

● Measurement, Control, and Datalogging Solutions



We welcome your business and will be pleased to assist you.

Your main contacts at Tempcon Instrumentation are:

- | | |
|----------------|--|
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Product News & Application stories follow:-

**Manufacturers of
Temperature Sensors
& Official
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News

January 2010

Electrocorder Portable Energy Monitor



Measures & profiles kWh energy usage

ElectroCorder helping to reduce Energy costs

Introduced as an extension to our already successful Energy portfolio Tempcon Instrumentation is proud to launch the ElectroCorder range of Monitors.

Available in single and 3 - phase models, ElectroCorder is simple to use and measures Current, Voltage , kW and kWh values of energy supplies, as well as storing measured data for up to 75 days allowing a full analysis to be undertaken.

Supplied complete with Electrosoft Data Analysis software.

kWh profiling, phase balancing and voltage fluctuations can be viewed on screen or exported to excel as part of a more comprehensive report.

In addition the software offers tariff costing analysis with the potential to reduce energy costs.

Typical applications include:

- Overall building energy monitoring
- Individual department monitoring
- Manufacturing process monitoring
- Cost reduction exercises
- Tenancy disputes

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News

January 2010

HOBO Energy Monitoring Systems



HOBO energy monitoring systems save you time and money in a wide range of energy and green building monitoring applications, from analyzing energy usage in a facility to monitoring boilers/solar hot water heater performance and indoor air quality studies. These state-of-the-art energy metering systems provide industrial-grade performance with real-time access to your data via the Internet.



- Versatility allows use in both indoor and outdoor environments
- Plug-and-play Smart Sensors eliminate the need for complicated wiring and programming
- Remote data access via Ethernet, cellular or Wi-Fi communications
- Immediate notification (HOBO U30 systems only) of problems via cell phone or email
- Optional analog inputs for specialized third-party

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Applications: HOBO Dataloggers

January 2010

Re-forestation in the East Washington, USA Cascades



Researchers use ventilated tree shelters on half of the seedlings planted in their study.



Excerpt from the Society of American Foresters
By Michael Taylor, Weyerhaeuser Company, Diane L. Haase, Department of Forest Engineering, Resources & Management, and Robin L. Rose, Department of Forest Engineering, Resources & Management

Re-forestation on harsh, high-elevation sites can be challenging because of persistent snowpack and extreme climatic variation. To help find a solution to meet this challenge, the use of tree shelters was investigated with two tree species, Douglas-fir and Western Larch, across three planting dates.

High-elevation sites in the eastern Cascades of Washington have a short period of favourable spring planting conditions followed by a short growing season. In addition, rapid changes in soil moisture, temperature, relative humidity, and solar radiation make plantation establishment on these sites more challenging than on lower-elevation sites. Most soil moisture on these sites result from snowmelt with very little additional precipitation from spring through fall. The snowpack insulates the ground and young seedlings from constantly changing and potentially deadly temperatures and winds during the winter months; but once the snowpack melts, the seedling environment changes rapidly from wet and cold to hot and dry.

Higher-elevation sites can be impossible to plant until late spring because the persistent snowpack prevents access. By the time sites become accessible, soil moisture may drop to unacceptably low levels. The short window between snowmelt and summer drought results in a narrow margin between plantation success and failure. Fall planting is a potential alternative because roads are clear of snow and sites are accessible for planting. However, very little data is available for fall planting.

Inherent risks associated with fall planting require careful consideration of local conditions. Tree shelters can increase seedling survival on harsh, high-elevation sites by limiting the intensity of ultraviolet light that may cause damage via desiccation. In addition, tree shelters may increase CO₂ temperature, and relative humidity as well as shielding seedlings from animal browse.

Management considerations for using tree shelters include the costs of purchase, and assembly. The increased cost may be offset by increased survival, thereby reducing the need to replant at a later



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date when competing vegetation is established. The objective of this study was to quantify Douglas-fir field performance as influenced by planting date, tree shelters, and environmental conditions.

Environmental Measurements

HOBO Micro Stations were installed at each site to monitor air temperature, relative humidity, soil temperature at 15 cm depths, and soil moisture at 10 and 20 cm depths. Measurements were taken every six hours from August 2005 through September 2006.

Results: Environmental Conditions

Soil temperatures on each of the fall planting dates were above 5°C which is a critical root growth temperature until less than 1 week after the third planting date, when they dropped below 5°C where they remained until May 2006. Soil moisture content on the western larch site was 10% on the first planting date but increased to nearly 20% for the October planting dates.

On the Douglas-fir site, soil moisture in the root zone was 11-12% for all three fall planting dates and did not increase until 5 days after the three fall planting dates, respectively. Soil moisture peaked at both sites in May 2006 but declined rapidly thereafter.

Air temperature at each site followed seasonal patterns similar to soil temperature.

