

THE TOMORROW PEOPLE

With increasing pressure on both water management and general course management the modern Golf Course Manager should be aware of advances in technology, and how they can be of both financial and environmental benefit to the long term maintenance regime of the course.

Using technology couldn't be easier or have more benefits. For example products that are available to assist course management include GPS technology (Global Positioning Systems), Digital aerial imagery, PC based irrigation control systems, Pump system management, Weatherstations, Palm top technology, and Radio and telephone remote control / communication.

This article does not suggest that every item will assist in the daily management of your particular course, however that you are aware of the products and their ability to assist.

With water costs rising (£0.90 per cubic metre (220 gallons) in some areas and many clubs using approximately 60 - 100 cubic metres of water per night), and the forthcoming changes in water distribution legislation - the water bill, a PC based irrigation management system is able to assist in managing both system hydraulics and monitor water usage.

Clever programme software can allow the end user to input pipe sizes and allocate flows to pipes allowing hydraulic management and prevention of pipe network overload. This maximises efficiency and reduces hydraulic stress within the system. Each branch or section of the pipeline can have added a sensing device/data retrieval unit which will feed real time information back to the control system, closing down the branch of the pipeline in the event of too high a flow/too low a pressure (pipeline burst). These actions are logged by the PC and/or sent as a text/radio message to the Course Manager.

As well as the benefits of easy programming, sprinkler precipitation rate calculations and run time calculations, the installation of a PC control system can also enable the acquisition and use of an accurate course plan that at a touch of a mouse can identify and print in colour scaled as laid irrigation



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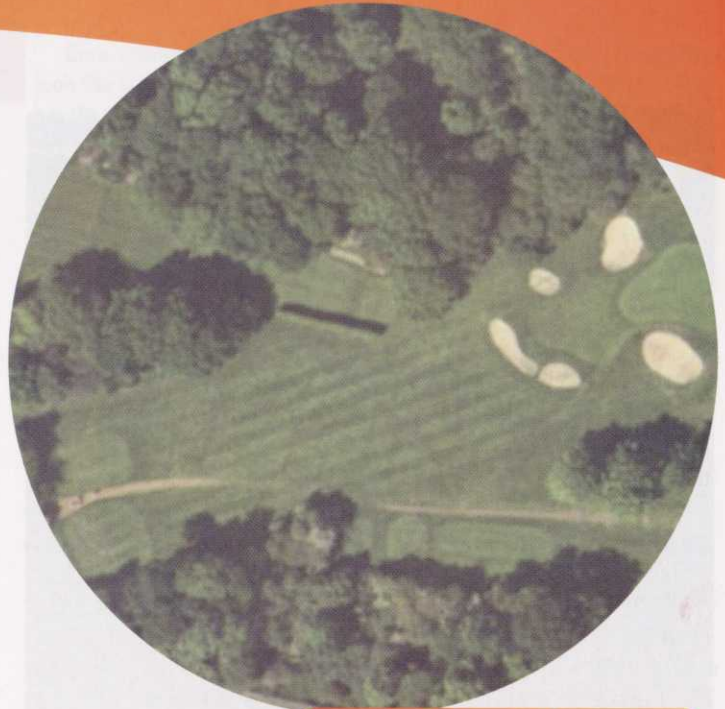
Roger Davey looks at the aims that are available to assist the modern Course Manager with their irrigation requirements

plans, service routing, drainage layouts, bunker positions, Greens sizes, buggy path layouts, etc.

These course images can either be captured as a digital aerial image or via GPS ground mapping, however the end user must be aware that each is different in its entirety. Many people providing digital aerial images do so without realising that potentially unless rectified prior to supply, they will be inaccurate due to the curvature of both the lens and the earth, therefore providing an 'inaccurate' image.

Digital aerial image plans are provided in specialist drawing files such as BMP and will graphically show every feature of the terrain – as long as the pixel resolution is great enough (generally a resolution of 25cm is recommended). Plans can then be added to in layers, ie. layer 1 – irrigation mainline, layer 2 - sprinklers, layer 3 - drainage pipe layout, etc by a specialist CAD drawing program.

The Global Positioning System (GPS) is a worldwide radio-navigation system consisting of 24 satellites and their associated ground stations. GPS uses these 'man made stars' as reference points to calculate positions of objects to define points of measurement. The points of measurement are recorded on the ground and a layout plan produced.



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GPS Mapping in progress



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The accuracy of GPS can be affected by many factors including the number of visible satellites, interference and distance between reference base station and roving receiver. Generally a minimum of four satellites are needed to pinpoint a good position with the accuracy increasing as the number of satellites increases (the number of satellites changes as the horizon alters during the day). As GPS is dependent upon a direct line of sight with the satellites there are many situations, particularly around shaded greens and tees on a golf course, where GPS reception is degraded to such an extent that accuracy is unobtainable. This situation however can be overcome using additional equipment, occupying a position of good reception ie. the middle of the fairway, and offsetting your position.

As with most products, the more expensive the survey the more accurate the detail - what use is a GPS mapped plan if it is not accurate? The end user should always seek clarification of accuracy and detail.

Both digital aerial images and GPS maps can provide an image of the area in question which can be used to accurately plan and calculate all activities from irrigation to the tracking of course vehicles, area calculation for fertiliser applications and as an image of the course, for course alteration meetings. GPS has the added advantage of having the ability to accurately record all as laid products within the map - sprinklers, pipelines, telecommunications, electricity, gas, oil, etc.

