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Innovation through Technology

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— Richard Rice

Building Gold

In 2008, RIT dedicated the newest building on campus that houses the College of Applied Science and Technology (CAST). A department since 1972, CAST is committed to preparing students to be innovative, technologically advanced, and entrepreneurial. The new building provides a location to foster those ideals while bringing differing technologies together.

The CAST building has nearly 43,000 square feet of laboratory, classroom, office and common space. M/E Engineering was the local engineering firm providing the mechanical, electrical, plumbing and fire protection design. Founded in Rochester in 1991, M/E Engineering is now ranked #30 in the United States by Building Design and Construction for both 2007 and 2008. Sustainable and innovative design is incorporated in all of M/E's designs. For the CAST building, M/E Engineering and the local architectural firm of SWBR worked closely with RIT to maximize the use of sustainable components. This effort resulted in a Gold certification by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) green building rating system for new construction. RIT's CAST Building was the second LEED Gold building on a NY State campus.

The Early Light

From its beginning in 1885 as Mechanics Institute, the CAST ideals of innovation through technology has been a firmly pursued principle. The very first class of the newly formed Mechanics Institute was mechanical drawing. Gas lights and day lighting provided illumination for lessons in mechanical drawing. As daylight waned, the gas lights were brought on; a practical use of daylight, but expensive and inefficient gas lights gave marginal light as a substitute.

Innovative Light

M/E reduced the overall building lighting power to a level that bettered ASHRAE 90.1 light power density overall by 10%. The building luminaires are controlled utilizing a combination of inboard/outboard switching, ceiling/wall mounted occupancy sensors and ceiling-mounted light sensory photocells. The switching allows building users to select the right amount of illumination for the application. The photocells were utilized in perimeter spaces to take advantage of the natural daylight provided from the building exterior shell that consists of nearly 50% glass.

The laboratories were designed with 75 foot candles of maintained illumination at the benchtop. Photocell control keeps luminaires off whenever natural light meets or exceeds the preset minimum illumination requirements.

Creative Light

M/E Engineering's efforts to achieve LEED Gold are a modern reflection of practices from the early 1900s. Built in 1901, the Technical Institute's Eastman Building had clerestories that provided substantial natural day lighting in the interior

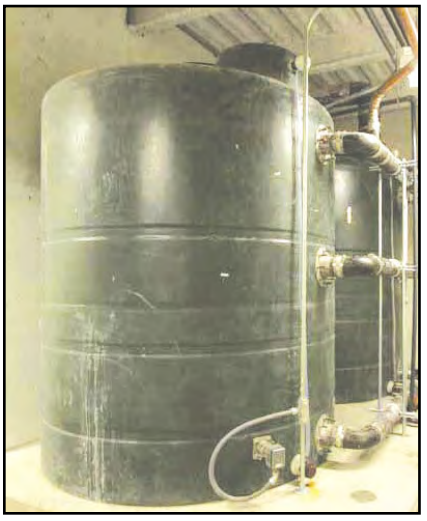
of the second floor. Maximizing natural light was critical since the electricity costs to supply artificial light in the burgeoning period of 1900-1920 was 100 times the relative cost for today's electricity.[1]

Water is Gold

Water savings are a high priority for RIT. M/E Engineering designed low flow plumbing fixtures and a rainwater storage system with two (2) 1500 gallon cisterns. These cisterns capture roof rainwater runoff and reuse it for non-potable (toilet/urinal) use and for plantings. The water savings associated with these efforts amounts to over 70% (or over 44,000 gallons) of the annual water use in a code compliant building. The rain storage also reduced the amount of water shed to the surrounding site. A new retention pond further mitigated site runoff, thus keeping this site a minimal impact for natural wastewater.

Breathe Clean - For People Only

Today's technology enables monitoring of Carbon Dioxide (CO_2) in building spaces, which then provides feedback to reduce or increase the quantity of air delivered thereby tailoring to the space need. This reduces the building energy usage and also provides improved ventilation when needed. The monitoring significantly reduces the overall ventilation requirements during low occupancy and assures proper ventilation during heavily occupied times by introducing air at 1.3 times the ASHRAE minimum standards. A very healthy building that now serves as home for 25% of RIT's enrolled student population.



Institutions have historically run their laboratory and general exhaust systems 24 hours, 7 days per week. Student use during non-classroom time is erratic, and concerns about safety trumped any attempt at energy savings. M/E Engineering designed system control sequences that utilize occupancy sensors to reduce exhaust and supply air to a minimum set-point during low or no use periods. This provides the recommended amount of air flow during the occupied periods satisfying health and safety concerns. No time clock or classroom scheduler program is required and the savings are significant. Each CFM of exhaust air from such a system (that runs 24/7) would cost RIT over $8.00 annually for electrical, heating and cooling costs.

Energy modeling shows that the CAST building is 21% more efficient than an ASHRAE 90.1 compliant building. This was achieved using the efficient lighting, increased mechanical controls and utilizing the campus energy efficient heating and cooling central systems. The energy savings do not include the solar electrical energy generated by a photovoltaic system that was added to the building after its occupancy. An important component to the building energy savings is that the building systems were commissioned after installation to ensure that they will operate as designed.

During the construction of the building over 60% of the construction debris was diverted from a landfill due to recycling and reuse. The university also initiated a campus wide recycling program. Over 20% of the building materials used for the CAST building were manufactured from recycled materials. All of these efforts reduce the amount of material added to the local landfills and reduces energy usage by reusing raw materials where possible.

The initial costs for this LEED Gold Building will be returned in a 5 year payback. The ability to teach environmental stewardship in classrooms and labs in a building example is the pinnacle of educational instruction. Teaching and learning to be innovative, technologically advanced and entrepreneurial is RIT and is the new Gold CAST Building.

Note: CAST received 41 points to achieve Gold status.

(Footnotes)
[1] Fouquet & Pearson (2006) Energy Journal, Vol. 27(1)

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Historical pictures - courtesy RIT Archive Collections