How architects can futureproof the buildings they design and satisfy building owners

This year and beyond, architectural firms should be incorporating integrated building solutions that safeguard the wellbeing of people and boost the bottom line for their clients.

The new trends in building development require the health and wellness of building occupants and users above all, creating a shift in the way architects approach their jobs. To roll with the changes, architects must aim to futureproof the structures they design by ensuring healthy work environments for occupants and guests, finding new ways to use space with social distancing in mind and incorporating systems that ensure low operational costs once a building is completed and in use.

Astute architectural firms as well as AEC teams and their client groups have the option of partnering with a single-source building solution provider that also possesses the perspective of solutions that work in multiple markets worldwide. Mitsubishi Electric is just such a partner, offering the hardware needed, the software to optimize operations, and the comprehensive after-service options to handle upgrades and any issues that arise.

Architects can partner with a single-source building solution provider with local and global perspectives

Energy-saving HVAC systems make a big difference.

What should architectural firms and AEC teams focus on first? Three systems: HVAC, vertical transportation and uninterruptible power supply (UPS) systems.

Carl Ian Graham, P.E., of Viridian Energy & Environmental, Inc. notes that HVAC consumes an average of 39 percent of the energy that com¬mercial buildings use. Modern, high-performance HVAC systems deliver big, long-term energy savings, cleaner air and comfort, and greater design freedom: from 10 to 40 percent in energy, emissions and costs, and up to 70 percent through whole building design[1].

HVAC systems featuring variable refrigerant flow (VRF) technology also contribute to the certification and marketability of high-performance buildings as "sustainable." Specifically, VRF adds up to 21 points in the Energy and Atmosphere category and up to seven points in the Indoor Environment category for the internationally recognized green building certification system LEED (Leadership in Energy and Environmental Design) certification[2].

Higher-performance HVAC systems deliver big energy savings, cleaner air and comfort, and greater building-design freedom

LEED (Leadership in Energy and Environmental Design). Air flow and air quality were dominant themes in HVAC systems long before the current virus came along. According to Mitsubishi Electric performance construction manager Kimberly Llewellyn[3], improved comfort and thermal control are essential to indoor environmental quality and a positive tenant experience. VRF control in warm climates, for example, addresses excessively humid air and moisture accumulation in materials, which can lead to upper respiratory infections and asthma. Mitsubishi Electric also introduced the world's first duct ventilator with a built-in CO_2 sensor in November 2020.

VRF systems use small-diameter piping to move refrigerant. This allows for smaller plenums and less space between floors. Rooms appear more spacious. Taller spaces may provide opportunities to add windows for better natural lighting. Architects can also demonstrate how they reduce construction costs by, for example, designing shorter buildings with the same amount of usable space[4].

VRF-equipped units are also more compact than conventional HVAC units, and distributed rather than centralized. This reduces space requirements for mechanical rooms. At an average weight of 70 pounds per ton for an outdoor unit, VRF equipment is up to 30 percent lighter than alternatives such as chilled water systems. This reduces requirements for structural steel and lintel beams[5].

Heat recovery VRF systems such as Mitsubishi Electric's Lossnay system offer significant efficiency gains of up to 25 percent, and new outdoor units up to 30 tons in capacity can have footprints as much as 30 percent smaller than the pre¬vious generation[6]. This also gives architects more space to work with in design layouts.

No-touch building navigation enhances safety

The fewer surfaces that people touch in a building, the healthier they will remain. Moreover, the less time they spend in enclosed spaces such as elevators, the less chance there is of viral infection. Some solutions are low-tech, such as escalator guide rails that pass through a device with cleaning brushes. rubber guiderails and cleans them.

On the high-tech side, Mitsubishi Electric's Destination Oriented Allocation System (DOAS) optimizes multi-car elevator systems by efficiently allocating cars according to the floors that passengers enter at the hall landing before they board an elevator, helping to reduce both wait and travel times. Since the destination is automatically pre-programmed in the arriving car, passengers need not touch a button[7].

Based on simulations conducted by Mitsubishi Electric (using 16 floors, six cars and 20-person load capacities), DOAS cuts average wait times by up to 30 percent during congested hours compared to conventional systems. The controls also reduced incidents of long waits (those of 60 seconds or more) by up to 60 percent during peak times.

