



Mater Private Hospital



 Keeping the Mater's energy bills healthy



A hospital uses a great deal of energy; much of it vital to the patients' well-being and the running of the medical services. To provide this energy efficiently and to manage it well poses a demanding test. At the Mater Private Hospital, using Building Energy Management Systems (BEMS), they have been able to meet the challenge head on.

The Mater Private Hospital - Intensive Energy Care

The Mater Private Hospital, which opened in 1986 is one of Ireland's foremost medical centres, with 168 inpatient beds and 34 outpatient beds. More than 650 staff and 140 specialist consultants are engaged in giving world-class care to patients in a wide range of treatment and care units. In creating energy-intelligent systems, the overriding interest must be in the well-being of the patients. Wards and operating theatres need optimum comfort, whilst wisely managing energy use and controlling costs.

The energy-saving benefits of Building Energy Management Systems are well known. A Building Energy Management System is a computerised control system that reduces


energy consumption by more efficient control of all the building's services and facilities. At the Mater Private Hospital, the BEMS plays a central role in monitoring and controlling the provision of energy throughout the complex.

The Ever Watchful Eye


The main BEMS at the Mater Private Hospital is Irish designed and made, with over 1,000 points for controlling or monitoring systems including boilers, air-handling units, pumps, lighting and emergency generator circuit-breakers. Each task is handled by one of a series of BEMS outstations, located throughout and around the building, which are networked via a sophisticated computer system. The status of the systems is then displayed on a series of personal computers, which provide a user-friendly display.


Through the graphic displays, staff can control set-points and set time clocks. The PCs also allow people to see isometric views of various systems with real-time measurements such as temperature and operating conditions. As soon as conditions drift outside prescribed limits, the BEMS notifies engineers, allowing them to carry out essential maintenance to ensure efficiently running systems.



 Boiler House BEMS Outstations



 BEMS User Interface Computer

 *The BEMS is used to monitor and control air-handling units to areas such as the operating theatres, X-ray departments and changing rooms. The computer is a standard PC with BEMS software which is networked to the outstations. A simple graphical interface makes time scheduling changes quick and easy to do. If required, an A4 printer can be used to record alarms or show energy usage. The BEMS can also link up to an outside maintenance company via a modem and password to allow for remote troubleshooting.*

BEMS – Growing Technology with Shrinking Costs

BEMS found its first commercial uses more than 20 years ago. Since then, the BEMS technology has vastly improved while the actual costs of installing systems have become much more readily attainable. Today, a small inexpensive system can be cost-effective in buildings with annual energy bills as low as €10,000. In new buildings, the possible savings can be even more dramatic, since the cost of installing a new BEMS system is competitive with installing a series of less efficient traditional control systems.


For large organisations with buildings of various sizes spread across a wide area – such as supermarket chains - an outstation at each site can be linked to a single overall control location via mobile phone, landline or the Internet.

The future of BEMS technology will see further savings in costs such as open source software, allowing any standard PC with a web browser to interface with the systems. This would not only reduce capital costs, but also enables more people to interface with the system, with less training required.

For the Mater Private Hospital, BEMS has been central to controlling energy costs and improving the reliability of their systems. They have been able to save energy and money whilst guaranteeing the highest level of patient comfort and a healthy environment.



 Normal and Standby Power Control

 *The BEMS monitors both the main incoming power-breakers to the building and the emergency generator change-over breakers. The reliable operation of these circuit-breakers and changeover breakers is essential in a hospital, where lives can depend on the ongoing availability of electrical power. The BEMS is pivotal in maintaining this reliability.*



↑ *BEMS ensures comfortable conditions for all at The Mater Hospital and provides checks on air, refrigeration, water systems and lighting.*

A Healthier Environment

Typically, running a BEMS system can save up to 20% or more of energy requirements. This, in turn, reduces impact on the environment caused by emissions of atmospheric pollutants (so-called greenhouse gases) – such as CO₂ – giving both financial and environmental benefits. The savings created through using a BEMS are substantial and recur year after year.

Optimum Heating Systems Control

One of the most important areas influenced by BEMS is the hospital's heating control system and the benefits here of using BEMS can be very marked. The system monitors not only room conditions but also outdoor temperatures. In this way, the BEMS learns the characteristics of the space to determine the last possible moment to bring a plant item on and the earliest possible moment to switch an item off.

Zone and Time Control

It is used to great effect in controlling the central heating system in the hospital, which is divided into various zones. Using the hospital's computers, staff can schedule room occupancy

times in advance and have the room at a temperature most beneficial to patient health. When some rooms are not occupied, such as bank holidays, or at night, various air-handling systems that are not used continuously can be easily programmed on and off.

The Electronic Engineer - Monitor and Alarm Reporting

The BEMS allows system engineers to monitor all the systems without the need to visit the various plant rooms. It notifies the engineers of problems often before the occupants are aware of them. For example, as soon as a temperature is higher or lower than prescribed limits, an alarm at the PC alerts the engineer. The problem can then be looked into and corrected before patients or staff are aware of a noticeable temperature difference. By monitoring system faults from the various specialist systems around the hospital from a central point, maintenance is faster and more responsive.

Throughout the various buildings, electricity check meters monitor the main incoming electrical supply to the hospital. Using the



📷 *The Boiler House*

↑ *The Motor Control Centre Panel can be seen at the rear of the boiler house. It contains the equipment operating at 200 volts and above, while the BEMS control equipment operates at low-voltage, usually 24V. The BEMS outstations are housed along side this motor control panel.*



information, graphs of electricity usage can be plotted to show trends, times of peak usage, and allow the hospital management to formulate the optimal electricity usage plan. Having successfully reduced electricity usage and spending, the hospital now intends to fit further electricity check meters.

Maintenance

The system brings together the various engineering systems at the hospital under a single system to report faults and adjust controls remotely. These include areas such as food refrigerator temperatures; gas detection systems, water treatment and emergency lighting. It is used to control the air-handling units in operating theatres, general areas, X-ray facilities and changing rooms. The BEMS also monitors and controls the hot and cold water temperatures and calorifiers.

In the air-handling units, air differential pressure switches monitor the condition of filters. When a large differential between incoming and outgoing airflow is detected, this indicates that the filter is dirty and needs changing. This not only reduces the need for routine maintenance checks, but also ensures that filters are not allowed to clog

up, helping to maintain air quality and reduce fan energy use.

Water levels and temperatures of clean water and foul water storage tanks at the Mater Hospital are monitored with the BEMS. It is also linked into the security system to provide out-of-hours notification of problems in such a way that security personnel know whether to call the duty plumber or electrician.

BEMS – Keeping the Mater Healthy

The Mater Private Hospital's BEMS acts as a master system that brings together all the different engineering systems at the hospital under a unified control. It means that all aspects of energy usage and plant items costs are constantly monitored, attended to promptly and kept functioning optimally.



Source Text

Paul Overy, Overy & Associates



Glasnevin

Dublin 9

Ireland

t +353 1 8369080

f +353 1 8372848

e info@sei.ie

w www.sei.ie

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