Hydronic Systems improve building comfort and efficiency

Metallic Building Materials LLC sheds light on building performance over the long-term lifecycle of a project, and the need for construction stakeholders to utilise the right systems to ensure efficient heating and cooling

Stakeholders operating in the MEP industry will be quite well aware of the implementation of sealed Chilled Water (CHW) & Hot Water (HW) Systems used in a variety of applications in the region, from commercial to residential and even industrial developments.

Many contractors opt for these systems for their ease of installation, energy-efficient operation, as well as streamlined maintenance benefits.

While these systems can be versatile in a variety of HVAC circuits, ranging from different static heights and CHW/HW system volumes, they can struggle to deliver over time and cause distress, not only to the building's occupants, but also to the very resource that powers them.

The principle of hydronics is more than just a pump circulating water around a CHW/HW circuit to provide cooling or heating. The use of hydronic systems within the circuit can be beneficial in optimising a building's HVAC performance.

One solution that Metallic Building Materials LLC can implement is a digital pressurization unit, which regulates the system pressure to a desired level for the building's overall comfort. In theory, once a desired pressure level has been set on this unit, it monitors the system pressure to ensure it is not lower than the pre-meditated level.

This can happen if, for example, there is a leak in the sealed system's pipes. If the actual pressure is lower than desired, the pressurization unit injects the deficit through a built-in break tank to bring the pressure back up to the preset level.

A low system pressure can cause insufficient and non-uniform cooling or heating within the premises. The inclusion of a digital controller can provide valuable feedback and insights into the system's pressure variances, not to mention the benefits of remote monitoring.

Alternatively, there is a need to make sure the system's pressure is not higher than the pre-determined level either. A high system pressure can cause the system and its components to fail and cause leaks and damages in the equipment.

An expansion vessel can help avoid this. As the system pressure increases, mainly due to high temperatures, the system fluid expands and has nowhere to go in a sealed system. The excess fluid flows into the expansion vessel and remains there until the pressure drops back to the desired level.

Now that system pressures have been dealt with, it is also essential to address fluid properties and the factors affecting them.

Chilled/Hot Water can be an effective medium in providing comfort and efficient indoor air quality, but it can be threatened with external properties.

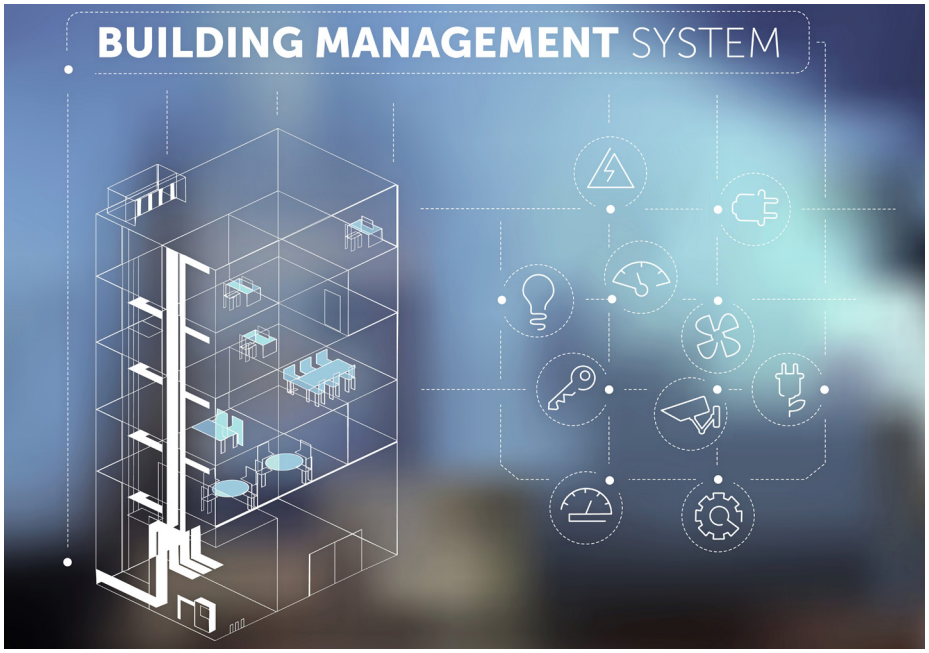
As time goes by, rust from internal piping and other debris can collect and dilute the circulating fluid. The same goes for the accumulation of air bubbles and dissolved gasses which can be brought in through air leaks.

These properties can negatively affect the system overall, causing not only fluctuations in the delivery of air quality, but also in the performance of complementing equipment in the circuit, for example, by causing cavitation and damage to the pump.

As such, the inclusion of an air & dirt separator can be useful in eliminating dissolved gases and debris from the system, even while it is running at full strength and therefore, provide quality indoor air to the tenants and maintain consistent performance of the HVAC system.

To take things up a notch, as systems become bigger and more complex, the requirement for air removal grows progressively.

Hence, a digital vacuum degassing unit should be added to the circuit. In conjunction with an independent dirt separator, the two can remove dissolved gasses and physical debris on a larger scale.



Again, the addition of a digital controller can help in observing system conditions and measure energy consumption.

The inclusion of hydronic systems not only enables tenants to experience comfortable indoor air quality, but also empowers the facility's managers to contribute to the practice of energy and system efficiency.

The digitisation of building services can tie in with hydronic systems to allow stakeholders to proactively find solutions to problems.

For example, when installing flow control valves in chilled water fan coil units, an accompanying digital actuator can provide real-time analytics to the project's Building Management System (BMS) in terms of the valve's position, upstream/downstream flow rates and other data.

When monitored across the board, managers can look out for "dead spots" in cooling and correct the matter more effectively whilst managing the load on the system's resources and making more efficient use of labour.

Over time, the use of hydronic systems and digitisation can induce more sustainable energy resources, resulting in a lower carbon footprint and lower building ownership and operation costs among stakeholders.

Hydronic systems are often overlooked on projects due to cost-saving measures, but they are critical in the performance of buildings and establishments and can very well save on operating and maintenance costs in the long term.

Efficient heating or cooling requires efficient systems to run and the ability to preserve both indoor climates and energy sources are a win-win for all.