



# New UPS and supercapacitor technology at the heart of hospital

**Location:**

TAYS, Tampere University Hospital, Tampere

**Challenge:**

Peak shaving towards emergency generators and grid

**Solution:**

Three paralleled 300 kVA Supercapacitor UPSs

**Results:**

Continuation of operation is of paramount importance and confidence in the functioning of this technology is now proven. Without the supercapacitors, this solution would not have been chosen.

*“The most important reason for the installation of supercapacitor UPSs was their ability for peak shaving. As a bonus they also provide traditional UPS support.”*

*Juhani Jauhiainen, hospital engineer, Pirkanmaa Hospital District*

**Background**

The Pirkanmaa Hospital District (PSHP) worked with Eaton to install modern UPSs with supercapacitor technology to ensure uninterrupted operation of hospital imaging devices.

In the first phase of the project, Eaton Power Quality Oy, which manufactures UPS equipment in Finland, delivered one 300 kVA UPS with supercapacitors into Pirkanmaa Hospital District's cardiology department. In the second phase, two more UPSs of the same capacity will be delivered to the hospital. All three UPSs will then be connected in parallel.

During the project, the hospital also installed a further Eaton 300 kVA UPS with supercapacitors to secure uninterrupted operation of the Computed Tomography (CT) scan in the emergency department. Consequently, the hospital will have a total of 1.2 MVA power from the supercapacitor UPSs.

Hospitals always have back-up generators available; in this case, PSHP's UPS system will be fed by three 1 MVA generators, if necessary.

The most important reason for the installation of supercapacitor UPSs was for their ability to enable peak shaving for the generators and the grid. As a bonus, they also provide traditional UPS support. The power and back-up power requirements in hospitals have grown more critical alongside hospitals use of electric equipment and ICT.

“At first, we had planned to use DRUPS devices, whereby a diesel rotary generator powers a UPS. However, the reduced maintenance from a supercapacitor UPS, combined with higher efficiency, convinced us to take the opportunity that new capacitor technology provides in feeding the demanding load equipment.”

“We trusted that a carefully designed and manufactured product would lead to a reliable solution. In addition, the chance to replace traditional lead batteries with new maintenance-free and longer-lasting technology contributed to the decision.”

*Juhani Jauhiainen, hospital engineer, Pirkanmaa Hospital District.*



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## Challenge

Surgery in hospitals is performed with the support of CT, computer-based imaging devices. Open surgeries are reduced all the time. This emphasizes the role of the UPS; if the surgeon's operating screen goes blank during surgery, it is impossible to continue. The UPS supplies the rated power of the CT devices. At the same time, the supercapacitors supply the current peaks of the CT device imaging function and thus also help the emergency generator. "We are better able to implement grid protection when we don't need to take into account those CT peaks," says Jauhiainen.

The most challenging in hospitals is to guarantee the 24/7 operation. Not all activities require this, but so many systems do, that all activities need to be organized on their basis. Hospitals have operational processes that staff needs to manage and understand. This also means that choice of the device needs to be carefully considered, in order to obtain functional, manageable and practical systems.

The hospital's 24/7 operation also poses challenges for technical personnel in terms of maintenance and testing. The planning of controlled one or two-hour breaks in the hospital's power supply has to be done well in advance because of the reliance on IT equipment, which means that breaks must be planned in accordance with surgeries and other operations. Above all, the IT team must make sure there is no interruption of other functions at the same time, for example if there is a controlled power outage, there should be no interruption to the heating or water supply at the same time.

## Solution

Patient safety is everything. Beyond the large UPSs, there are imaging devices, elevators, security systems and other devices that need UPS protection. In the past, the hospital's imaging devices were not even connected to the emergency generators because of the power surges that occur while doing imaging, which could have jeopardized the entire electricity supply from the generator. Consequently, this project has delivered a huge improvement, thanks to three large UPSs with supercapacitors that are N + 1 connected, i.e. with redundancy planned into the system.

Eaton was chosen largely because of the hospital's past experience with the company, not to mention its heritage built over 56 years of making UPSs in Espoo (Finland). According to Jauhiainen, "Eaton was also chosen because of the reliability of its UPSs and the fact that their maintenance and technical support have always worked well and skillfully. There has always been help available, when it was needed."

Jauhiainen added that "It is also important that there is a high degree of domesticity in that the closer the supplier's culture is to your own, the more confidence you have in the supplier."



## Results

Preventive maintenance as a philosophy is very important in hospitals. One cannot wait for failures before starting maintenance work. Advanced planning is very important; all service interruptions are agreed in advance so that every member of the hospital team can be prepared for them. When the equipment is needed it must work. The medical profession dictates that patients should not be exposed to hazardous situations and it does not make allowances for extraordinary circumstances, such as should the whole sub-region not have electricity for days or even weeks. The hospital must prepare for these situations, despite their rarity. Of course, the hospital has

different electricity supplies, but it also has to be able to maintain the operations using power from the generators.

The Eaton Power Xpert 9395P UPS with supercapacitors has been supplying the CT imaging for over a year now.

"We have positive experiences and have eagerly followed the operation of supercapacitors from the beginning of the installation. Because of the cyclic nature of the load, we did not believe in battery power in CT. Continuity of operations is of paramount importance and the confidence in the functionality of this technology is now proven. Without a capacitor option, this solution would not have been chosen," said Juhani Jauhiainen.

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