

University of Minnesota Jones Hall

PROJECT BACKGROUND

The University of Minnesota wanted to decrease energy costs in Jones Hall, one of their mixed-use buildings on campus with a combination of offices, classrooms, and public space. The building is a historic component of the campus, hosting many functions over the years, and is currently home to the University's Admissions, Language Center, and College of Liberal Arts classrooms. The building had fallen behind in some of the University's aggressive sustainability initiatives and needed new lighting and controls.

The Integrated Controls pilot program, co-funded by Xcel Energy and the US Department of Energy (DOE), could deliver the deeper, more holistic energy retrofit

PROJECT DETAILS

Location

27 Pleasant St. SE,
Minneapolis, MN 55455

Building size

25,000 sq. ft.

Building /sector type

Administrative office building (office, classroom, computer lab, lounges)

HVAC unit type

One single duct, variable air volume (VAV) AHU serving several zones. Most are hot water reheat boxes. Served by district steam and chilled water.

BAS system type

Johnson Controls METASYS system, with controls technicians at the University making the improvements

Occupancy description

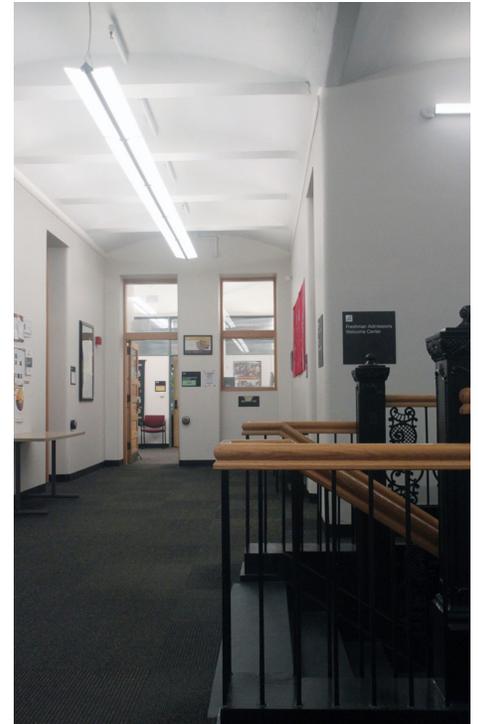
95 occupants, 6 a.m.–9 p.m., Monday–Friday, variable Saturday usage

Incentives

DOE incentive: \$35,000
Xcel incentive: \$16,100

PROJECT PARTNERS





The new suspended linear lighting not only provides energy savings, but significant improvement in lighting quality with direct/indirect, task tunable fixtures.

they were looking for. It included a complete lighting retrofit with a luminaire-level lighting controls system, wireless outlet controls, and a tie from the lighting controls to the HVAC building automation system. This took advantage of the highly variable occupancy in the higher education building.

PROJECT SUMMARY

The University chose to retrofit the entirety of Jones Hall, which is approximately 25,000 square feet. The pilot provided a packaged solution for complete retrofit of the building, including site survey, design, and selection of the systems, and some financial assistance with materials and labor. The University managed the lighting and controls hardware retrofit, the majority of which took about 8 weeks (with a number of follow-up items taking a while longer).

The backbone of the new hardware was a luminaire-level lighting control system provided by Cree—their SmartCast

platform. This system incorporates dimming control, photosensing, and occupancy sensing all onboard each individual fixture. The existing fixtures were replaced with SmartCast on a one-for-one basis. Sensors communicate wirelessly with each other to create a flexible, granular mesh network of sensing throughout the building from just replacing the fixtures themselves. This network is accurate enough to be used for individual outlet control, HVAC zone control, and of course lighting control. In addition to the new lighting fixtures and onboard controls, the other hardware component installed were the wirelessly-controlled outlets.

The project was not complete once this hardware was installed. Commissioning of the controls was an important step:

- The lighting and plug load controls were commissioned by the vendor, Cree, as a service included with the purchase of the fixtures.
- New HVAC sequences were implemented by the building's designated controls contractor that took advantage of the occupancy data from the lighting network. These sequences were programmed by University energy management staff.
- Building operators and occupants were trained on use of the lighting controls and outlet controls.

ENERGY SAVING CONTROL STRATEGIES

- SmartCast lighting and all its associated energy-saving controls and features
- Plug load controls in office spaces
- Plug load controls on common area equipment like printers and chargers
- Thermostat setback based on occupancy
- VAV box shut off based on occupancy
- SAT reset
- Demand control ventilation

LESSONS LEARNED

The concept of integrating controls across systems is relatively new, and lessons were learned along the way:

- The lighting control implementation and commissioning of the lighting was made fairly simple for the owner and their contractor due to Cree's assistance, but it did take significant time and multiple separate trips.
- The integration with HVAC was not yet plug and play. Cree learned several lessons about configuring their system to communicate readily with the HVAC system. And once integration is complete, alarms should be set to ensure that it remains functional; lighting systems will not alarm if that connection goes down.
- Some wall controls required a neutral wire to be fed to power the device. This took some time.
- IT staff should be involved early to ensure the controls system has a path to connect to the internet. Initial implementation was attempted without this connection, which led to challenges.
- Mapping control points between lighting and HVAC involves coordination between multiple parties; the lighting and HVAC zones should be planned in advance.
- In order to tune light levels, just enough high-end trim was implemented for the task in each space. This was initially planned using photometric calculations but the commissioning agent did need to make some adjustments in the first weeks following installation based on occupant feedback.
- Occupants do need to be informed of both the purpose of the lighting controls and how they operate. Outlet controls especially need to be communicated clearly. In the future color-coded outlets would be an improvement.
- Plan on training someone on the building owner's staff as commissioning is taking place so they have someone local who knows how to make any necessary adjustments.

PAYBACK INFORMATION

The impacts table describes the savings, cost, and resulting payback for this project. Electricity savings for lighting are shown as measured at the site.



The atrium area, served by wall mounted fixtures with supplemental control modules.

IMPACTS	
Lighting savings	0.9 kWh/sq. ft.
Plug load savings	N/A
HVAC savings	2.8 kWh/sq. ft. 0.06 therms/sq. ft.
Total cost savings	\$0.45/sq. ft.
Cost (after incentives)	\$4.81/sq. ft.
Payback	10.6 years
Payback, mature product*	10.2 years

*Based on system costs in more mature markets, and excluding plug load controls.

FOR MORE INFORMATION

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