

Research & Development Profiles

February 2006



Study Shows Impact of Lighting Controls in School Gym

Lester Park Elementary in Duluth has a small gymnasium that is used for physical education classes, school activities and community events. For years, maintenance staff arrived early each morning,



Duluth Schools Master Electrician Gene Salmi programs the gym lights at Lester Park Elementary.

flicked on the high pressure sodium lights, and left them burning until late at night, regardless of whether the gym was in use.

That changed recently when Duluth Schools Master Electrician Gene Salmi had a brilliant idea—to retrofit the gymnasium with energy-efficient fluorescent lights and install a lighting control system with programmable timers and

occupancy sensors. He was proposing a similar system to improve the quality and energy efficiency of gym lighting at Duluth Central High School, and Lester Park was a good site to test the approach on a smaller scale before committing to a wholesale retrofit at the high school.

“Gene is always looking for ways to conserve energy,” said Duluth Schools Facilities Manager Dave Spooner. “He researched lighting and programming technology and came up with a great system that needed to be tested.”

Salmi began the process at Lester Park by replacing overhead sodium fixtures with eight high-bay T-5 fluorescent fixtures. The energy-efficient fluorescents offer brighter and whiter light at lower wattage, more even distribution, instant-on capabilities, and less lumen depreciation over time—important performance considerations for a school gym. He then mounted two four-foot, T-8 fluorescent fixtures on the wall for pass-through lighting.



New high-bay fluorescent fixtures and lighting controls cut the electrical costs of lighting the Lester Park gym by 70%, from \$524 to \$156 per year.

Occupancy sensors trigger their use if someone enters the gym when the main lights are not on. Both the overhead and pass-through lights are linked to a control system that allows school officials to program their use around scheduled events. All of the gym lights turn off automatically if no one is in the room.

Knowing that Minnesota Power often assists customers with conservation projects, school officials approached the utility. The timing was perfect. Minnesota Power was looking for a school site to test the impacts of lighting controls. It awarded Duluth Schools a \$2,215 Research Grant to fully fund the new lights and control system.

For two weeks in September 2005, Minnesota Power monitored the gym's electrical control panel to measure the times and amount of energy drawn to power the main lights, as well as the new pass-through lighting. The first week, overhead lights remained on all day,

R&D Contact Information

For more information, please call Minnesota Power's Conservation Improvement Program toll-free at 800-228-4966 ext. 2902.

"Energizing Our Region" through Conservation Improvement

Minnesota Power's Conservation Improvement Program (CIP) works with local leaders, businesses, community groups, other energy providers and government entities to help customers reap the economic and environmental benefits of sustainable energy savings. Minnesota Power and its partners accomplish this through research and development (R&D), education, evaluation and direct impact initiatives.

Research and Development

Minnesota Power collaborates with manufacturers, distributors, customers and community groups to identify R&D projects that solve problems, optimize existing ecosystems or business operations and support the mission of participating organizations.

Project allocations are determined using many criteria. These include the level of innovation in the technology, process or application; commitment of resources from other public and private partners; ability to solve current and future customer and market challenges; energy savings and environmental benefits; project feasibility; and impact on Minnesota Power and its system.

Technologies and processes that may qualify for R&D support include:

- Renewable energy technologies
- Process improvements
- Lighting/controls
- Motors/controls
- Energy management systems
- Refrigeration systems
- HVAC systems
- Market assessment: segment and target market profile
- Pilot studies

Other Minnesota Power Products and Services

In addition to research and development support, MP CIP offers commercial and industrial customers other energy efficiency products and services. These include energy audits, PowerGrant rebates, dual fuel, storage/off-peak services, outdoor and area lighting and economic development assistance.



Gymnasium lighting improvements at Duluth Central High School model those tested at Lester Park and are expected to yield substantial energy and cost savings.

Controls cut lighting use by 7.4 hours per day...

much like they have in the past. During the second week, they were programmed to actual times when the gym was in use, and the pass-through lighting was utilized as needed. The difference was used to calculate savings. Results were profound. Operational hours for the main gym lights were reduced 57% from 13 to 5.6 hours per day using the timers. Pass-through lights burned an average of one-half hour per day at little or no annual cost. The lighting controls alone will reduce energy consumption by 2,982 kWh per year, resulting in an annual cost savings of \$138. When you factor in both the new lights and the new controls, the total electrical cost to light the gym went from an estimated \$524 to an estimated \$156 per year—a 70% reduction! The energy and demand savings qualified the project for a \$466

PowerGrant rebate from Minnesota Power.

“This project gave us a blueprint for gym lighting improvements that will be useful as we evaluate different buildings for energy savings,” Salmi said. It already has served as the model for Central High School lighting upgrades, which are getting rave reviews from students, teachers, teams, coaches and spectators.

“School district dollars are stretched pretty thin,” said Spooner. “Minnesota Power’s support gave us freedom to explore conservation technologies that will save energy and money in the long run.”

The lessons learned at Lester Park Elementary will stretch beyond Duluth Schools, helping Minnesota Power teach other school systems the value of energy efficiency.