Health and Safety Law poster which gives details of who is responsible for health and safety on site, the address of the enforcing authority for premises, who, if present, is the employee's representative for health and safety and also the address of the relevant Employment Medical Advisory Service. Or alternatively, issue leaflets to their employees with the same details.

The current health and safety law poster is A2 size and coloured beige and pink.

April 6 saw the introduction of a new Health and Safety Law poster. The new poster is easier to read and does not require any additional information to be added to it thus cannot go out of date. Pocket cards for individual employees are also available. Each poster and leaflet will have a unique serially numbered hologram to ensure authenticity.

The old poster, provided it is still legible and the additional details are correct, can be continued to be used until April 5, 2014. This last point should be noted as the last time the poster was changed many companies tried to sell businesses new posters before they were required.

If you require a new poster for a new premise or you cannot amend the existing one with new information then it can be bought from HSE Books, booksellers and office supply shops.

Signs should inform or warn employees and others about hazards and risks in the premises. Other posters and signs that should be displayed in the workplace are:

- A copy of the current Employers Liability Insurance certificate. This needs to be displayed in an area where the employees can read it or alternatively stored as an electronic copy in a shared file or intranet area

which employees have open access to.

- A sign of who is responsible for first aid should be displayed. This can be a trained first aider or the 'Appointed Person' who will ensure the first aid box is stocked and summon help if required.
- 'No Smoking' sign to comply with current legislation
- Various 'Fire' signs:
 - Fire exit signs above the emergency exits
 - Fire directional arrows indicating the route to the nearest emergency exit
 - "Fire Exit- Keep Clear" signs on the outside of each emergency exit
 - Fire extinguisher signs indicating the type of extinguisher and the type of fire it should be used on
 - "Fire Door- Keep Closed" on internal fire doors
 - A fire Action notice with what the alarm sounds like and where the Assembly Point is
 - A sign indicating the Assembly Point
- Hazards particular to the workplace signs, e.g:
 - Noise
 - Hazardous chemicals
 - Hazardous areas
 - Danger of injury from particular physical plant and equipment





EAGLE

Eagle designs
and delivers
quality golf
club collateral

Eagle course
furniture:
quality that
everyone admires



t +44 (0)1883 344244
f +44 (0)1883 341777
e info@eagle.uk.com
www.eagle.uk.com



Fertilisers - Chemicals - Grass Seed - Top Dressings & Aggregates
Golf Course Equipment - Sprayers & Spreaders - Sports & Landscaping Equipment
Contract Spraying - Technical Advice - Total Weed Control Solutions

SHERRIFF
AMENITY

Cheshire Depot: 01925 758886 Scotland Depot: 0131 4473784 Suffolk Depot: 01638 721888
www.sherriff-amenity.com sales@sherriff-amenity.com

New Products



NEW RANGE-TOPPING LOADERS

Avant Tecno (UK) has introduced its 700 Series loaders which are ideal for a wide range of materials handling applications.

The 745 and 750 models are both powered by 4-cylinder Kubota diesel engines developing 36 kW (49 hp) and both can handle loads of up to 1.4 tonne. The 750 is distinguished by its 2-speed hydrostatic transmission which provides a maximum speed of 25 kph, compared with the 745's 15 kph.

With the controls positioned on the front portion of the articulated chassis, the driver has an unrestricted view of the front end equipment to ensure accurate and safe operation.

📞 01953 714896

www.avanttecno.co.uk



VOLUME TURF LAYING RANGE EXPANDED

Rolawn has introduced an 18m² 29" wide roll to its Turfmaster range for volume turf laying projects.

The 18m² 29" wide Turfmaster 1800 roll has been developed in response to customer feedback to compliment the existing range and is available in both Medallion and Minster Pro turf specifications.

The Turfmaster range also includes 13m²-21" wide 1300 rolls, 26m²-2x21" wide Double 1300 rolls, which fit onto a single common tube and 26m²-42" wide 2600 rolls.

📞 www.rolawn.co.uk

0845 604 6085.



ULTIMATE PERFORMANCE SHIRT LAUNCHED

ProQuip has launched a unique, wool-rich base layer system, distinctively styled for on and off-course wear.

Sportwool is made with 51% Australian Extrafine Merino Wool and because it has more natural fibres than most base layers, it has thermal regulation and odour control properties. It also rapidly draws (wicks) vapour and sweat away from the skin to the outer part of the fabric leaving the inside dry and the golfer perfectly comfortable to play their best game.