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Once acquired, some PC based irrigation control systems can accept extra tools like hand held palmtop computers such as the Compaq® iPAQ™ which has the ability to import the course map and remotely operate the control system in real time simply by a tap of the stylus on the map to turn on, off or pause areas of irrigation.

Palm top Database management can take place in the field; changes to runtime, adjustments to ET / scheduling can be undertaken and then back in the office the palm top quickly synchronises with the central control computer and the database is updated automatically.

Remote communication of this type is achieved by the use of radio remote control. However some systems also accept mobile phone communications which allows the simple remote operation of the system by standard mobile phones using the keypad to provide instructions to the PC. These instructions can be relayed from anywhere that allows phone reception, even another country!

The radio remote control facility utilised by the palm top / irrigation control system can also double up as the internal communication system that Greens staff require to assist with the smooth programming of works and to monitor other course activities - competitions etc.

External influences created by the weather which effect water application rates and plant evapotranspiration can also be monitored by irrigation system weather stations which will report back to the PC to advise of changes in water requirements. Weather stations can record temperature, humidity, rainfall, wind speed, and solar radiation – downloading this information on a



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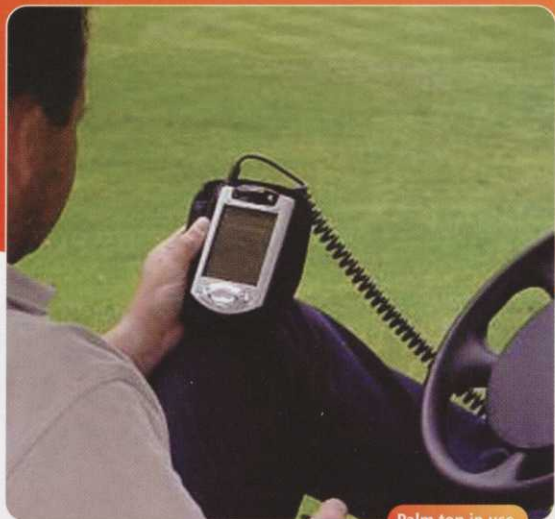
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Palm top in use

regular basis assisting with application rate calculations and run time cycles.

This may to some people seem like a toy, however, courses that use approximately 300 - 500m of water per night can save between 10% and 15% of water within a cycle by employing such technology; this equates to a value in mains water monetary terms of between £27 - £68 per night and over a 100 night period, this is a figure not taken for granted in both monetary and environmental terms.

Over the last 10 years the introduction of industrial technology within the irrigation pumping station has become more and more prevalent, most noticeably the use of variable frequency drive units. These manage the performance of each pump, slowing down and speeding up the pump motor – matching produced flow with required demand, minimising hydraulic stress and making the units extremely energy efficient. The affinity laws which

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govern pumps show that a 20% reduction in pump speed will result in a 50% reduction in electrical energy consumption by the motor. In the past pumps have constantly worked at full speed simply bleeding excess water back into the storage reservoir/tank - wasting energy and accelerating pump wear.

Pump station monitoring software can be used to link the pump station to the central control system providing real time communication and optimising irrigation cycles. It can also monitor and react to changes in station capacity ie. should one pump of a three pump station fail, the irrigation flow manager will receive instructions to reduce available water by 33% and prolong the cycle, ensuring that a cycle is achieved and that station failure does not occur due to low flow.

Now even further advances lay in store for this industry, integrating the technology with other aspects of course operations - GPS controlled mowing!?

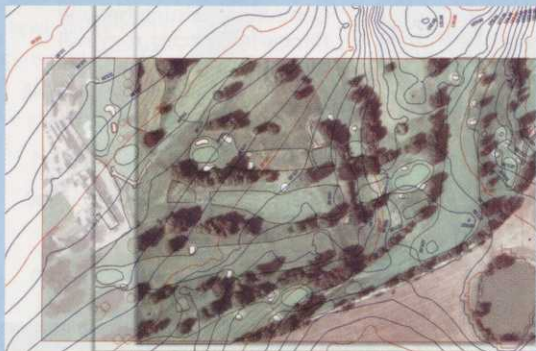
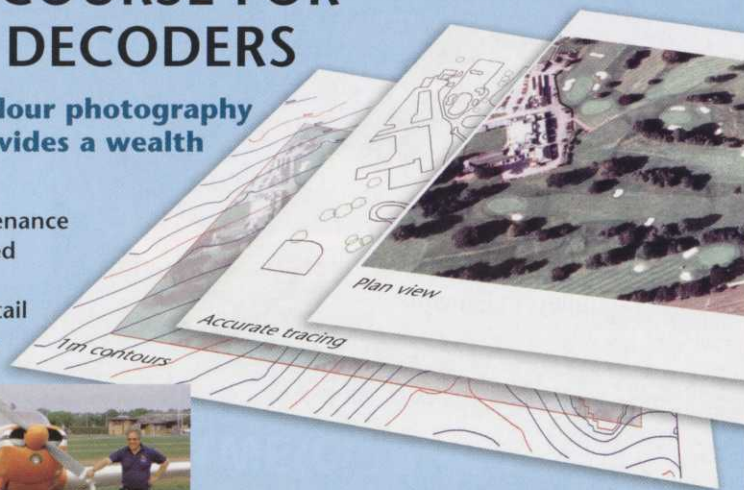
Perhaps by raising the stakes, we raise the game... 10 years ago would you have considered that a standard family car when purchased would come with satellite navigation, climate control, DVD player and intelligent speed limit control? Technology is all around us today and not just for the people of tomorrow.

Roger Davey is Managing Director of Irritech Limited - Independent Irrigation Consultants Tel: 01823 690216, www.irritechlimited.co.uk

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