

COMBINING
ENERGY EFFICIENCY
AND QUALITY DESIGN

SINAUER ASSOCIATES PUBLISHERS

A *knowhow*[™] CASE STUDY

demonstrating lighting



When employees of Sinauer Associates, a Sunderland Massachusetts publisher, moved into their new office addition in November 1999, they felt right at home. Warm T8 indirect lighting driven by electronic ballasts provided an open and airy atmosphere that complemented the abundance of windows. The completely up-to-date lighting system matches perfectly with the lighting chosen by Sinauer and its architect for the original construction 8 years ago. At only 1.3 watts per square foot, this energy-efficient lighting solution complies with the latest state energy codes, which are far more restrictive than those in place when the project was built. Flexible switching exploits the plentiful day lighting and saves further energy.

Even 8 years ago, Sinauer managers realized the importance of employee comfort, satisfaction, and productivity when running a business. Providing an adequate quantity of light is not enough. Good color, uniformity, and balanced brightness relationships contribute to long-term work performance. Shadows, glare, flicker, or chaotic patterns of light can distract employees and should be strictly avoided. All these strategies come together in a system that minimizes energy and maintenance costs.

Western Massachusetts Electric Company (WMECO) worked with Architect Lynn Posner Rice (who designed the original structure) to implement the installation. The predominant fixture type is an oval linear indirect fluorescent fixture that creates soft, uniform lighting. The fixtures themselves present a clean, modern appearance, enhancing the interior design of the space. T8 triphosphor lamps render colors in the space very well. Finally, the electronic ballasts reduce power consumption and contribute toward energy efficiency.



BACKGROUND

Sinauer Associates publishes scientific textbooks on a variety of topics from aging to vision to microbiology. Their 6,000 square foot office building looks more like an oversized residence. The single-story, sloped-roof building is nestled in a residential neighborhood on the edge of a maple grove. Inside, however, lies a highly efficient, modern, high-tech office. The existing lighting comprises rounded, indirect-only pendants, and management requested the same lighting for the planned addition.

The 3,200 square foot addition creates an enclosed courtyard and was designed so that all offices have windows and ample daylighting. Each employee selected the furnishings of his or her office, tailoring the workspace to specific tasks and tastes.

LIGHTING QUALITY

The *Office Lighting knowhow*[™] Series guide, published by the DesignLights[™] Consortium, describes "energy effective" lighting strategies and technologies that save energy while creating a comfortable and productive work environment. Office lighting should be relatively uniform, avoiding hot spots on the ceiling and shadows on work surfaces. Lighting the walls and ceiling reduces contrasts and glare, which can affect employee performance.

The indirect lighting at Sinauer meets all these requirements. Power consumption falls well

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below standards in place during construction. Lighting Power Density also meets the more stringent ASHRAE/IESNA Standard 90.1 on which the current state energy code is based. In addition, two-level switching permits greater flexibility and control.

QUALITY LIGHTING SOLUTION

The 9-foot high ceilings nicely permit the use of indirect lighting throughout the building. Three-lamp rounded pendants are installed in offices, in 8-foot and 12-foot fixture lengths. These extruded aluminum fixtures contain T8 lamps furnished in a warm 3500K color temperature and a good color rendering index of 75.

The fixtures were suspended 18 inches below the ceiling (to the center of the fixture), using clean-looking aircraft cable. This distance pro-

vides for good uniformity of illumination across the ceiling plane, which prevents glare on computer screens. The overall appearance closely matches the original 1993 construction.

Selective switching of lamps within fixtures allows for multiple illumination levels, saving energy when less light is needed and catering to individual preferences. Most offices have the ability to separately switch each half (3 lamps) of the six lamps within an 8-foot fixture. Occupants choose from half illumination or full. Some offices have controls arranged to allow 1/3, 2/3, or full-on. Careful wiring of ballasts permits illumination of just the center lamp or the two outer lamps or all three.

This allows employees to take advantage of the ample amounts of daylighting available, switching off lights in their offices in accordance with available daylight and the task at hand.

QUALITY INDICATORS

RATING

ACCEPTABLE GOOD EXCELLENT

QUALITY INDICATORS	ACCEPTABLE	GOOD	EXCELLENT
Control of Direct and Reflected Glare			✓
Light on Walls and Ceilings			✓
Fixture Location Related to People			✓
Light Patterns and Uniformity		✓	
Daylighting Integration		✓	
Color Rendering and Color Temperature		✓	
Lighting Controls and Flexibility			✓
Quantity of Light on Horizontal Surfaces (fc)		✓	

IMPRESSIONS

Dean Scudder, Vice President, claims that Sinauer management, having become accustomed to indirect lighting, never considered a direct lighting solution—even high-quality parabolics—for the new addition. “The indirect lighting produces a very soft light but there’s enough of it. It’s very good for office work and not overpowering or harsh at all. It gives us everything we need,” he said. “The fixtures themselves are quite attractive, yet unobtrusive.”

