ENERGY AIVC

EED: an attractive proposition

The Energy Efficient Design office building owned and operated by aircraft engineers Lovaux Ltd at Bournemouth International Airport has been keeping its occupants comfortable and productive, with the minimum of heat energy use, since it was built a year ago. Despite its low capital cost, no corners were cut with the building quality, and operating costs, including energy and maintenance, are comparable with other new office buildings specifically designed to use energy efficiently. *Michael Harnett* reports on a heating system with distinct developer appeal which can be used successfully and economically on quite small office projects.

Lovaux Aircraft Engineering Division handles the high-tech maintenance of military aircraft. When it decided to build an office at Hurn Airport, the company determined to demonstrate a forward-looking approach to the choice of building fabric and heating systems while also looking for an office which would be comfortable and easy to run.

Consultant George Tuson recommended the adoption of Energy Efficient Design principles which had just begun to be promoted by the Electricity Council for office buildings of the size Lovaux was contemplating.

The EED approach is to improve the insulation of the building envelope beyond that demanded by Building Regulations, and also to improve air tightness, so that when the internal heat gains from people, business machines and lighting have been taken into account, the top-up heat needed from the heating system is minimal.

It is also important, when heat energy needs are largely met by sources other than the heating system, that the local control of its output should be both fast and precise to avoid wasteful overheating. The ideal controllable heat source for this purpose is the modern electric panel heater.

The obvious attraction of such an approach for building owners and occupiers is that electric panel heater installations are much lower in capital cost than boilers, pipes and radiator systems, enabling the capital cost savings on the heating system to be ploughed back into improving the building fabric. The overall capital cost for an improved quality building with an EED heating system is lower than that of a conventional building using a wet heating system, insulated to current Building Regulations standards.

In addition, where insulation has been improved, and especially when windows are double glazed with low-emissivity glass, the interior surface temperatures of the exterior walls are higher than would otherwise be the case. Because comfort is determined by radiant temperature as well as air temperature, people feel able to sit closer to walls and windows, and thus it is not necessary to raise air temperatures to offset the effect of cold walls as is the case in many other buildings.

There is also a psychological factor to creating comfortable working conditions. Where people have control over their own local environment they can set temperature and air movement conditions to suit themselves, and because of this feel more comfortable. At Lovaux, as in other EED buildings, panel heaters are thermostatically-controlled individually and occupants can also open their windows if they feel the need for more outside air.

Higher internal surface temperatures mean that for virtually all the heating season, cold down draughts near windows are avoided. It is not necessary to site the heaters below windows and, because they are easier to fit into position, with their light weight and simple cable connections, these heaters could be situated anywhere in the room.

The Lovaux building has much lower heating requirements than conventional buildings and the panel heaters are consequently also much smaller than usual. They are more accurately matched to preheating needs than is usually the case and they are controlled carefully to bring the building up to temperature at the right time each day.

The Lovaux building has two floors with a gross area of 634m², based on a 4.5 by 3 metre grid and accommodating 22 people, mainly in open plan office areas but with some cellular offices for senior staff, and a board room.

Exterior walls comprise a brick skin, cavity, expanded polystyrene slabs and 200mm of lightweight concrete block, giving a U value of 0.31 W/m²K. Careful attention has been paid to avoiding potential cold bridges which might otherwise promote condensation; this was especially important as the building has a steel frame.

The roof had an extra 50mm of insulation added to increase its U value to 0.15 W/m²K, and the ground floor U value is calculated at 0.38 W/m²K. The windows comprise 26 per cent of the external facade area and are double glazed with a low-emissivity Kappafloat coating on the outer face of the

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inner pane. The U value of this combination is 1.9 W/m²K; the windows tilt open in small increments for extra ventilation.

The thicker-than-usual walls led to extra costs for the window casements and wider foundations. Nevertheless the savings on the heating system more than balanced this. Construction began in April 1987 and the buiding was completed in November the same year.

From then, the Electricity Council's Environmental Engineering Section has monitored the energy consumed by the building and the conditions maintained in it.