The spiral escalator can transform indoor spaces through dramatic visual experiences

DOAS and destination-control technologies maximize car allocation efficiency, by directing passengers bound for the same floor to use the same elevator and grouping passengers according to optimal traffic patterns. As a result, one's car will not stop at floors other cars are serving. A multi-car systems algorithm reduces energy draw by creating the most efficient service schemes.

Machine-room-less (MRL) elevators with gearless traction use a regenerative converter[8]. This technology transmits the power

generated by the traction machine back to the distribution transformer and into the building's electrical network, where it mixes with grid electricity. The power from operating the traction machine is typically dissipated as heat. Collecting and using this heat offsets the elevator's energy consumption by about 35 percent.

Purely from a design perspective, Mitsubishi Electric's exclusive spiral elevator—for indoor applications up to just over 21.5 feet of vertical rise—creates a dramatic sensory experience and visual impact while offering life-cycle performance comparable to linear (straight) escalators[9].

Uninterrupted power ensures critical mission

New UPS systems meet the need for more resilient buildings and commercial complexes that can ride out severe weather episodes and peak demand cycles. This is essential for places like hospitals and data centers with mission-critical requirements for continuous service.

UPS systems have become a significant selling point that architects and AEC teams can recommend to clients. As demand increases for cloud and colocation services, hyperscale megawatt UPS systems are often seen as a best-in-class facility feature to address the unique needs of data centers, with dense server usage and other critical systems.

Among the most valuable innovations are hyperscale UPS configurations with very small footprints and flat efficiency curves[10]. They offer a lower total cost of ownership (TCO) and improved power usage effectiveness in comparison to conventional UPS equipment. The installed base of Mitsubishi Electric's 9900 series UPS systems, for example, have been verified to provide uninterruptible power with sustained load-carrying capability of over 99.999 percent throughout the product line's operational lifecycle[11].

The Maisart AI software system can automate environments and allow predictive maintenance

"Build in redundancy for critical systems," advised Jennifer L. Chiodo, P.E., of engineering consulting firm CX Associates[12]. "For the power supply, ideally serve these buildings from two separate utility substations or distribution nodes. Ensure that buildings can be islanded—separate from the power grid so that they can continue operation during outages," she said.

As the cost of downtime skyrockets for virtually all types of businesses, achieving these levels of redundancy, isolation and backup should prove more efficient and profitable for building owners and developers.

High efficiency, rapid deployment, TCO, scalability, premier service and support are all critical.

Most UPS solutions are designed to make equipment smaller, lighter, more efficient and more reliable. To boost efficiency, for example, three-level topology introduced in 2008 ensures a UPS that provides greater than 97 percent true online double-conversion efficiency[13].

Building design of the future requires trusted partners

Architectural firms and AEC teams should always be looking ahead, but the lessons learned during the pandemic, with the need for health and wellness designed in from the start, form the cornerstone of the new era in building. Designing builds that are sustainable and that put safety, health and wellness front and center is crucial. Think decades ahead.

One key to a new mindset will be the "digital twin." This is a clone inside a server to control all these various systems in a building based on the specs of HVAC and vertical transportation systems, human traffic data and more[14]. Mitsubishi Electric's Maisart AI software system and other software packages are available to govern. They will generate the ideal environment for the structure, and even be predictive on maintenance.

As a trusted partner, Mitsubishi Electric can lay out the benefits of a full spectrum of products and systems now that will futureproof buildings as new challenges arise in the coming months and years.

**Some of the technologies mentioned above are not yet available in Vietnam. Please contact us for more information.*

References

(1). "Building Innovation Game-Changing Systems for Efficiency and Advantage"; Mitsubishi Electric white paper

(2). "Reducing Costs and Achieving Value with VRF Systems"; Mitsubishi Electric white paper

(3). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(4). "Reducing Costs and Achieving Value with VRF Systems"; Mitsubishi Electric white paper

(5). "Reducing Costs and Achieving Value with VRF Systems"; Mitsubishi Electric white paper

(6). "Building Innovation Game-Changing Systems for Efficiency and Advantage"; Mitsubishi Electric white paper

(7). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(8). "Stop Wasting Revenue Four Pro Tips to Design for Energy Efficiency"; Mitsubishi Electric white paper

(9). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(10). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(11). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(12). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(13). "Building for Efficiency Systems Approaches Boost Profitability"; Mitsubishi Electric white paper

(14). December 2020 online interview with Michael Owen, CEO of Transpacific Enterprises, a Tokyo-based consultancy that develops PR strategies for real estate developers, investors, and government officials.