Conclusion:

For both species, seedlings inside tree shelters had increased survival compared with non-sheltered seedlings after one growing season despite increased damage by crushing snowpack. Volumetric soil moisture content on the western larch site increased from 10% to 17% between the first and second planting dates, resulting in no effect of planting date on western larch survival. On the Douglas-fir site, however, soil moisture content was below 12% for all fall planting dates, resulting in only 2% survival for all seedlings planted on the first planting date. These results indicate the critical importance of soil moisture at time of planting and onset of precipitation after planting. Use of tree shelters may improve seedling survival on harsh, high-elevation sites, but it increases potential seedling damage because of crushing snowpack.

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Applications: HOBO Dataloggers

January 2009

Assessment of local climate change by The University of Reading, United Kingdom

Project Report

**Assessment of impacts of urban development in Reading on local climate change
and the quality of life through the use of the state-of-the-art meteorological
equipment**

**Dr Maria Shahgedanova
Department of Geography
School of Environmental and Human Sciences
The University of Reading**

Original aims of the project

The funding was sought to initiate a project of urban climate monitoring and analysis in the Reading urban area relating intra-urban climatic patterns to urban development. It was envisaged that in the framework of this project, the students will have an opportunity to have hand-on experience in research of local inadvertent climate change, its impacts on the quality of life of urban dwellers, and development of adaptation / mitigation strategies to / of climate change through the use of the state-of-the-art meteorological equipment. Climate science is often perceived by the undergraduate students in Geography and Environmental Science as too mathematical and abstract and this perception negatively affects students' willingness to engage with the subject. It was envisaged that the ability to employ the high-quality yet userfriendly equipment measuring various climatic characteristics across the Reading urban area will allow the undergraduates to overcome their fear of the subject, see its relevance, and to begin understanding climate science through useful and interesting experience of field work.

The project has proved extremely successful. A considerable amount of the highquality meteorological equipment has been obtained using the awarded grant. About 150 students, from Part 1 undergraduates to the MSc students, used the equipment in their studies in the 2008-09 academic year. This trend will continue and each year a similar or slightly higher number of students will use the equipment. The benefits were extremely visible: the students enjoyed their practical sessions and research work, managed to understand the complex scientific concepts through the hands-on experience of obtaining and analysing the data. Listed below are the component project where the obtained equipment was used.

Equipment

We have purchased a number of automatic weather stations (AWS), micro-loggers, and individual sensors from a UK-based company Tempcon Instrumentation Ltd. The company specialises in manufacturing the automated meteorological and hydrological equipment, which is simple in exploitation yet is reliable and accurate. The main feature of the equipment is the so-called 'smart sensors', i.e. meteorological sensors that are simply plugged into a logger through USB connection and recognised by the logger without any need for complicated programming, which is often favoured by other companies.



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The software that is used with the equipment is also very user friendly. This is a very important feature because the primary users of the equipment are undergraduate students. The following items have been purchased: (i) mini and micro loggers (15 and 4 recording channels respectively), (ii) anemometers and vanes, (iii) air temperature and humidity sensors, (iv) rain gauges, (v) pyranometers (sensors measuring solar radiation), (vi) soil moisture meters, (vii) river flow meters. Figure 1 shows two of the purchased AWS installed at the University of Reading campus.



Figure 1. AWS installed at the two sites with contrasting characteristics and different microclimates.

Students' Projects

To date, the equipment was used for the following projects:

(i) General Climatology, Part 1: A Study of Microclimatic Differences at the University of Reading Campus. The AWS, shown in Figure 1, were used for this project. One of the AWS was installed at a built-up location used as a substitute for the urban built-up environments. Such environments are known to be warmer and drier than the rural or suburban locations. Another AWS was installed in the Harris Gardens and represented more natural environments. The students collected meteorological readings from both AWS comparing the measurements of air temperature, humidity, wind speed, and solar radiation. The differences between the two sets of data were related to the differences between the AWS environments allowing the students to appreciate the factors controlling the formation of microclimates. In all, 120 students participated in this project.

(ii) Team Projects, Part 2: A Study of Microclimatic Differences between Parklands and Built-up Areas of Reading. In the course of the Teams Projects module, our students investigate the green areas of Reading. In this particular project, the students investigated the cooling effect of parklands on the surrounding urban space and its potential to reduce the heat island effect (excessive urban warmth) and the effects of heat waves, which are projected to become more frequent and intensive with climate change. In all, 10 students used the equipment.

(iii) Undergraduate Dissertations, Part 3: 'How has the changing urban development and land use of Reading affected the development of microclimates?' In the course of this dissertation project, the student installed temperature sensors with microloggers at the lampposts in the busy streets of Reading to evaluate how building density and traffic change local air temperature patterns.

