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EngineeringAdvantage™ Newsletter

August 2017

In This Issue:

Welcome to

Siemens EngineeringAdvantage™ Newsletter

We hope you find the information contained in this and our past newsletters useful. The goal is to periodically provide the engineering community with relevant building automation related information. Each issue will discuss a control system design topic followed by a Siemens product focus relevant to the design topic. Please contact us or your local Siemens representative if there is a particular topic or product you would like to see included in future issues or if you would like to see further information on the topic discussed. Please pass this along to other colleagues and let us know if you would like others added to our distribution list. Our contact information can be found on the last page of this newsletter

Introduction

Our industry is rapidly changing with the onset of Smart Buildings and the Internet of Things (IoT). As we ramp up to tackle the convergence of modern technology with building design and operations we have to make sure we are not overlooking the fundamentals. Building owners are anxious to reap the benefits of Smarter Buildings, but face new challenges in return. We will address some of those challenges in this newsletter.

Design Topic

Smart Buildings

Introduction

The concept of "Smart Buildings" began in the early 2000's but has only recently started to become a reality. One of the drivers has certainly been the global focus on energy and sustainability, but possibly the biggest influence has been the advance of information and communications technology (ICT), via smart phones, tablets, and computers in our daily lives. This advance has changed the paradigm of how information is communicated and provided the vision of the Internet of Things (IoT), where any sensor, device or software application that can be connected will be connected.

MarketsandMarkets, a global research, and consulting firm, has projected the smart building market will grow from $5.71B in 2016 to $31.74B by 2022. Other market research is indicating similar growth and more. With substantial projections such as these, the question is no longer do customers truly want smarter buildings; instead, the question is how do we as consultants, contractors, and providers ensure we deliver the product that meets their needs and expectations?

What Makes a Building Smart?

The primary distinction of a smart building is that core building systems such as HVAC, lighting, fire alarm, etc. are linked together through an open protocol building automation system in order to manage the building more effectively as well as provide enterprise level access to an entire portfolio. Facility stakeholders can take full advantage of advanced technologies for better decision making. Another common attribute of smart buildings is implementation of energy and sustainability innovations such as rain water harvesting, water reclamation, renewable energy sources, light harvesting blinds and sun tracking systems. The objective of smart buildings is to improve building life cycle performance, lower life cycle costs, deliver higher occupant satisfaction and generate greater financial returns for building owners.

Challenges

Compatible Technologies

Simply investing in smart building technology does not create a smart building. Facility owners, designers, and contractors need to look at new building technology holistically. Ad hoc technology and short sighted implementation plans can limit efficiency and hamper data collection. However, the right technology supported by an ***Intelligent Infrastructure Solution*** (**I2S**) will reduce costs, enhance productivity, enhance performance, and allow for future adaptability. To achieve this, a comprehensive plan for all of the building systems, technology and data should be developed during the design phase for new construction or as part of a migration plan for existing facilities. This **I2S Technology Roadmap** will ensure systems can access and share data among themselves and the facility's staff both on-site and remotely. Smart data from these systems give a facility's infrastructure a brain and a voice. It allows infrastructure to play a major role in supporting the mission of the organization. It helps drive top-line results by providing optimal environments, increasing equipment uptime and reliability, and lowering operating costs.

IT Interaction

IT departments are an essential part of planning for a smart building. Smart buildings leverage advanced technology and IT to become smart, efficient and sustainable. It is critical to bring the building automation system vendor into meetings to answer specific IT questions. The vendor representative should be proficient in IT issues. Although, building automation providers have not historically been "IT savvy", the industry is changing and if that skill set does not exist within the vendors organization, that is certainly a red flag that they may not be the right choice for the project The best approach is to get a vendor involved early in the design process to ensure at least one organization can meet the requirements of the project.

Cost

Many think there is an initial cost premium to achieve the life-cycle savings of a smart building due to additional sensor, meters etc. The reality is that both life-cycle and ***first cost*** savings can be achieved if the right technology and intelligent infrastructure are applied. Recent smart building projects have benefited from significant initial cost savings by taking advantage of existing technologies that reduce cabling, labor, hardware, commissioning etc. The key is evaluating what technologies are available to streamline the installation and operation of today's building systems. Owners no longer have to pay a premium to gain the benefits of smart buildings today.