📞 01620 892219

www.proquipgolf.com

PERFECT MOWING? THAT'S THE IDEA

Nottingham based Henton & Chattell Ltd is the sole UK distributor for the Italian range of IBEA outdoor power equipment and market the line-up of machines through a nationwide network of specialist dealers.

Just launched in time for the new season is the 'Idea' stable of rotary mowers. All four models are powered by Briggs & Stratton four-stroke engines and available in both push and self-propelled specification.

The Idea range consists of two 42cm and two 47cm cut mowers, all supplied with large 55-litre, easy-empty grass catchers and aerodynamically designed mulch-plug, simply inserted into the discharge tunnel to provide superior mulching action.

📞 0115 986 2161

www.hentonandchattell.co.uk



THE ONE TREATMENT WONDER

A product such as Greenor, which contains three active ingredients; fluroxypyr, clopyralid and MCPA, is ideal in any weed control programme. Applied at the rate of four litres per hectare, it gives excellent season long control of all the main problem turf weeds including daisies and clover, and on yarrow and plantain, which have waxy leaves and are often more difficult to control.

With spring around the corner the inevitable weeds will soon be starting to appear on the golf courses. Now is the time to get your weed control programme underway when leaves are soft, making it easier for chemicals to penetrate and provide more effective control.

📞 Rigby Taylor 0800 4240919.





TOPDRESSER MAKES LIGHT WORK

Topdressing is becoming an increasingly demanding operation, with groundsmen and greenkeepers wishing to apply materials ranging from sand and soil to compost to the sward at different times of year and in various densities.

The Rink topdresser range, from Charterhouse Turf Machinery, is ideal for discerning turf managers, and the DS800 towed model offers generous capacity and outstanding versatility.

Dual spinners offer a variable spread pattern, and along with the belt are operated from the tractor seat via the hydraulics, giving spread widths up to 12m.

01428 661222

www.charterhouseturfmachinery.co.uk



RIDE-ON MOWERS PROVIDE COMFORT & PERFORMANCE

The new Kubota G23 and G26 professional ride-on mowers incorporate the very latest technology to maximise fully their performance, power and manoeuvrability, making them ideal for both domestic and commercial use.

Boasting 20.5 litre fuel tanks, both the G23, with a 23.3hp Kubota 3 cylinder ETVCs water-cooled diesel engine and the G26, with a 25.5hp engine, offer exceptional power and efficiency for the most demanding mowing applications.

Both models incorporate a highly durable gear driven twin cut mower deck that ensures maximum efficiency and collection performance.

0800 023

www.kubota.co.uk



LELY RELAUNCHES 'COST-SAVING' GTI TURF IRRIGATION

The latest launch from Lely UK is Gemini-Trident Irrigation (GTI), a system designed to improve dramatically efficiency for a reduction in running costs.

Suitable for both new and refurbishment projects across an array of sports and amenity turf applications, the two systems – Gemini and Trident – couple a computerised central control system with decoder field hardware for simple, effective and economic irrigation management.

With water an increasingly costly resource, GTI's management and maintenance system ensures greenkeepers and groundsmen can make optimum use of every last drop of this precious commodity. As well as accurately monitoring where water is going, how much is being applied and to which sprinklers, the software incorporates a host of features and reporting functions, such as radio remote control, water-flow management and detailed system diagnostics.

01480 226858

email: irrigation.uk@lely.com www.bailoy.com



LATEST DEVELOPMENTS IN BREAKERS

Bobcat has announced that the company's HB880, 980 and 1180 80 Series breakers are now approved for use on the new E55W wheeled and E60 crawler excavators. All the breakers can be mounted using the pin-on, Klac or Lehnhoff systems, three of the four mounting systems currently available from Bobcat.

At the other end of the Bobcat excavator and breaker ranges, the smallest HB280 breaker, previously only approved for use with its integrated fixing cap on the company's 316 micro-excavator, now has the modular fixing cap system used in the rest of the 80 series and, as a result, can be used not just on the 316, but also on the new E08 and E10 micro-excavators that have superseded the 316 model.

www.bobcat.com

SOIL WETTING AGENTS

By Dr Ruth Mann



Soil water repellency (SWR) occurs on many golf courses in the UK and Ireland. There are numerous causes of SWR, such as preferential flow of water, fungal activity, application of top dressing, presence of thatch and compaction, which may contribute to varying degrees.