Heating energy ran at 37.3 kWh/m² from December 1987 to November 1988, 56 per cent of which was during the off-peak period. This cost £1.26/m² on standard Southern Electricity tariffs. The total energy consumption of all services including heating, lighting, hot water and small power for business machines, etc, was 82.5 kWh/m², costing £4.16/m².

Put another way, total energy costs for the building run out at £2 500 a year. Hot water costs 70p a day.

Maintenance costs have also been minimal and certainly much less than would have been the case with a comparable piped radiator system, where a regular maintenance contract needs to be taken out to deal with boiler cleaning, minor leaks and so forth.

From the developer and builder's point of view the Electricity Council would claim that the moral to be derived from this project, and indeed from a number of others around the country, including, incidentally, the Building Research Establishment building, is that the old adage that energy-saving design always costs more no longer holds true. Indeed the Council would say that the reverse is the case with quite a number of selling points of more than passing interest to the speculative developer.

Although the extra insulation does indeed cost more, the EED electric heating system itself costs much less than a boiler and pipework scheme and is quicker to build with less site supervision. There is thus a net saving in capital cost which can be used to increase yield or can be put back into the building to improve finishes, for example, to interest a wider range of tenants.

With EED offices only the smallest of wall-mounted electric panel heaters needs to be used with all the benefits this confers in terms of flexibility, cost saving and economy of space.

In addition, because separate heat emission units are capable of simple alteration, unconstricted by pipework routes, buildings constructed on EED principles have in-built flexibility to meet changing tenant needs in the future.

Finally, EED buildings have the compelling advantage of providing more lettable area from a given amount of construction space. As heat is generated solely at the point of use, central plant rooms and riser spaces are eliminated.

Certainly the directors of Lovaux have seen the benefits and are more than pleased with the comfort and cost performance of new building. To prove the point, when the company builds additional offices at Hurn Airport, they too will be constructed to EED principles.

COMPUTERS

This month our new computer contributor *Dr Micro* opens his agony column

Dear Doc,

My machine keeps sending me angry messages. It says "Data error reading Drive B".

Take the 5¼ disk out, put two fingers through the big, centre hole, give it half a twiddle, stick it back, and tell your machine not to be so obnoxious.

Dear Doc,

I drive a Ford because I know spare parts are easy to find. Is there a "Ford" of the computer world?

Good thinking! Life is made easier if your gear is on its way to becoming an industry standard.

So, go for an IBM computer, Epson printer, a Hayes modem, Microsoft mouse, Lotus 1-2-3 spreadsheet, Autocad drawing, dBase database and Wordstar word processing.

Now, having annoyed hundreds of other manufacturers, let me upset these few . . . if you can't afford their prices, you can get away with look-alikes. You are spoiled for choice with IBM-compatible computers, modems and printers that use Epson control codes. Cheeky rivals to Lotus 1-2-3 are a quarter of the price.

Professional draughtsmen and professional programmers need the power of Autocad and dBase but lesser mortals can find easier programs able to read Autocad and dBase files. As for Wordstar – I hate it! I much prefer its little brother: the £54 Wordstar 1512.

Dear Doc,

The instruction manual says: "This code sets Normal-density bit image mode. When this code is input, the data following ESC K code is printed out as dot pattern(s)." What does this mean?

Don't ask me. I don't speak Japanese either.

Dear Doc,

Since we decided to upgrade our system, we've had salesmen coming out of the woodwork. How can you judge a program, because, according to the sales-talk, they are all the greatest?

True. When a salesman's fingers go twinkling over that keyboard, every program looks perfect.

So, you test software by trying to screw it up. Tell it to PRINT with the printer unplugged – does it give a polite warning and wait for you to switch on, or does the screen go blank and the keyboard lock up?

If it demands "input date dd/mm/yy", type Sunday 26 June – will it only accept 26/06/88, or worse, will it even reject 26.06.88 because of the full stops? If it asks for a number, give it a word – does it ask you again, or does it go bananas trying to find the square root of "Hello"?