Intelligent Infrastructure

In order to meet the demands of data management, it is important to provide an intelligent infrastructure to handle current and future needs. Smart buildings are meant to be dynamic and flexible so they can incorporate new technologies as they evolve or when financially feasible. The following items should be part of a smart building infrastructure:

Integrated Building Management System (IBMS) with an open platform able to accommodate multiple protocols such as BACnet, OPC, Modbus etc, to ensure connectivity to the variety of systems within the smart building. Examples of potential smart building systems include: HVAC, lighting, fire, access control, video management system (VMS), rainwater harvesting, exterior shading, energy management,

power monitoring, sun-tracking, water reclamation, demand response programs, alternative energy sources – and any other emerging technology

Data collection – intelligent field devices that record and collect data allowing the building to capture and communicate data. Examples include smart lighting, energy and water meters, video imaging/cameras etc

Data analytics – a true analytic platform that can analyze data and monitor system performance. This is frequently a cloud based service that combines energy information with building performance and enterprise customers to analyze entire portfolios

Fault Detection Diagnostics (FDD) – often part of a data analytics platform that collects data and identifies faults, or errors, based on established hierarchical relationships and rules between the different equipment and processes. Also frequently a cloud based service

Integrating data analytics with the IBMS allows measurement of energy and efficiency performance at all levels of an organization, generating tailored reports such as:

- Detailed energy analyses (energy benchmarks, billing errors, budget/actual cost comparison)
- Environmental analysis (e.g. greenhouse gas actual vs targets, real-time regulatory compliance, sustainability goals)
- Performance assurance (e.g. equipment improvements, optimization opportunities, performance vs targets, M&V on facility improvements)

Cabling

Cabling plays a prominent role in an intelligent infrastructure. Smart buildings with intelligent infrastructures require a consistent power supply to manage large amounts of data. End-to-end Ethernet ("E3") cabling provides power and communications through one cable. While Ethernet use is not necessarily faster than private lines, it increases capacity and is extremely scalable. End-to-end Ethernet can be tied to Internet access, bumping up access speeds appreciably. Ethernet cables also allow your building an affordable way to connect local area networks (LANs) to a wide area network. Every router has an Ethernet interface. You don't need special hardware, and the technology is very familiar. So, most IT staffers will have little trouble adapting them

In the Duke Energy Center in Charlotte, N.C., 16 separate building systems, including three building automation systems, are integrated on one network.

In Closing

With the projection of this market growing drastically over the next five years, it is inevitable that many of us will be designing, building, or operating these types of facilities for some time. Smart buildings will continue to evolve concurrently with technology and building owners will reap the benefits.

For more information on Smart Buildings and how to develop an **Intelligent Infrastructure Technology Roadmap**, contact your local Siemens representative, Rich Nowak at richard.nowak@siemens.com, or email us below.

This publication is intended for informational and business purposes only. If you have an idea for a topic you would like to see covered here, if you would like more information or if we can provide support on your specific project, please contact:

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Product Focus

Siemens Total Room Automation

HVAC * Lighting * Shading

Total Room Automation from Siemens is an innovative approach for simplifying the control of HVAC, lights and/or shades in buildings. By incorporating comfort, lighting, shade control and energy saving applications into a single controller, it eliminates the complexity of traditional "integrated" solutions and provides a cost effective, scalable configuration.

The Core

The Siemens DXR controller is the core of the Total Room Automation offering. HVAC applications come preloaded (e.g. VAV, FCU, Heat Pump, Chilled Beam, Lab space, etc.) with options for enabling lighting and/or shading control in each.

Ideal Lighting Conditions

Total Room Automation ensures optimized lighting conditions in the workplace. Artificial light e.g. is switched on/off depending on natural light and information from presence detectors and controlled by brightness sensors. Blinds are optimally adjusted to minimize glare, to make use of natural light and to protect from the heat and the cold.

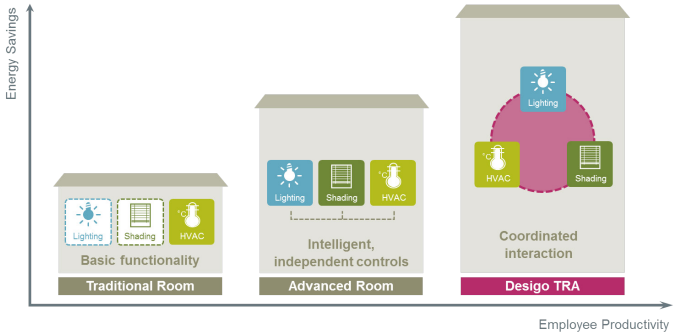
Lower Life Cycle Cost

Flexibility

Total Room Automation offers a flexible room/zone software concept. When space layouts or usage profiles change over the life of the building, it is easy to accommodate these modifications through software configuration changes only. No installation changes needed.

Scalability

The modularity of Siemens Total Room Automation allows a customer to add lighting or shading control later. It is just a matter of installing those end devices and reconfiguring the DXR – a much more attractive and economical option than buying a new lighting control system. And investments can be amortized over a longer period.