Further to this, as soil dries, a critical moisture content may be reached below which soils become difficult to rewet. Where soil water repellency occurs, the turfgrass may wilt and eventually die in the most severe case. Playability and the aesthetic appearance of the golf course can be affected. Further to this, the use of water on golf courses is being discouraged throughout Europe as water shortages have occurred in recent years. Wetting agents have been used for many years to improve the wettability of soils on golf courses and so improve the efficacy of any water absorption. In the UK, numerous wetting agents are available. Each product may perform slightly differently depending on its mode of action, dose rate and suggested programme of use.

Soil wetting agents are based on three chemistries – non-ionic surfactants, block copolymers and organosilicones. A natural product – Yucca extract – is also available. Hydrophobic soils are often coated with organic substances, which repel water making them difficult to rewet. Non-ionic surfactants work by binding to the organic coating allowing water to become attracted to the soil again. Block copolymers attach to the soil particles differently and may allow water to disperse or to be held in the rootzone. Organosilicones are very effective at achieving fast spreading of water.

To achieve the best from wetting agents any factors contributing to the dry patch should be addressed. Such as alleviation of compaction, removal of thatch and preventing the rootzone from reaching the critical moisture content by ensuring even and timely irrigation. Best results are achieved by applying wetting agents in a programmed approach starting early in the season before symptoms are observed. Blanket applications are also more effective than spot treatments. The efficacy and longevity of each product depends on the dose rate.

Therefore, subsequent applications should occur after the suggested period of effective control has elapsed for each product. Attention should also be paid to the activity of each product. For example, Breaker Curative does not help water penetration but helps to remove the organic coatings on sand grains and flush them through the rootzone. Therefore, it should be used in a programme with another soil wetting agent that helps water distribution, such as Breaker.



A selection of products with their modes of action and possible distributors is provided on the table below. This is by no means an exhaustive product list but gives the main soil wetting agents available in the UK.

Product	Distributor	Straight / Blend	Chemistry	Advertised Uses
Advantage	Aitkens/Avoncrop/Vitax	Blend	Non-ionic surfactant	b, e
Aqua - zorb	Turftech	Blend	Non-ionic surfactant	a, b, d, g
Award Osprey	Avoncrop	Blend	Block copolymer	a, e, f
Breaker Advance	Rigby Taylor	Blend	Non-ionic surfactant	a, b, e, f
Breaker Curative	Rigby Taylor	Blend	Non-ionic surfactant	b, d
Clearing	Vitax	Blend	Non-ionic surfactant	c, e
Correct OARS	Tower Chemicals	Blend	Non-ionic soil surfactant and organic solvent	d, e, f
Dispatch	Aitkens/Avoncrop/Vitax	Blend	Non-ionic surfactant	e, f, g
Fifty 90	Aitkens/Avoncrop/Vitax	Blend	Non-ionic surfactant	a, b
H ₂ Pro	Scotts	Blend	Non-ionic surfactant	a, b, e, f, g
Inflo XL	Headland	Straight	Organosilicone	b, e
Noburn	Novozymes	-	Yucca plant extract	a, e, f
Organiflo	Aitkens	-	Yucca plant extract	a, e
Primer Choice	Aitkens/Avoncrop/Vitax	Straight	Non-ionic surfactant	b, e
Primer 604	Aitkens/Avoncrop/Vitax	Straight	Non-ionic surfactant	a, b, e
Quench	Sherriff Amenity	Blend	Block Copolymer	a, b
Revolution	Aitkens/Avoncrop/Vitax	Straight	Block Copolymer	e, f, g
Tricure	Headland/Sherriff Amenity	Blend	Block Copolymer	a, b, e, f, g
Ultraflo	Aitkens/Avoncrop/Vitax	Straight	Non-ionic surfactant	a, c, e
XL Fairway	Headland	Straight	Organosilicone	c, e

Table 1: Example soil wetting products, modes of action and distributor. Neither the list of products nor the distributors is exhaustive. Other products are available and each product may be available from other distributors.

Please note the information contained in the above table has been taken from the respective product labels. STRI does not accept any responsibility for the accuracy of these claims.

- a – To treat localised dry patch preventatively
- b – To treat localised dry patch curatively
- c – To manage fairy ring
- d – To strip away organic coatings on sand grains
- e – Aid water penetration/dew removal
- f – Help ensure even water distribution in the rootzone
- g – Reduce irrigation requirements

If you require any further information, please contact:
 Dr Ruth Mann, the Senior Plant Pathologist at STRI
 TEL: 01274 565131
 email: ruth.mann@stri.co.uk