Superior Control Solutions

Case Study:
National Capital Private Hospital

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National Capital Private Hospital

Located in Garran ACT, National Capital Private Hospital is co-located with Canberra Hospital. In 2015, the National Capital Private Hospital completed a major extension that delivered three additional state-of-the-art operating theatres, an intensive care unit, a coronary care unit new wards, oncology wards, a level 4 isolation room, specialist suites and a refurbishment of some areas of the existing building.

The mechanical and building management for the extension comprised of two mechanical plants. The vast majority of the equipment runs 24/7. A dedicated theatre plant made up of 4 HHW and CHW coil AHU's with fan assisted relief air and economy mode, 3 humidifiers and ventilation systems.

The main roof plant comprises of 6 HHW and CHW AHU's with fan assisted return and relief air, economy and dehumidification mode. These AHU's feed Level 4 ICU and CCU areas as well as Level 5 CSSD and staff areas that have further temperature control either through the use of thermal VAV diffusers or HLI controlled electronic VAV diffusers.

2 HHW and CHW coil air to air heat exchange units use recovered conditioned air via exhaust grills on levels 2, 3, 4 and 5. These units then use this air to feed preconditioned OA to the FCU's on levels 2, 3 and 4. 3 gas boilers with 3 HHW pumps supply hot water to the mechanical systems while a Chiller with 2 CHW pumps, a tenant condensing tower with 2 CDW pumps provide chilled and condenser water. Flow metering is also present on the HHW, CHW and CDW.

Setpoint control of the chiller and boilers is calculated against the average position of the valves. The higher the average, the lower the setpoint. This strategy is used to reduce the energy consumption of the chiller and boilers. Building flow required is calculated through the position of each valve and then compared to the total measured flow. Pump speeds are then adjusted to maintain required flow.

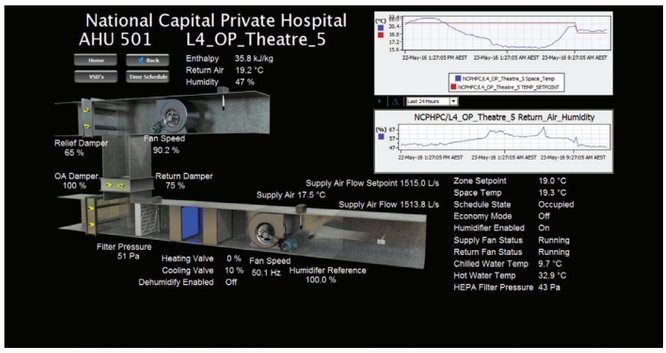
Also installed are a Mitsubishi VRF system for the Comms rooms on level 2, 3, 4 and 5 and 6 Mitsubishi reverse cycle units for the suites and UPS room on level 5 and 6.Monitoring systems include electrical metering, third party monitoring of UPS, Emergency Generator and hydraulic services.

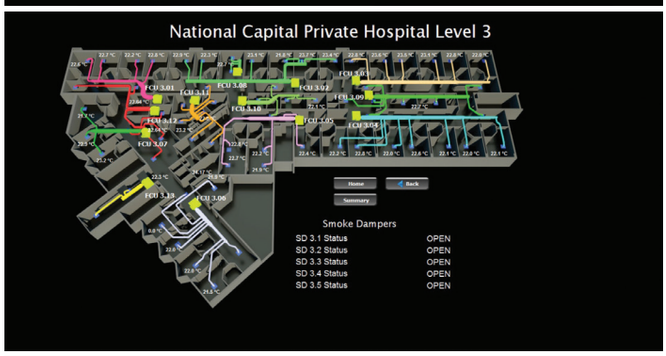
Over the 5 levels there are 25 HHW and CHW FCU's with preconditioned outside air feeding electronic and thermal VAV diffusers. All AHU's and FCU's are monitored for supply and return temp, status, filter pressure, duct pressure in the case of equipment supplying VAV's.

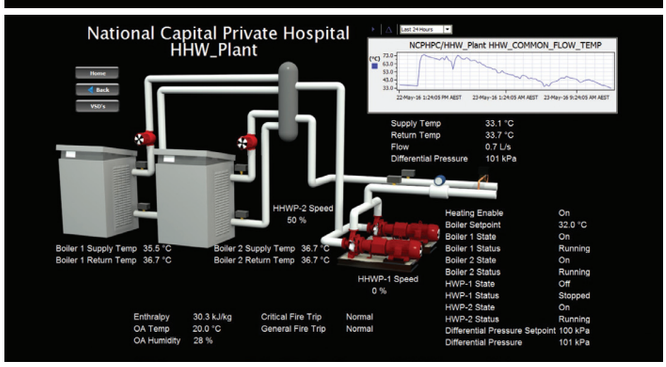
Essential services include 3 stair pressurisation fans which activate when a fire alarm is tripped. Speed is controlled directly controlled by the VSD via stairwell pressure transducers on level 3. 2 stair exhaust fans also activate and relieve pressure in conjunction with fire relief dampers on each floor which only open when a fire alarm is tripped. At the same time isolation smoke dampers on each level close to ensure smoke is not distributed throughout the building.

The mechanical system is centrally controlled and monitored via a Tridium Niagara based system. This system comprises of 2 JACE central controllers, a Mitsubishi BACnet server allowing central control and monitoring of the VRF and reverse cycle units, a tenant billing server, local BACNet EASYIO DDC controllers controlling each AHU or FCU as well as switchboard located controllers and HLI monitored variable speed drives for the main and theatre plant equipment.