Future Proof Networking

The world is rapidly changing with the onset of the "Internet of Things" and demanding more and more data from building management systems. To accommodate this trend, the Siemens controller broke from traditional Building Automation System topology of floor level controllers residing on a BACnet/MSTP network. To prepare for the bandwidth requirements of the future the controller resides on an Ethernet/IP or BACnet/IP network. Keeping in line with flexibility the controller is also capable of residing on traditional BACnet/MSTP networks.

Lower Energy Cost

Combined Energy Savings

By knowing the status of all three disciplines it is possible to have a unified program to save energy during peak demand situations, such as when a demand response event occurs – reduce lighting, shut shades, manage set points, etc. to reduce HVAC and electrical energy usage in times when energy is more expensive.

Active Energy Management by Occupants

Studies have shown that energy can be reduced by changing occupant behavior. People today want a sustainable future. The controller combines all disciplines within a single user interface which allows them to intuitively participate without compromising comfort. The Green Leaf symbol on each room unit shows the occupants whether the room is operating in an energy-efficient mode. The configurable Green leaf rules will change the leaf to red when various conditions between the HVAC, shading, and lighting that are less efficient are detected – occupants need only touch the leaf to release the room back to efficient control.

Energy Efficient Indoor Air Quality

Demand Control Ventilation has become more and more prominent in Energy Code/LEED requirements and the controllers have built-in capabilities for performing this function – today or implemented later in the building Life Cycle. This ensures that your space temperature, air quality, and humidity limits are not exceeded and provides a means to meet lower energy consumption when required.

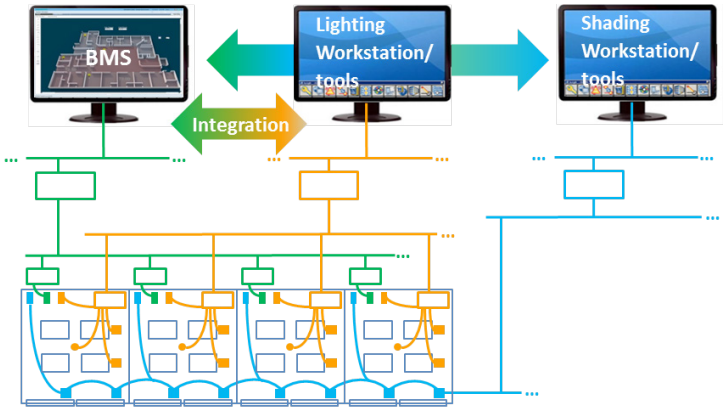
Better Customer Experience and Comfort

With a single interface for room control, occupants can manage HVAC, Lighting, and Shading in their space in an intuitive way. Coordinated control through the use of scenes can be called up with a single button press. For example, set up a presentation mode for a meeting room which may include reducing the lighting in the front of the room, lowering a projection screen and lowering the blinds. Multiple devices from different vendors on the wall are no longer required.

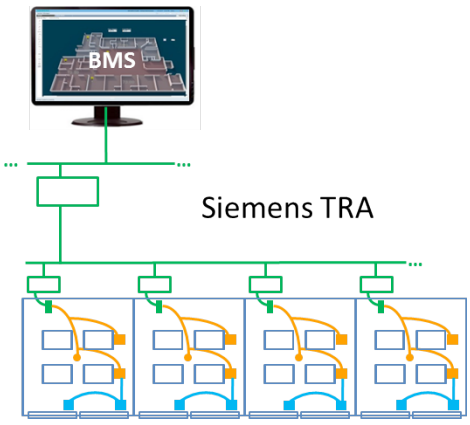
Total Room Automation positively influences all comfort and usage aspects from a unified control strategy with proven applications out of one single controller. Total Room Automation helps ensure (1) Adequate temperatures can be met and sustained (2) Good air quality is available to keep CO2 concentration at optimal levels·(3) Improved lighting is available and kept at constant levels (4) Simplified and unified scheduling of multiple disciplines

Lower Installed Cost

Traditional integrated HVAC, Lighting and Shade Control systems generally require three separate networks, frequently three separate workstations, and three separate vendors along with the integration challenges to get the systems communicating with each other. At the room level, three separate user interfaces would be required. The Total Room Automation ***integral*** approach lowers installation cost by consolidating all of these into a single unified infrastructure and user interface. Contractor coordination is also simplified to a single vendor. These savings are hard cost savings on construction and can provide increased opportunities for customers. For example, on one project a tenant fitting out space was able to expand the use of automatic shading due to savings from installing the unified system.



Traditional Integration



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