Scudder expressed pride in the facility, and in the way the lighting contributes to the overall



ambiance. “We have a really nice place to work here. It’s more traditional than upscale, but it’s very clean and very, very efficient.”

Every office has outside exposure and, with the indirect lighting added, is consistently quite bright. “We can adjust the amount of light that we need to use and that’s energy efficient,” Scudder added. “If it’s a darker day and we need more light, we flip both switches.”

It’s unlikely, according to Scudder, that Sinauer will add on to the building again. “But I wouldn’t hesitate to say we’d use the indirect lighting again if we expanded.”

AND NOW THE NUMBERS

Extremely uniform illumination throughout the office averages 50 footcandles, which is ideal for

small offices. During the final design, the installation met the WMECO criteria for incentive support, and savings were calculated against a 1.5 watt per square foot baseline. Based on observations of lighting trends and changes in code-mandated practice, the utility now believes installations of 1.3 watts per square foot can be routinely and easily achieved. Additional savings will, of course, be realized as the occupants take advantage of the multi-level switching features of the installation.

This case study demonstrated to WMECO that, when compared to traditional commercial practice, high-quality lighting can be expensive, but increased levels of occupant satisfaction and lower energy costs are advantages that many customers find compelling. Many who have installed similar designs would not hesitate to replicate the solution in new facilities.



“It’s very soft lighting without any glare problems, and we have two switches in every office so we can adjust the illumination. I would recommend it to anybody.”

*Dean Scudder,
Vice President, Sinauer
Associates, Inc.*

Costs

Total fixtures and lamps	\$15,000
Total installation labor	\$2,500
Installed system cost	\$17,500
Materials per square foot	\$4.70
Installation labor per square foot	\$0.78
Total cost per square foot	\$5.48

SAVINGS

Demand reduction	0.6 KW
Watts saved per square foot	0.2 W/SF
Annual utility cost savings ¹	\$180

¹Based on 3,756 hours per year usage and local utility rate of \$0.075 per kilowatt-hour.

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PROJECT SUMMARY

- Utility:** Western Massachusetts Electric Company
- Utility Representative:** Alan Paton
- Customer:** Sinauer Associates, Inc.
- Facility:** Office addition
- Location:** Sunderland, Massachusetts
- Space:** Office
- Area:** 3,200 square feet
- Ceiling Height:** 9 feet
- Fixtures Used:** Peerless Envision indirect-only pendants with three OSRAM Sylvania 2950 lumen T8 lamps
- Mounting:** Suspended 18 inches from ceiling
- Light Levels Achieved:** 50 footcandles average
- Lighting Power Density:** 1.3 Watts per square foot
- Lighting Specifier:** Lynn Posner Rice, Architect
- Installing Contractor:** Marc Bussiere, Electrical Contractor

THE LIGHTING KNOWHOW™ SERIES

The DesignLights™ Consortium publishes the *knowhow™ Series* for office, small retail and classroom lighting. This *demonstrating lighting knowhow™ Case Study* highlights a specific installation of lighting that showcases quality, comfort and efficient use of energy. With members located throughout the Northeast, the DesignLights™ Consortium is “a regional collaboration seeking to influence naturally occurring lighting events towards quality, comfort and efficiency.” The DLC includes among its members many New England electric utilities as active participants, as well as several other interested stakeholders. The DLC created these case studies with the intention of helping contractors and lighting specialists sell and deliver the benefits of high quality, energy efficient lighting to their customers in the commercial building market.

National Grid

- Massachusetts Electric
- Narragansett Electric
- Granite State Electric
- Nantucket Electric

Northeast Energy Efficiency Partnerships, Inc.

New York State Energy Research and Development Authority

Northeast Utilities

- The Connecticut Light and Power Company
- Western Massachusetts Electric Company

NStar

- Boston Edison Company
- Commonwealth Electric Company
- Cambridge Electric Light Company

United Illuminating

Unitil

- Fitchburg Gas and Electric Light Company



Prepared by Weller & Michal Architects Inc. with WV Engineering Associates PA.
Technical writing by Lois I. Hutchinson. Photography by George Leisey. Graphic Design by Braden Printing, Inc.

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