

Single Control, Multiple Benefits

Integral, automated room controls for HVAC, lights, and shades bring gains to general contractors, architects, and building owners

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In a typical office building, HVAC, lighting, and shades are all separate systems, each with its own controls. But that approach has many disadvantages, hurting the aesthetic appeal of space, adding cost, and increasing complexity. Having a single infrastructure and system to control those three systems brings benefits to key stakeholders in the design, construction, and management of buildings such as offices, healthcare facilities, or educational facilities: architects, general contractors, consultants, and building owners. Those benefits begin during the design phase, extend through the installation of the system, and continue throughout the life of the building.

In the past, the only option for getting controls for those three systems to work together was field integration. Today, however, there's a better option: a single infrastructure and system that controls all three elements. Desigo Total Room Automation from Siemens delivers control of HVAC, lighting, and shading from a single system, with a single device on the wall.

Easier, Less Costly Installation

A single system for controlling HVAC, lights, and shades brings significant bottom-line benefits to general contractors and building owners. Installing three different control systems takes more time and raises costs. In fact, during the construction phase, the standard approach triples installation costs when compared to one controls system for all three, according to Brian Antonsen, director of major construction at McKinstry, a full-service design, build, operate, and maintain firm. "It just costs more because you're running three times as many wires," Antonsen explains.

These savings are significant to both general contractors and building owners. But that's not the only benefit to a single control system. Having a single product to control the

three systems also simplifies life for general contractors. Separate controls usually mean three different vendors. When all three are controlled by a common system and infrastructure, the general contractor has only one controls vendor to manage — one throat to choke, as the saying goes.

Antonsen also notes that separate controls make it more difficult “to get a holistic view of the system,” so commissioning one device that controls multiple room functions may be easier.

For building owners, the savings — up to 35 percent, by Siemens’ estimate — can have a major impact on the overall project. In one case, for example, a tenant fitting out space found that it could expand the use of shading thanks to the savings from installing a single system to control HVAC, lighting, and shades.

Reducing Clutter Brings a Cleaner Look

An architect designing space has to meet many goals specific to the project. One priority is key on every project, however: The space has to look good. Separate control devices for HVAC, lights, and shades pose an aesthetic challenge, since each will have a device on the wall.

Having thermostats, light switches, and shading controls on the wall isn’t good news when it comes to aesthetics. “From a design standpoint, walls already are frequently places for artwork, LCD panels, and branding pieces,” says Lindsey Mackey, architect at Margulies Perruzzi, an architecture and interior design firm. “Aligning multiple, separate control devices near the entry door can lead to a cluttered wall look.”

Devices on the wall are only part of the problem. “Each control device may need some form of labeling, so building occupants know which switch is the lighting switch versus which switch operates the shading,” says Mackey. The design benefit of a single device to control HVAC, lighting, and shades in an office is clear: a cleaner look.

On the building’s exterior, an automatic shading system that optimizes shading controls except when a particular location needs adjustments for viewing training videos, for example, also would provide visual advantages. “Many buildings have beautiful facades that look messy because shading isn’t being applied evenly across the fenestration,” notes Mackey. “Integrating shading sensors that know when glare could cause a problem and then lower or go up accordingly benefits everyone.” Building occupants don’t have to adjust for glare and potential new tenants see an attractive, consistent exterior, she points out.

Single Control Offers Operational Benefits

When HVAC, lighting, and shading systems don’t talk to each other, there’s no way for them to act in a synchronized

manner. And if those three systems operate without any coordination, the result can be that systems “fight with each other,” says Brad Cardoso, principal architect and manager of project development and implementation at Hobbs Brook Management, a developer, owner, and manager of Class A office space. “You have the window treatments responding to the brightness outside the building and then you’ll have the interior lights responding to the darkening of the room. The rooms are usually very bright when they’re getting direct sunlight even when the shades are down, so there’s no need for the artificial lighting to be turned on.”



Installing a single system to control HVAC, lighting, and shading can bring substantial savings in construction costs compared to installing separate controls for all three systems.

Integrating the three systems can bring operational and performance benefits that are valuable to building owners. “By having all the systems integrated into one system you will have the advantage of your HVAC, lighting, and shading working in sync,” explains George Kerns, associate and facilities/security project manager at Markon Solutions, a consulting firm. “With three separate (controls) systems, they aren’t going to work in harmony, which can lead to things like glare, inconsistent temperatures, and tenant un-comfort. Not to mention loss of efficiency and higher operating costs.”

When building controls are optimized they save energy, improve occupant comfort, and increase worker productivity. Accomplishing these three goals simultaneously in buildings requires precise balancing of HVAC, lighting, and shading so that each responds seamlessly to the actions of the other two.

Savings Through the Life of the Building

Once commercial office space is built, many factors lead to changes and modifications inside the workplace. From the building owner perspective, reconfiguring space in a traditionally zoned building makes changing office space to suit

Making It Easier for Occupants to Save Energy

Research studies have suggested that occupants can play a significant role in saving energy. For example, a recent Munich study found that involving European occupants can produce energy savings of up to 25 percent.

Another study by researchers from Lawrence Berkeley National Laboratory in tandem with Taiwan's Industrial Technology Research Institute modeled occupant behavior in the United States. Researchers categorized occupant behaviors by how they could be expected to use room controls to adjust HVAC, occupancy lighting, and daylighting controls.