(iv) Undergraduate Dissertations, Part 3: Another dissertation project examined the impacts of microclimatic differences on the differences between weathering rates of historical buildings using Winchester Cathedral as an example. This project was an excellent addition to the originally planned



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studies focusing on the Reading urban area. The Part 3 Geography student, Samin Kawaja, installed two sets of the equipment on the south-western and north-eastern sides of the Winchester Cathedral roof measuring differences in the meteorological variables controlling weathering such as wind speed, rainfall intensity, and sunshine (Fig. 2). She also measured the extent of building deterioration relating it to the observed microclimatic patterns. Samin produced an excellent dissertation which is of great use to the Winchester Cathedral maintenance staff and to English Heritage. Parts of the dissertation are of publishable standard. Importantly, following this research, Samin was awarded a PhD studentship by the University of Oxford to investigate the impacts of changing climate on historical buildings. The interviewing panel commented that it is the excellent experiments, which Samin conducted during her dissertation research, that distinguished her application from the others. This would not have happened without the awarded grant.



Figure 2. Micrometeorological experiments on the roof of Winchester Cathedral.

(v) MSc in Urban Sustainability: Twelve students, from various parts of the world, who take this module, used the equipment in two different ways. Firstly, the students familiarised themselves with the concepts and practice of meteorological monitoring, and with the concepts of microclimate and climatic comfort. Similarly to the Part 1 undergraduates, they collected and analysed the AWS data. This was an extremely useful exercise, which through practical work with the very modern and user-friendly equipment allowed the students with very different educational backgrounds to grasp the complex scientific concepts within a short time frame. Secondly, the students are running a project investigating the possibility of using roof-top gardens in the densely built up areas for climatic amelioration. The microclimate of a roof-top garden, located on the Reading International Solidarity Centre (www.risc.org.uk/garden) in London Street (Figure 3) is being investigated and compared with a microclimate that

exists around a conventional building. For this purpose, the equipment was installed in the two locations, the roof-top garden and a conventional roof nearby. An additional aim of the project is to investigate the water requirements of a roof top garden (the main factor limiting sustainability of such gardens) through the use of soil moisture sensors.



Figure 3.

The meteorological equipment installed on the roof-top garden at RISC.



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Innovative teaching and benefits for the students

The main benefit of the project was the ability to make climate science attractive to the students lacking scientific and mathematical background and to inspire their interest in both, climate science and urban sustainability. The Part 1 students, who in the past frequently complained that “climate is too difficult” and practical work of climate data collection is “too boring”, commented on how they enjoyed the practical work using the equipment that we were able to obtain. Many of these students already expressed their willingness to take climate-related modules in Parts 2 and 3 and are enquiring about the possibility of using this equipment for their dissertation research. The benefit for the MSc students was enormous. Not only have the MSc students familiarised themselves with the meteorological measurements but they have also got first-hand experience of monitoring urban environments which may be able to implement in their future careers. This is particularly important for the overseas MSc students from the developing world.

It is envisaged that the equipment will be operated for a number of years (e.g. 5-6 while equipment lasts). In addition to the students, who benefited from the use of the equipment this year, this will allow a large number of students to work on the project in the future and will also enable a collection of large and extremely valuable data sets which can be subsequently used in PhD research. The roof-top garden project has already generated interest from the perspective PhD students, other departments within the University of Reading (i.e. Meteorology) and other universities (e.g. King's College London), the Reading Borough Council, and companies involved in the design of green roofs and roof-top gardens. We very much hope that this interest will develop into the externally funded research on urban sustainability-----

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Applications: HOBO Dataloggers

February 2007

Carbon Trust – Research into Global Warming



Global Warming - Hobo Data Loggers aid research into reduction of carbon emission levels

Tempcon Instrumentation Ltd, the temperature measurement and control specialists, have now supplied a large quantity of HOBO data loggers for a major new programme of research focussed on reducing emissions of carbon from UK building stock.

Participating sites throughout the UK will install over 2000 of Tempcon Instrumentations Hobo range of portable temperature, RH and light loggers.

Data on how householders use energy-consuming appliances and services will be collected, so a “social-technical” model can be constructed of these patterns of behaviour.

Known as CaRB i.e. Carbon Reduction in Buildings, the programme is funded by the Carbon Trust in conjunction with EPSRC and forms part of “Carbon Vision Buildings” (CVB) which started in autumn 2004. The aims are to demonstrate how carbon emissions from domestic and non-domestic buildings can be reduced by 50% by 2030.

A consortium of five universities, UCL, DeMontfort, Sheffield, Manchester and Reading aims to create an innovative, public domain, social-technical model of energy use in buildings applicable at national, regional, city and community level.

Tempcon’s Hobo range of loggers lead the market in practical and convenient capture of readings providing the research team with accurate and reliable data that is easily interrupted into meaningful information.

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