As part of the refurbishment, 13 existing HHW and CHW coil FCU's had their analogue controls removed and the system was updated with new local BACNet EASYIO DDC controllers which are linked to







the new central BMS system. Provision has been made for future upgrades to be integrated within the new central BMS controls. As the theatres are a critical area for conditions, they include local LCD touch screen monitors which allow the occupants to monitor conditions in each theatre such as temperature, humidity, room pressure and the running status of equipment.

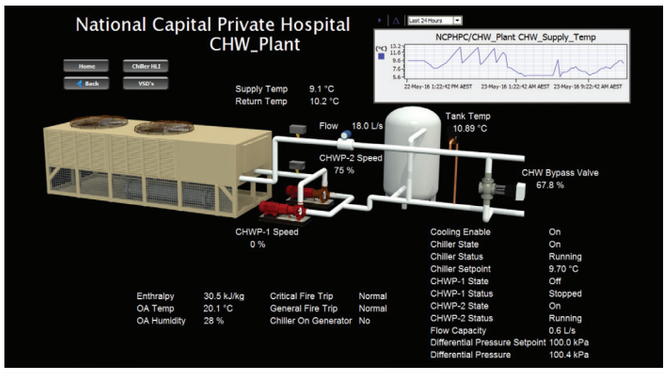
Each theatre space is controlled to a specific temperature setpoint. Humidity is controlled via the use of electric humidifiers and dehumidifying through the use of chilled water. The screens also display generated alarms specific to the space and allows the adjustment of room temperature set points.

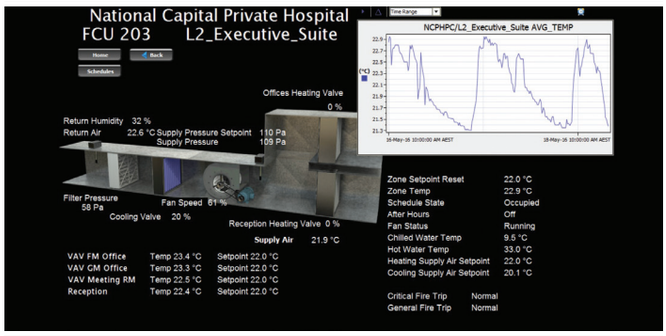
The intensive care isolation room also includes a local LCD touch screen monitor which displays local conditions within the ICU. It allows temperature setpoint adjustment and the activation of an isolation mode in the isolation ward which activates spring return motorised dampers on the supply, return and exhaust ductwork so that air in the space is not returned to the system, but rather exhausted outside via an exhaust fan on the roof. Room pressure is monitored as the ward must be kept negative pressured in relation to the ICU main space when in isolation mode. The dampers and fan are monitored for status and if any part of the system fails the dampers will close and an audible alarm will sound.

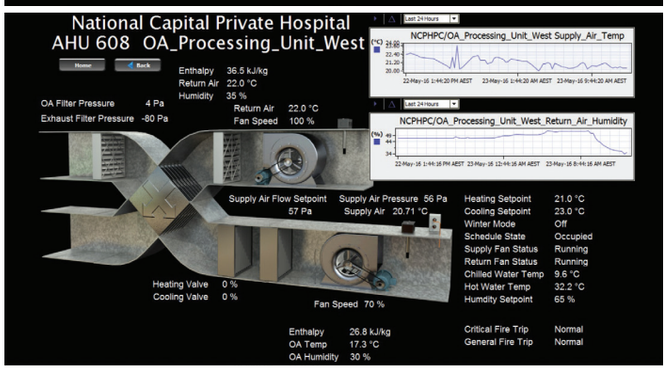
A dedicated UPS backed local BMS server with internet connection and RAID 5 backup configuration; hosting Niagara AX supervisor software links all equipment together giving the facility and service technicians remote access to monitor the HVAC equipment and BMS systems from anywhere with an internet connection.

The monitoring of the site is easily achieved via web based graphical representations of all specific mechanical plant equipment; which include tables and historical graphs which can be used to monitor conditions over a period of time and floor layouts which identify each zones temperature and the equipment serving it.

The system monitors conditions and equipment and generates alarms which are shown on the graphics and are also emailed to identified parties. This system also monitors the electrical energy and water usage of the building via electrical meters located in the main switchboard and each of the 4 mechanical switchboards and hydraulic meters spread throughout the building. The specialist suites are made up of either local CDW and HHW coil Temperzone PAC units on level 2 or HHW coil reverse cycle ducted Mitsubishi AC systems on level 5. The CDW and HHW are supplied from a dedicated closed circuit cooler and gas boiler in the main roof plant.







The electrical and gas energy plant usage of these suites is calculated automatically via a tenant billing server with integrated software. Suites on level 2 output a call for HHW or CDW and Suites on level 5 output calls for HHW when required. These water calls are used in conjunction with energy consumption of the tenant plant and then calculated against the floor area and time duration of usage of each suite. Each month usage per suite is finalised and a bill generated and emailed.

The local BMS server also hosts Vykon Energy Suite software. Vykon Energy Suite (VES) is an enterprise energy management application that allows the user a way of querying and managing energy and the facility. The complete installed BMS package at the National Capital Private Hospital has proven that our control solutions can provide for complex mechanical and monitoring systems to be implemented with infinite expandability and the capability to be easily tuned and adjusted both on site and remotely. It can be integrated with existing systems, third party devices or provisioned for future upgrades.

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