



Smart Energy Design Assistance Center

SEDAC CASE STUDY 06-1, November 2006

PERCEPTIVE VISIONS

Main Street, Mahomet, Illinois 61853

www.perceptivevisions.com

About SEDAC

The Smart Energy Design Assistance Center (SEDAC) provides advice and analyses, enabling small businesses in the State of Illinois to increase their profitability through the efficient use of energy resources.

SEDAC is sponsored by the Illinois Department of Commerce and Economic Opportunity's *Small Business Smart Energy Program (SB\$E)* and provides its valuable services at no cost to small businesses. SEDAC is managed by the University of Illinois at Urbana-Champaign in partnership with the Geothermal Heat Pump Consortium.

Building Data

Location: Mahomet, Illinois
IL Economic Region: East Central
Total Space: 2,200 sf
Total Additional Cost: \$44,802
Annual Energy Cost Savings: \$3,357
Annual kWh Savings: 7,753
Annual Therms Savings: 2,592

ECRM Summary

- Insulation
- Windows
- Geothermal Heat Pump
- HVAC zoning
- Air sealing

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Photo: Jason Lindsey

In late 2005, photographer Jason Lindsey relocated the operations of his small business, Perceptive Visions, into a 2,200 square foot, solid brick building located on Main Street in Mahomet, Illinois. The building space is divided into three rooms: a storefront that is rented out for retail use, and two additional areas that serve as the office, studio, and gallery for Perceptive Visions' photography operations

and exhibitions. The photographs are used around the world by advertising, corporate, and editorial clients. Jason shoots in locations from the Ice Hotel in Sweden to the Manhattan Bridge in New York, and from glaciers in Alaska to farm fields in the Midwest.

Constructed near the turn of the century, the building has an unvented earthen crawlspace and an uninsulated attic. In addition, the remainder of the building envelope had no insulation and loosely fit, single-pane windows. The building used an inefficient and dilapidated natural gas furnace and electric air conditioner to heat and cool the building. Finally, the building was lit with T12 fluorescent and halogen lamps. In late 2005, shortly after purchasing and moving into the building, the owner began to make repairs. At that time, Perceptive Visions asked the Smart Energy Design Assistance Center (SEDAC) to complete an energy audit to identify energy-efficient improvements to help upgrade the facility.

The Analysis and Findings

In November 2005, SEDAC staff met with Jason Lindsey to discuss and assess the existing building systems in the Mahomet facility. During the visit, SEDAC staff completed an energy and cost analysis and recommended the following Energy Cost Reduction Measures (ECRMs):

- Installing insulation in the walls, from the ground level to the ceiling, and on the attic floor.
- Upgrading windows (single-pane) to low-e, double-pane windows.
- Upgrading lighting in the front retail space with T8 electronic ballast fixtures and compact fluorescent lights.
- Installing a geothermal heat pump system or an efficient HVAC system to replace the existing furnace, air conditioner, and hot-water heater.
- Using zoned HVAC and thermostat settings to maintain different room temperatures in different building spaces. (When occupied, it is recommended that the thermostat be set for 70° F in the winter and 76° F in the summer. When unoccupied, it is recommended that the thermostat be set for 62° F in the winter and 84° F in the summer.)
- Reducing sources of infiltration by caulking, weatherstripping, and installing vapor barriers to reduce air and moisture infiltration through the windows, doors, and ceiling/wall joints.

Implementation



Perceptive Visions building from the rear

Perceptive Visions installed a five-ton vertical loop geothermal heat pump system for an investment of \$23,000; improved the building envelope by adding insulation to the walls and attic; replaced the single-pane windows with double-pane windows; weatherized the building by reducing air leaks by sealing cracks/gaps; and zoned the HVAC and thermostat settings. The system uses vertical loop field design due to space constraints on the site. “Perceptive Visions Photography decided to use georexchange technology to reduce our impact on the environment,” said photographer and owner, Jason Lindsey. “We were thrilled to discover that investing in this technology was a smart business decision as well. We had a good year financially in 2005, so we decided to reinvest into our business. This investment will reduce our operating costs for the next 20 years.”

For the wall insulation, Jason installed polyisocyanurate rigid 1-inch panels with an R-7 insulation value, applied against the interior plaster. A taped foil face was added to prevent moisture problems.

For the attic insulation, SEDAC recommended that the attic floor be insulated to R-30, potentially with 9.25” of fiberglass batt insulation or 9” of cellulose, and that the attic hatch be insulated with rigid insulation on the attic side of the door, and weather stripping around the edges. To prevent moisture damage to the roof, SEDAC recommended an air tight drywall approach rather than a suspended ceiling. Perceptive Visions implemented all of these recommendations.



existing window example



crawl space before retrofit

They replaced the single pane windows with low-e, well-sealed, double pane, non-metallic sashed windows having a U-value less than 0.4. Also installed was a thick and sturdy, high-density, cross-laminated polyethylene vapor barrier over the earthen floor of the crawlspace.

In addition to the energy efficiency upgrades to the building, Perceptive Visions remodeled its interior space using the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) Green Building Rating System® as a guideline. In accordance with a number of the LEED green building principles to reduce the environmental and human health impact of their building, Perceptive Visions used a paint that does not contain any volatile organic compounds (VOC) for the walls and ceilings. Jason also used a citrus-based product to strip the floors and then water-based, low-VOC clear coat to seal the wood floors and trim.



Perceptive Visions interior before retrofit

Reclaimed wood was used to repair areas of the existing wood floor and the wood studs and lumber from a torn out wall were recycled. Finally, he used an attic insulation product that was composed of 25 percent recycled glass and was free of formaldehyde.

At the project start, Jason was already in the process of implementing the majority of the lighting retrofits. The lighting system upgrades were completed using high-efficient T8 lamps and compact fluorescent lamps (CFLs). SEDAC estimates that the new lighting and other energy investments in efficiency will reduce the annual energy bill by more than \$3,000 (over 50%) and will result in savings for years to come.