Researchers concluded that workers who did the most to save energy could save between 42 percent and 50 percent of

source energy compared to typical workers, while those who did the least would consume between 74 and 89 percent more energy than average.

The researchers also reported studies showing energy savings from 5 to 30 percent from changes in occupant behavior. An integrated system can make it easier to involve building occupants in energy efficiency efforts.

For example, with Total Room Automation, users are able to operate the HVAC, shading, and lighting systems from room control units with a touch display. There are several methods of controlling the system: at the control unit or through PCs, smartphones, or tablets. An energy optimum control feature detects



unnecessary energy consumption and visualizes it in a leaf symbol. If energy consumption is too high, the leaf symbol turns red. Simply by pushing the red symbol, the occupant can return room control to its energy-optimized setpoints, allowing the room to save energy and costs easily.

new enterprise or tenant demands difficult because groups of existing spaces generally are zoned together.

"When you have a single room per zone, whether it be lighting or HVAC, it's much easier to reconfigure," says Cardoso. "If you want to move that room or rededicate it to something else, you're dealing with a single zone servicing that space, instead of affecting other spaces that may not need physical reconfiguration."

Overall, Cardoso sees many efficiencies with a well-integrated room automation system, particularly when office spaces and conference rooms are unoccupied. "You may have someone on a business development trip, who's gone for four days with his door closed." In that scenario, the room's lights can remain off, the HVAC go back to its unoccupied setpoint temperature, and shading can continue operating to make sure the room does not become overheated by direct sunlight. "I can see a number of efficiencies that can be gained from controlling all three," notes Cardoso.

A single-system approach brings another major benefit to building owners. "The advantage of a single source is support of the system," Cardoso says. "You get the support that you need for the life of the system. And you're buying a system that's also been tested and designed in a certain way."

What's more, the building owner only has one service contract to cover controls for all three systems. Those savings, by one owner's estimate, were in the range of 35 percent to 40 percent.

Total Room Automation

A single system and infrastructure that controls HVAC, lights, and shades meets the needs of architects, contractors, consultants, and building owners. There are two options for achieving that goal: custom integration or a single product that offers prepackaged control of all three systems. Desigo Total Room Automation from Siemens provides control of HVAC, lighting, and shades in one product.

Desigo Total Room Automation consists of programmable and configurable room controllers, sensors, and actuators that can be seamlessly incorporated into the Desigo CC building management platform. The integration of data makes it easier to manage the three systems from a central



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location. For example, room data is displayed graphically in the Desigo CC user interface.

Total Room Automation components include various room controllers. The Desigo DXR is a compact room controller with preprogrammed standard applications, making it easy to install and commission. For more complex building infrastructures, the Desigo DXR room controller allows programming of the three systems applications to meet any customer needs.



The benefits of having a single system to control HVAC, lighting, and shading extends to many types of buildings, including hospitals, where patient satisfaction is crucially important.

Desigo Total Room Automation features demand-driven control of HVAC and automatic adjustment of blinds, based on the angle of the sun considering different sun positions during the course of the year. Occupancy- and brightness-sensing light controls ensure that the amount of light available at each workplace remains constant throughout the day.

[Click here for more information about Siemens Desigo Total Room Automation.](#)

For the building owner, Total Room Automation offers the benefit of easier control system management throughout the life of the building, since Siemens can bring its extensive service capabilities and partners to handle any issues that arise.

Field Integration Opens Door to Problems

In the past, the only option for getting the HVAC, lighting, and shading systems to work together has been custom integration. But that's far more complex for consultants than being able to specify a single infrastructure and system. "Not all systems will communicate or integrate with one another, depending on the manufacturer," Kerns says. Speaking about the building controls industry generally, Antonsen says: "Interoperability and the ability for [different

vendors'] HVAC, lighting, and shading controls to work together is getting really close. But it's not streamlined or efficient."

When disparate controls systems are integrated, the results are often disappointing. Field engineered integration may not result in true value for the commercial building owner. "I know of integrated systems that were installed where the integration was disabled after three months," Antonsen points out.

Building owners are wading into unknown waters with custom integration. "To try to cobble together different systems from different manufacturers, you're looking at creating a proprietary interface between all systems," Cardoso says. "That means you own the functioning of that system."

There are long-term issues to weigh as well. When different building systems use unique systems-based controls, they often are not compatible with upgrades down the road. "Also, as time goes by, newer or revised systems may enter the market and no longer support the other systems already in place," Kerns says. He also notes that a single system means that building operators have fewer systems to learn and therefore fewer things to remember. "This will lead to fewer mistakes while performing their work," he says.

Antonsen says any integration solution should be evaluated based "on the ease of making future changes to it." Integrative solutions that use an international standard like BACnet and a common dashboard "can offer great long-range value."

Total Room Automation avoids problems associated with custom integration. Control of HVAC, lighting, and shading is integral to Total Room Automation, so no field integration is needed to provide common control for all three systems. What's more, building owners aren't locked into a proprietary lighting or shading control system. Total Room Automation is BACnet-based and uses the global KNX standard for light and shade controls with more than 400 KNX controls manufacturers world-wide, so that both building owners and consultants have a choice of third-party vendors.

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