PRINCIPIA COLLEGE

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Ameren Illinois' Innovation Award Application
"New Technology" Category

McVay Center for the Performing Arts
Principia College

Overview

Many buildings on the Principia College campus are designated historical landmarks. The "new" *McVay Center for the Performing Arts* is no exception. Designed by renowned architect Bernard Maybeck and built in the mid-1930s, the McVay Center was originally the gymnasium for the college. However, because the building lacked adequate ventilation and air conditioning, it eventually became so outdated that it was mostly unusable to the college and it was replaced by two more modern athletic facilities. While our Athletics Department no longer had a use for this historic landmark, our growing Performing Arts Department expressed a desire for a contemporary performance space. To transform this beautiful and historic gymnasium would require innovation and a state-of-the-art electrical and HVAC system.

Multi-functional Spaces

In addition to acting as the college's new performance space, McVay will house a dance studio and additional theater classroom spaces. It is not very energy efficient to maintain a space that is only used on occasion; therefore, it was decided to make the spaces multi-functional. For example, the lobby will double as a dance studio and the stage will serve as a classroom for acting and stage craft. This decision aimed to boost efficiency by reducing the overall footprint of the building, and avoiding the need to condition large unoccupied spaces.

Lighting

Lighting in the new space is 100% LED, including the new stage lights. The lighting system is powered via a distributed low voltage system (DLV). The stage and house lights are controlled through the DMX system. However, several day-to-day scenes have been programed for the lobby and stage areas when they are being used as classrooms. Should any of these spaces ever be used in new way, a new scene could easily be programed specifically for such use. The added benefit of the DLV LED system is that it is far more energy efficient that conventional lighting systems and allows one system to be multi-functional.

HVAC

Prior to the renovation, the building only had a radiant heat system. The challenge was to install a ventilation system and air handlers while preserving the historical appeal of the original edifice. To accomplish this, ductwork was installed underground, air handlers for the lobby and auditorium were installed under the auditorium seating, and the building was tied into the college's hydronic heat pump system.

The building utilizes a combination of demand control ventilation (DCV), variable air volume (VAV) boxes with hydronic reheat, fan coil units (FCU), and mini-split air conditioners. The mini-splits are used only in areas that require year-round cooling, such as the server closet and tech booths. This allows for the large chillers to be shut down in the winter months.

VAVs have been installed in all regularly occupied spaces. For the most part these spaces are used during the academic semesters, which are primarily the spring, fall and winter months. And since it is the practice of the college to turn off the boilers in the summer and the chillers in the winter, there is never any simultaneous heating and cooling.

FCUs have been installed in areas that are rarely occupied, such as storage units and backstage areas. This allows for temperature in these areas to be scaled back, allowing the DCV to maintain needed air changes and humidity control.

The primary air handlers are equipped with economizers so that the building can take advantage of the outside air when it meets the proper conditions for heating and cooling. Economizers also allow for precooling the high mass building overnight when the air is cool, reducing the cooling load during a hot day. This saves energy and reduces peak demand.

Other Considerations

Since there are two large air handling units (AHU) and ventilation systems located under the auditorium seating, extra attention was paid to ensure that the HVAC system operated quietly. This was done by placing the AHUs all of the way towards the back and building a sound proof enclosure around them. The duct work for the auditorium is then completely under the seating area and the air is pushed out through large perforated ducts where it moves out through holes in the risers. This design practically eliminates the noise created by pushing air though a diffuser. The returns are located at the top of the seating riser and pull air up along the seating area and back down into the AHU. To further ensure the quiet operation of this innovative system, ultra-quiet fans and motors were used.

Building Envelope

The walls of this building are solid concrete and were poured in place. Additionally, due to the building's historic designation, there was little that could be done to improve the envelope and not change the look/design of the building. However, the large steel framed windows were rehabbed and double-glazed panes were inserted to replace the original single pane windows.

Conclusion

Using the latest technology, Principia College worked with McClure Engineering, Wegman Electric, and other talented contractors to transform a building that had been vacant for many years into a modern, multi-functional performing arts center. This is a great model of building reuse and repurpose. As the U.S. Green Building Council states, “Extending the life cycle of existing building stock, conserves resources, reduces waste and reduces the environmental impacts of new buildings as they relate to materials manufacturing and transport.” In extending the life of this existing historic building, we have used the latest technology to make the building more energy efficient, comfortable, and functional – ensuring its usefulness for many decades to come.