

# FIRST CLASS RESULT AT PORTSMOUTH UNIVERSITY

In the context of ever rising energy costs and the threat of climate change, building industry specifiers are in need of heating and cooling technologies that are future proof, cost effective and energy efficient. Project teams are increasingly looking beyond conventional systems to create environments that can inspire, motivate and bring out the best in people's abilities. This is clearly important when designing workplaces and places of study to ensure that users are happy and productive. A good example of how this can work in buildings is the extension at Portsmouth University's Frewen Library.

The impressive building provides a triple-height entrance space, with two floors of library stack areas, seminar rooms and a 24-hour IT facility. A major challenge was, therefore, how best to create a heating and ventilation system that met the needs of the users by adhering to the British Council of Offices recommendations that 'temperatures be no greater than 28°C for more than 1% of the year and no greater than 25°C for more than 5% of the year'. In order to meet this, an underfloor heating and cooling system was selected. Such systems substantially reduce the energy required to heat a building, are low maintenance and enjoy low whole-life costs.

Mike Lamb, Managing Director of Warmafloor (the company selected to design and install the underfloor heating / cooling system) said;

"The brief was clear – create a low energy, low cost system that offers a comfortable and stimulating space for students to study. Indoor air quality, temperature and ventilation were rightly of prime concern to the project team. It is clear that the environment is very important in making those who use the building more comfortable and therefore more productive.

"A recent YouGov survey has revealed that 71% of people feel their place of work is regularly too hot or too cold to work at peak performance. More than two-thirds (67%) feel drowsiness in a hot room, just over half (56%) suffer from loss of concentration and 37% experience headaches. This research can easily be applied to

academic buildings such as libraries where people spend a lot of time studying. With rising fees resulting in increased pressure on students to do well, the last thing they need is for their concentration to be comprised by the university environment."

Compared with traditional systems, underfloor heating and cooling systems provide an even and comfort effect with no draughts, high air speeds or hot/cold spots. The reduction of convection currents also ensures that there are fewer disturbances of dust mites and other microbiological contaminants ensuring a purer quality of air. This was an important consideration in designing the system for the library extension, as was the removal of dangerous hot and sharp-edged surface. Sophisticated controls monitor and adjust temperatures to ensure maximum comfort and maximum productivity. This also helps with the preservation of library books and archival collections as temperature and relative humidity contribute significantly to the breakdown of materials. Maximum use of wall space was also important to house the vast array of books, which was facilitated by use of the underfloor heating and cooling system rather than conventional wall mounted radiators

Another challenge was to ensure optimal use of space by concealing all the IT and electrical cabling. This was facilitated through the installation of Warmafloor's patented Raised Access Floor System (GB-2375 815 B). This uses brackets which are fixed to the floor pedestals with polybutylene plastic pipe runs and insulation panels, served by zoned manifolds, which sit in the brackets. When these come into contact with the floor tiles, heat transfer occurs. The system provides radiant heating between 50-80W/m<sup>2</sup> at flow temp of 45-60°C. In the IT area of the library, the system also provides cooling to offset the higher heat gains. The same pipework is connected to an air-to-air heat pump, providing a cooling load of 35 W/m<sup>2</sup>. Mike concluded;

"Surface heating and cooling is more than a fashion and is increasingly being used in industrial, public and commercial buildings. Best outputs are

achieved for underfloor heating when used in conjunction with solid floors, either concrete slab (structural slab) or screeded. Both require insulation below the pipework in accordance with building regulations and typically outputs obtained are 100w/m<sup>2</sup>. Systems are compatible with most types of floor covering too, allowing an interior designer freedom to specify anything from tiles to wood to laminates to carpets."

Professor Andrew Wilson, an expert in Archaeology of the Roman Empire, highlights how our ancestors were more on the ball than modern day builders when it came to energy use. He said:

"One of the many things the Romans did for us was to show us ways to be much more imaginative and efficient with their energy use. They used underfloor heating systems, called hypocausts, which heated the entire room from the floor and walls. Modern radiators are often placed on exterior walls underneath windows, where heat can escape or where they are smothered by curtains."

The UK has a long way to go before surface heating and cooling becomes the norm but



*Exterior and Interior of Portsmouth University's Frewen Library*



progress is being made. After all, if the Romans, famed for their advancements in engineering, used it in their public buildings more than 2000 years ago, especially in the colder parts of the Empire like Britannia, then why don't we?

**Web:** [www.warmafloor.co.uk](http://www.warmafloor.co.uk)